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THERMAL STORAGE SYSTEM

PREOPERATIONAL TEST

PROCEDURE 205/250

REVISION 0

20 JULY 1981

UNITED STATES DEPARTMENT OF ENERGY/

SOUTHERN CALIFORNIA EDISON COMPANY

10 MWe SOLAR PILOT PLANT

DAGGETT, CALIFORNIA

PROJECT: C-21700

MCDONNELL DOUGLAS CORPORATION

HUNTINGTON BEACH, CALIFORNIA

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THERMAL STORAGE SYSTEM

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NOTE

This procedure addresses checkout and operation of TSS Instrumentation, Controls, Red Line Unit logic, Interlock Logic System logic, and Valve and Pump Operations. The Appendices to this procedure have End to End Checkouts of system transducers and components. The appendices are prerequisite tests to be accomplished prior to preoperational checks. Merely confirming that the prerequisite test has been accomplished satisfies many preoperational test requirements.

1.0 OBJECTIVES

1.01 Demonstrate prerequisite end-to-end checkout of all instrumentation, and operation of DARMS and SDPC.

1.1 Demonstrate RLU-201 trip and distribution logic.

1.2 Demonstrate RLU-201 alarm logic.

1.3 Demonstrate TSU ullage pressurization and purge system.

1.4 Demonstrate the logic of ILS-201 valve control circuits and control and monitor of these circuits from the operator console CRT and keyboard.

1.5 Demonstrate modulating valve circuit manual control and position indication from the operator's console CRT and keyboard.

1.6 Demonstrate charging and extraction oil pumps and flash tank drain pump operation, run permits, stops, and alarms.

2.0	ACCEPTANCE CRITERIA	VERIFICATION PARAGRAPH	OBJECTIVE
2.1	RLU-201 Trip SFDI Dwg. 40E7005133120	8.1	1.1
2.1.1	RLU-201 TSCH Trip starts DARMS high speed recording	8.1.1	1.1
2.1.2	RLU-201 TSEXT Trips starts DARMS high speed recording	8.1.2	1.1
2.1.3	RLU-201 TSCH Trip initiates plant trip logic signals	8.1.3	1.1
2.1.4	RLU-201 TSEXT Trip initiates plant trip logic signals	8.1.4	1.1
2.1.5	All receiver trip signals and trip parameters are tripped and latched in RLU-201 Per Rockwell International IL 140-0086	8.1.5	1.1
2.2	RLU-201 Alarms Per Rockwell International IL 140-0088	8.2	1.2
2.2.1	RLU-201 Thermocouple monitor for trips is alarmed if an "A" primary parameter is failed, and the secondary "B" parameter is monitored	8.2.1	1.2.
2.2.2	RLU-201 Pressure sensor monitor for trips is alarmed if an "A" primary parameter is failed, and the secondary "B" parameter is monitored	8.2.2	1.2.
2.3	TSU Ullage Pressurization and Purge System	8.3	1.3

		VERIFICATION PARAGRAPH	OBJECTIVE
2.3.1	UMU Alarm sounds if pilot pressure limits not normal.	8.3.1	1.3
2.3.2	UMU Alarm sounds if fume pressure limits not normal.	8.3.2	1.3
2.3.3	UMU Alarm sounds if UV detector fails to detect flame.	8.3.3	1.3
2.3.4	UMU thermal oxidizer control system operates properly in MANUAL mode.	8.3.4	1.3
2.3.5	Ullage pump operates properly from PS4010.	8.3.5 to 8.3.10	1.3
2.3.6	UMU thermal oxidizer control system operates properly from PS4011.	8.3.11 to 8.3.15	1.3
2.3.7	UMU N_2 system regulates properly.	8.3.16 to 8.3.21	1.3
2.4	Operator Valve Control and ILS Logic, Stearns-Roger Dwg. No. 9033/4	8.4	1.4
2.4.1	AOV-3011	8.4.1	1.4

		VERIFICATION PARAGRAPH	OBJECTIVE
2.4.1.1	AOV-3001 is open with power off	8.4.1.1	1.4
2.4.1.2	Valve AOV-3001 operates from TSS keyboard HS-3001	8.4.1.2	1.4
2.4.1.3	ZS-3001B indicates AOV-3001 open position	8.4.1.3	1.4
2.4.1.4	HS-3001 closes AOV-3001	8.4.1.4	1.4
2.4.1.5	ZS-3001A indicates closed position of AOV-3001	8.4.1.5	1.4
2.4.1.6	Trips open AOV-3001	8.4.1.6	1.4
2.4.2	AOV-3002	8.4.2	1.4
2.4.2.1	AOV-3002 is open with power off	8.4.2.1	1.4
2.4.2.2	Valve AOV-3002 operates from TSS keyboard HS-3002	8.4.2.2	1.4
2.4.2.3	ZS-3002B indicates open position of AOV-3002	8.4.2.3	1.4
2.4.2.4	HS-3002 closes AOV-3002	8.4.2.4	1.4
2.4.2.5	ZS-3002A indicates closed position of AOV-3002	8.4.2.5	1.4
2.4.2.6	Trips open AOV-3002	8.4.2.6	1.4
2.4.3	AOV-3003	8.4.3	1.4
2.4.3.1	AOV-3003 is open with power off	8.4.3.1	1.4
2.4.3.2	Valve AOV-3003 operates from TSS keyboard HS-3003	8.4.3.2	1.4
2.4.3.3	ZS-3003B indicates AOV-3003 is open	8.4.3.3	1.4
2.4.3.4	HS-3003 closes AOV-3003	8.4.3.4	1.4
2.4.3.5	ZS-3003A indicates closed position of AOV-3003	8.4.3.5	1.4

		VERIFICATION PARAGRAPH	OBJECTIVE
2.4.3.6	Trips open AOV-3003	8.4.3.6	1.4
2.4.4	AOV-3004	8.4.4	1.4
2.4.4.1	AOV-3004 is closed with power off	8.4.4.1	1.4
2.4.4.2	Valve AOV-3004 operates from TSS keyboard HS-3004	8.4.4.2	1.4
2.4.4.3	ZS-3004B indicates open position of valve AOV-3004	8.4.4.3	1.4
2.4.4.4	HS-3004 closes AOV-3004	8.4.4.4	1.4
2.4.4.5	ZS-3004A indicates AOV-3004 is closed	8.4.4.5	1.4
2.4.4.6	Trips close AOV-3004	8.4.4.6	1.4
2.4.5	AOV-3005	8.4.5	1.4
2.4.5.1	AOV-3005 is closed with power off	8.4.5.1	1.4
2.4.5.2	Valve AOV-3005 operates from TSS keyboard HS-3005	8.4.5.2	1.4
2.4.5.3	ZS-3005B indicates AOV-3005 is open	8.4.5.3	1.4
2.4.5.4	HS-3005 closes AOV-3005	8.4.5.4	1.4
2.4.5.5	ZS-3005A indicates AOV-3005 is closed	8.4.5.5	1.4
2.4.5.6	Trips close AOV-3005	8.4.5.6	1.4
2.4.6	LV-3116	8.4.6	1.4
2.4.6.1	LV-3116 is closed with power off	8.4.6.1	1.4
2.4.6.2	Valve LV-3116 operates from TSS keyboard HS-3116	8.4.6.2	1.4
2.4.6.3	ZS-3116B indicates LV-3116 is open	8.4.6.3	1.4

		VERIFICATION PARAGRAPH	OBJECTIVE
2.4.6.4	RLU-201 trip does not affect control of LV-3116	8.4.6.4	1.4
2.4.6.5	HS-3116 closes LV-3116	8.4.6.5	1.4
2.4.6.6	ZS-3116A indicates LV-3116 is closed	8.4.6.6	1.4
2.4.6.7	Additional functional of LV-3116	8.4.6.7	1.4
2.4.7	AOV-3117	8.4.7	1.4
2.4.7.1	AOV-3117 is closed with power off	8.4.7.1	1.4
2.4.7.2	Valve AOV-3117 operates from TSS keyboard HS-3117	8.4.7.2	1.4
2.4.7.3	ZS-3117B indicates AOV-3117 is open	8.4.7.3	1.4
2.4.7.4	HS-3117 closes AOV-3117	8.4.7.4	1.4
2.4.7.5	ZS-3117A indicates AOV-3117 is closed	8.4.7.5	1.4
2.4.7.6	Extraction trip opens AOV-3117	8.4.7.6	1.4
2.4.7.7	Additional functional of AOV-3117	8.4.7.7	1.4
2.4.8	AOV-3118	8.4.8	1.4
2.4.8.1	AOV-3118 is closed with power off	8.4.8.1	1.4
2.4.8.2	Valve AOV-3118 operates from TSS keyboard HS-3118	8.4.8.2	1.4
2.4.8.3	ZS-3118B indicates AOV-3118 is open	8.4.8.3	1.4
2.4.8.4	HS-3118 closes AOV-3118	8.4.8.4	1.4
2.4.8.5	ZS-3118A indicates AOV-3118 is closed	8.4.8.5	1.4
2.4.8.6	Extraction trip opens AOV-3118	8.4.8.6	1.4
2.4.8.7	Additional functional on AOV-3118	8.4.8.7	1.4

		VERIFICATION PARAGRAPH	OBJECTIVE
2.4.9	AOV-3206	8.4.9	1.4
2.4.9.1	AOV-3206 is closed with power off	8.4.9.1	1.4
2.4.9.2	Valve AOV-3206 operates from TSS keyboard HS-3206	8.4.9.2	1.4
2.4.9.3	ZS-3206B indicates AOV-3206 is open	8.4.9.3	1.4
2.4.9.4	RLU-201 trip does not affect control of AOV-3206	8.4.9.4	1.4
2.4.9.5	HS-3206 closes AOV-3206	8.4.9.5	1.4
2.4.9.6	ZS-3206A indicates AOV-3206 is closed	8.4.9.6	1.4
2.4.9.7	Additional functionals of AOV-3206	8.4.9.7	1.4
2.4.9.8	Repeat with HS-3206 in different group	8.4.9.8	1.4
2.4.10	SOV-3209	8.4.10	1.4
2.4.10.1	SOV-3209 is closed with power off	8.4.10.1	1.4
2.4.10.2	Valve SOV-3209 operates from TSS keyboard HS-3209	8.4.10.2	1.4
2.4.10.3	RLU-201 trip does not affect control of SOV-3209	8.4.10.3	1.4
2.4.10.4	HS-3209 closes SOV-3209	8.4.10.4	1.4
2.4.11	AOV-3218	8.4.11	1.4
2.4.11.1	AOV-3218 is open with power off	8.4.11.1	1.4
2.4.11.2	Valve AOV-3218 operates from TSS keyboard HS-3218	8.4.11.2	1.4
2.4.11.3	ZS-3218B indicates AOV-3218 is open	8.4.11.3	1.4
2.4.11.4	RLU-201 trip does not affect control of AOV-3218	8.4.11.4	1.4
2.4.11.5	HS-3218 closes AOV-3218	8.4.11.5	1.4
2.4.11.6	ZS-3218A indicates AOV-3218 is closed	8.4.11.6	1.4

		VERIFICATION PARAGRAPH	OBJECTIVE
2.4.12	AOV-3220	8.4.12	1.4
2.4.12.1	AOV-3220 is closed with power off	8.4.12.1	1.4
2.4.12.2	Valve AOV-3220 operates from TSS keyboard HS-3220	8.4.12.2	1.4
2.4.12.3	ZS-3220B indicates AOV-3220 is open	8.4.12.3	1.4
2.4.12.4	RLU-201 trip does not affect control of AOV-3220	8.4.12.4	1.4
2.4.12.5	HS-3220 closes AOV-3220	8.4.12.5	1.4
2.4.12.6	ZS-3220A indicates AOV-3220 is closed	8.4.12.6	1.4
2.4.13	AOV-3306	8.4.13	1.4
2.4.13.1	AOV-3306 is closed with power off	8.4.13.1	1.4
2.4.13.2	Valve AOV-3306 operates from TSS keyboard HS-3306	8.4.13.2	1.4
2.4.13.3	ZS-3306B indicates AOV-3306 is open	8.4.13.3	1.4
2.4.13.4	RLU-201 trip does not affect control of AOV-3306	8.4.13.4	1.4
2.4.13.5	HS-3306 closes AOV-3306	8.4.13.5	1.4
2.4.13.6	ZS-3306A indicates AOV-3306 is closed	8.4.13.6	1.4
2.4.13.7	Additional functionals of AOV-3306	8.4.13.7	1.4
2.4.13.8	Repeat with HS-3306 in different group	8.4.13.8	1.4
2.4.14	SOV-3309	8.4.14	1.4
2.4.14.1	SOV-3309 is closed with power off	8.4.14.1	1.4

		VERIFICATION PARAGRAPH	OBJECTIVE
2.4.14.2	Valve SOV-3309 operates from TSS keyboard HS-3309	8.4.14.2	1.4
2.4.14.3	RLU-201 trip does not affect control of SOV-3309	8.4.14.3	1.4
2.4.14.4	HS-3309 closes SOV-3309	8.4.14.4	1.4
2.4.15	AOV-3318	8.4.15	1.4
2.4.15.1	AOV-3318 is open with power off	8.4.15.1	1.4
2.4.15.2	Valve AOV-3318 operates from TSS keyboard HS-3318	8.4.15.2	1.4
2.4.15.3	ZS-3318B indicates AOV-3318 is open	8.4.15.3	1.4
2.4.15.4	RLU-201 trip does not affect control of AOV-3318	8.4.15.4	1.4
2.4.15.5	HS-3318 closes AOV-3318	8.4.15.5	1.4
2.4.15.6	ZS-3318A indicates AOV-3318 is closed	8.4.15.6	1.4
2.4.16	AOV-3320	8.4.16	1.4
2.4.16.1	AOV-3320 is closed with power off	8.4.16.1	1.4

		VERIFICATION PARAGRAPH	OBJECTIVE
2.4.16.2	Valve AOV-3320 operates from TSS keyboard HS-3320	8.4.16.2	1.4
2.4.16.3	ZS-3320B indicates AOV-3320 is open	8.4.16.3	1.4
2.4.16.4	RLU-201 trip does not affect control of AOV-3320	8.4.16.4	1.4
2.4.16.5	HS-3320 closes AOV-3320	8.4.16.5	1.4
2.4.16.6	ZS-3320A indicates AOV-3320 is closed	8.4.16.6	1.4
2.4.17	AOV-3707	8.4.17	1.4
2.4.17.1	AOV-3707 is open with power off	8.4.17.1	1.4
2.4.17.2	Valve AOV-3707 operates from TSS keyboard HS-3707	8.4.17.2	1.4
2.4.17.3	ZS-3707B indicates AOV-3707 is open	8.4.17.3	1.4
2.4.17.4	RLU-201 trip does not affect control of AOV-3707	8.4.17.4	1.4
2.4.17.5	HS-3707 closes AOV-3707	8.4.17.5	1.4
2.4.17.6	ZS-3707A indicates AOV-3707 is closed	8.4.17.6	1.4
2.4.18	AOV-3708	8.4.18	1.4
2.4.18.1	AOV-3708 is closed with power off	8.4.18.1	1.4
2.4.18.2	Valve AOV-3708 operates from TSS keyboard HS-3708	8.4.18.2	1.4
2.4.18.3	ZS-3708B indicates AOV-3708 is open	8.4.18.3	1.4
2.4.18.4	HS-3708 closes AOV-3708	8.4.18.4	1.4
2.4.18.5	ZS-3708A indicates AOV-3708 is closed	8.4.18.5	1.4
2.4.18.6	Extraction trip closes AOV-3708	8.4.18.6	1.4
2.4.19	AOV-3717	8.4.19	1.4
2.4.19.1	AOV-3717 is open with power off	8.4.19.1	1.4

		VERIFICATION PARAGRAPH	OBJECTIVE
2.4.19.2	Valve AOV-3717 operates from TSS keyboard HS-3717	8.4.19.2	1.4
2.4.19.3	ZS-3717B indicates AOV-3717 is open	8.4.19.3	1.4
2.4.19.4	RLU-201 trip does not affect control of AOV-3717	8.4.19.4	1.4
2.4.19.5	HS-3717 closes AOV-3717	8.4.19.5	1.4
2.4.19.6	ZS-3717A indicates AOV-3717 is closed	8.4.19.6	1.4
2.4.19.7	Interlock with AOV-3117	8.4.19.7	1.4
2.4.20	AOV-3807	8.4.20	1.4
2.4.20.1	AOV-3807 is open with power off	8.4.20.1	1.4
2.4.20.2	Valve AOV-3807 operates from TSS keyboard HS-3807	8.4.20.2	1.4
2.4.20.3	ZS-3807B indicates AOV-3807 is open	8.4.20-3	1.4
2.4.20.4	RLU-201 trip does not affect control of AOV-3807	8.4.20.4	1.4
2.4.20.5	HS-3807 closes AOV-3807	8.4.20.5	1.4
2.4.20.6	ZS-3807A indicates AOV-3807 is closed	8.4.20.6	1.4
2.4.21	AOV-3808	8.4.21	1.4
2.4.21.1	AOV-3808 is closed with power off	8.4.21.1	1.4
2.4.21.2	Valve AOV-3808 operates from TSS keyboard HS-3808	8.4.21.2	1.4
2.4.21.3	ZS-3808B indicates AOV-3808 is open	8.4.21.3	1.4
2.4.21.4	HS-3808 closes AOV-3808	8.4.21.4	1.4
2.4.21.5	ZS-3808A indicates AOV-3808 is closed	8.4.21.5	1.4
2.4.21.6	Extraction trip closes AOV-3808	8.4.21.6	1.4
2.4.22	AOV-3817	8.4.22	1.4
2.4.22.1	AOV-3817 is open with power off	8.4.22.1	1.4

		VERIFICATION PARAGRAPH	OBJECTIVE
2.4.22.2	Valve AOV-3817 operates from TSS keyboard HS-3817	8.4.22.2	1.4
2.4.22.3	ZS-3817B indicates AOV-3817 is open	8.4.22.3	1.4
2.4.22.4	RLU-201 trip does not affect control of AOV-3817	8.4.22.4	1.4
2.4.22.5	HS-3817 closes AOV-3817	8.4.22.5	1.4
2.4.22.6	ZS-3817A indicates AOV-3817 is closed	8.4.22.6	1.4
2.4.22.7	Interlock with AOV-3118	8.4.22.7	1.4
2.4.23	AOV-3905	8.4.23	1.4
2.4.23.1	AOV-3905 is closed with power off	8.4.23.1	1.4
2.4.23.2	Valve AOV-3905 operates from TSS keyboard HS-3905	8.4.23.2	1.4
2.4.23.3	ZS-3905B indicates AOV-3905 is open	8.4.23.3	1.4
2.4.23.4	RLU-201 trip does not affect control of AOV-3905	8.4.23.4	1.4
2.4.23.5	HS-3905 closes AOV-3905	8.4.23.5	1.4
2.4.23.6	ZS-3905A indicates AOV-3905 is closed	8.4.23.6	1.4
2.4.23.7	Repeat with HS-3905 indifferent group	8.4.23.7	1.4
2.4.24	AOV-3906	8.4.24	1.4
2.4.24.1	AOV-3906 is closed with power off	8.4.24.1	1.4
2.4.24.2	Valve AOV-3906 operates from TSS keyboard HS-3906	8.4.24.2	1.4
2.4.24.3	ZS-3906B indicates AOV-3906 is open	8.4.24.3	1.4
2.4.24.4	RLU-201 trip does not affect control of AOV-3906	8.4.24.4	1.4
2.4.24.5	HS-3906 closes AOV-3906	8.4.24.5	1.4
2.4.24.6	ZS-3906A indicates AOV-3906 is closed	8.4.24.6	1.4
2.4.24.7	Repeat with HS-3906 in different group	8.4.24.7	1.4
2.4.25	AOV-3907	8.4.25	1.4
2.4.25.1	AOV-3907 is closed with power off	8.4.25.1	1.4

		VERIFICATION PARAGRAPH	OBJECTIVE
2.4.25.2	Valve AOV-3907 operates from TSS keyboard HS-3907	8.4.25.2	1.4
2.4.25.3	ZS-3907B indicates AOV-3907 is open	8.4.25.3	1.4
2.4.25.4	HS-3907 closes AOV-3907	8.4.25.4	1.4
2.4.25.5	ZS-3907A indicates AOV-3907 is closed	8.4.25.5	1.4
2.4.25.6	Trips close AOV-3907	8.4.25.6	1.4
2.4.25.7	Repeat with HS-3907 in different group	8.4.25.7	1.4
2.4.26	MOV-1030	8.4.26	1.4
2.4.26.1	MOV-1030 is closed with power off	8.4.26.1	1.4
2.4.26.2	Valve MOV-1030 operates from TSS keyboard HS-1030	8.4.26.2	1.4
2.4.26.3	ZS-1030B indicates MOV-1030 is open	8.4.26.3	1.4
2.4.26.4	RLU-201 trip does not affect control of MOV-1030	8.4.26.4	1.4
2.4.26.5	HS-1030 closes MOV-1030	8.4.26.5	1.4
2.4.26.6	ZS-1030A indicates MOV-1030 is closed	8.4.26.6	1.4

		VERIFICATION PARAGRAPH	OBJECTIVE
2.5	Modulating Valve Circuits	8.5	1.5
2.5.1	Modulating valve LV-74B	8.5.1	1.5
2.5.1.1	Modulating valve LV-74B controls manually from the operator's keyboard tag number AM-74B The respective valve position parameter indicate the measured valve position	8.5.1.1 8.5.1.2 8.5.1.3	1.5
2.5.1.2	The full open position of the valve is 100 percent	8.5.1.4	1.5
2.5.1.3	The full closed position of the valve is 0 percent	8.5.1.5.	1.5
2.5.1.4	Functionals of LV-74B	8.5.1.6	1.5
2.5.2	Modulating valve LV-74D-1	8.5.2	1.5
2.5.2.1	Modulating valve LV-74D-1 controls manually from the operator's keyboard tag number LCM-74D-1 The respective valve position parameter indicate the measured valve position	8.5.2.1 8.5.2.2 8.5.2.3	1.5
2.5.2.2	The full open position of the valve is 100 percent	8.5.2.4	1.5
2.5.2.3	The full closed position of the valve is 0 percent	8.5.2.5	1.5
2.5.2.4	Functionals of LV-74D-1	8.5.2.6	1.5
2.5.3	Modulating valve LV-74D-2	8.5.3	1.5
2.5.3.1	Modulating valve LV-74D-2 controls manually from the operator's keyboard tag number LCM74D-2 The respective valve position parameter indicate the measured valve position	8.5.3.1 8.5.3.2 8.5.3.3	1.5
2.5.3.2	The full open position of the valve is 100 percent	8.5.3.4	1.5
2.5.3.3	The full closed position of the valve is 0 percent	8.5.3.5	1.5
2.5.3.4	Functionals of LV-74D-2	8.5.3.6	1.5

		VERIFICATION PARAGRAPH	OBJECTIVE
2.5.4	Modulating valve PV-640	8.5.4	1.5
2.5.4.1	Modulating valve PV-640 controls manually from the operator's keyboard tag number AM-640 The respective valve position parameter indicate the measured valve position	8.5.4.1 8.5.4.2 8.5.4.3	1.5
2.5.4.2	The full open position of the valve is 100 percent	8.5.4.4	1.5
2.5.4.3	The full closed position of the valve is 0 percent	8.5.4.5 .	1.5
2.5.4.4	Functionals of PV-640	8.5.4.6	1.5
2.5.5	Modulating valve PV-647C	8.5.5	1.5
2.5.5.1	Modulating valve PV-647C controls manually from the operator's keyboard tag number AM-647C The respective valve position parameter indicate the measured valve position	8.5.5.1 8.5.5.2 8.5.5.3	1.5
2.5.5.2	The full open position of the valve is 100 percent	8.5.5.4	1.5
2.5.5.3	The full closed position of the valve is 0 percent	8.5.5.5	1.5
2.5.5.4	Functionals of PV-647C	8.5.5.6	1.5
2.5.6	Modulating valve TV-1420	8.5.6	1.5
2.5.6.1	Modulating valve TV-1420 controls from the CHU	8.5.6.1 8.5.6.2 8.5.6.3	1.5
	The respective valve position parameter indicate the measured valve position	8.5.6.4 8.5.6.5	

		VERIFICATION PARAGRAPH	OBJECTIVE
2.5.7	Modulating valve UV-3102	8.5.7	1.5
2.5.7.1	Modulating valve UV-3102 controls manually from the operator's keyboard tag number AM-3102 The respective valve position parameter indicate the measured valve position	8.5.7.1 8.5.7.2 8.5.7.3	1.5
2.5.7.2	The full open position of the valve is 100 percent	8.5.7.4	1.5
2.5.7.3	The full closed position of the valve is 0 percent	7.5.7.5	1.5
2.5.8	Modulating valve TV-3105	8.5.8	1.5
2.5.8.1	Modulating valve TV-3105 controls manually from the operator's keyboard tag number FCM3105 The respective valve position parameter indicate the measured valve position	8.5.8.1 8.5.8.2 8.5.8.3	1.5
2.5.8.2	The full open position of the valve is 100 percent	8.5.8.4	1.5
2.5.8.3	The full closed position of the valve is 0 percent	8.5.8.5	1.5
2.5.9	Modulating valve PV-3110	8.5.9	1.5
2.5.9.1	Modulating valve PV-3110 controls manually from the operator's keyboard tag number PCM-3110 The respective valve position parameter indicate the measured valve position	8.5.9.1 8.5.9.2 8.5.9.3	1.5 1.5 1.5
2.5.9.2	The full open position of the valve is 100 percent	8.5.9.4	1.5
2.5.9.3	The full closed position of the valve is 0 percent	8.5.9.5	1.5

		VERIFICATION PARAGRAPH	OBJECTIVE
2.5.10	Modulating valve PV-3111	8.5.10	1.5
2.5.10.1	Modulating valve PV-3111 controls manually from the operator's keyboard tag number PCM-3111 The respective valve position parameter indicate the measured valve position	8.5.10.1 8.5.10.2 8.5.10.3	1.5
2.5.10.2	The full open position of the valve is 100 percent	8.5.10.4	1.5
2.5.10.3	The full closed position of the valve is 0 percent	8.5.10.5	1.5
2.5.11	Modulating valve TV-3410	8.5.11	1.5
2.5.11.1	Modulating valve TV-3410 controls manually from the operator's keyboard tag number TCM3410 The respective valve position parameter indicate the measured valve position	8.5.11.1 8.5.11.2 8.5.11.3	1.5
2.5.11.2	The full open position of the valve is 100 percent	8.5.11.4	1.5
2.5.11.3	The full closed position of the valve is 0 percent	8.5.11.5	1.5
2.5.12	Modulating valve TV-3411	8.5.12	1.5
2.5.12.1	Modulating valve TV-3411 controls manually from the operator's keyboard tag number TCM-3411 The respective valve position parameter indicate the measured valve position	8.5.12.1 8.5.12.2 8.5.12.3	1.5
2.5.12.2	The full open position of the valve is 100 percent	8.5.12.4	1.5
2.5.12.3	The full closed position of the valve is 0 percent	8.5.12.5	1.5

		VERIFICATION PARAGRAPH	OBJECTIVE
2.5.13	Modulating valve LV-3505	8.5.13	1.5
2.5.13.1	Modulating valve LV-3505 controls manually from the operator's keyboard tag number LCM-3505 The respective valve position parameter indicate the measured valve position	8.5.13.1 8.5.13.2 8.5.13.3	1.5
2.5.13.2	The full open position of the valve is 100 percent	8.5.13.4	1.5
2.5.13.3	The full closed position of the valve is 0 percent	8.5.13.5	1.5
2.5.14	Modulating valve LV-3605	8.5.14	1.5
2.5.14.1	Modulating valve LV-3605 controls manually from the operator's keyboard tag number LCM-3605 The respective valve position parameter indicate the measured valve position	8.5.14.1 8.5.14.2 8.5.14.3	1.5
2.5.14.2	The full open position of the valve is 100 percent	8.5.14.4	1.5
2.5.14.3	The full closed position of the valve is 0 percent	8.5.14.5	1.5
2.5.15	Modulating valve PV-3702	8.5.15	1.5
2.5.15.1	Modulating valve PV-3702 controls manually from the operator's keyboard tag number AM-3702 The respective valve position parameter indicate the measured valve position	8.5.15.1 8.5.15.2 8.5.15.3	1.5
2.5.15.2	The full open position of the valve is 100 percent	8.5.15.4	1.5
2.5.15.3	The full closed position of the valve is 0 percent	8.5.15.5	1.5

		VERIFICATION PARAGRAPH	OBJECTIVE
2.5.16	Modulating valve TV-3710	8.5.16	1.5
2.5.16.1	Modulating valve TV-3710 controls manually from the operator's keyboard tag number FCM3710 The respective valve position parameter indicate the measured valve position	8.5.16.1 8.5.16.2 8.5.16.3	1.5
2.5.16.2	The full open position of the valve is 100 percent	8.5.16.4	1.5
2.5.16.3	The full closed position of the valve is 0 percent	8.5.16.5	1.5
2.5.17	Modulating valve PV-3802	8.5.17	1.5
2.5.17.1	Modulating valve PV-3802 controls manually from the operator's keyboard tag number AM-3802 The respective valve position parameter indicate the measured valve position	8.5.17.1 8.5.17.2 8.5.17.3	1.5
2.5.17.2	The full open position of the valve is 100 percent	8.5.17.4	1.5
2.5.17.3	The full closed position of the valve is 0 percent	8.5.17.5	1.5
2.5.18	Modulating valve TV-3810	8.5.18	1.5
2.5.18.1	Modulating valve TV-3810 controls manually from the operator's keyboard tag number FCM-3810 The respective valve position parameter indicate the measured valve position	8.5.18.1 8.5.18.2 8.5.18.3	1.5
2.5.18.2	The full open position of the valve is 100 percent	8.5.18.4	1.5
2.5.18.3	The full closed position of the valve is 0 percent	8.5.18.5	1.5

		VERIFICATION PARAGRAPH	OBJECTIVE
2.5.19	Modulating valve PV-3910	8.5.19	1.5
2.5.19.1	Modulating valve PV-3910 controls manually from the operator's keyboard tag number PCM-3910 The respective valve position parameter indicate the measured valve position.	8.5.19.1 8.5.19.2 8.5.19.3	1.5
2.5.19.2	The full open position of the valve is 100 percent	8.5.19.4	1.5
2.5.19.3	The full closed position of the valve is 0 percent	8.5.19.5	1.5

		VERIFICATION PARAGRAPH	OBJECTIVE
2.6	Pump Functionals		
2.6.1	Pump P-301		
2.6.1.1	Pump set-up to verify start signal without operating pump motor.	8.6.1.1 8.6.1.2	1.6
2.6.1.2	Pump MANUAL start from TSS function panel. Stop by low oil flow trip.	8.6.1.3 8.6.1.4	1.6
2.6.1.3	Pump AUTO start from graphics panel. Stop by HS3413A(TSS function panel)	8.6.1.5	1.6
2.6.1.4	Pump start from graphics panel. Stop by HS3413B (graphics panel)	8.6.1.6	1.6
2.6.1.5	Pump start from graphics panel. Stop from RLU.	8.6.1.7	1.6
2.6.1.6	Pump start from graphics panel. Stop from GFI trip.	8.6.1.8	1.6
2.6.1.7	Pump start from graphics panel. Stop from motor current overload trip.	8.6.1.9	1.6
2.6.1.8	Pump start from graphics panel. Stop from motor overtemp trip.	8.6.1.10	1.6
2.6.1.9	Pump start from graphics panel. Stop from low coolant flow trip.	8.6.1.11	1.6
2.6.1.10	Pump start from graphics panel. Stop from pump seal leakage trip.	8.6.1.12	1.6
2.6.1.11	Pump start from graphics panel. Stop from inverter overtemp trip.	8.6.1.13	1.6
2.6.1.12	Pump start from graphics panel. Pump speed increase. Stop by HS3413B.	8.6.1.14	1.6
2.6.1.13	Pump start from graphics panel alternate group. Stop by low oil flow trip.	8.6.1.15	1.6

		VERIFICATION PARAGRAPH	OBJECTIVE
2.6.2	Pump P-302		
2.6.2.1	Pump set-up to verify start signal without operating pump motor.	8.6.2.1 8.6.2.2	1.6
2.6.2.2	Pump MANUAL start from TSS function panel. Stop by low oil flow trip.	8.6.2.3 8.6.2.4	1.6
2.6.2.3	Pump AUTO start from graphics panel. Stop by HS3414A(TSS function panel)	8.6.2.5	1.6
2.6.2.4	Pump start from graphics panel. Stop by HS3414B (graphics panel)	8.6.2.6	1.6
2.6.2.5	Pump start from graphics panel. Stop from RLU.	8.6.2.7	1.6
2.6.2.6	Pump start from graphics panel. Stop from GFI trip.	8.6.2.8	1.6
2.6.2.7	Pump start from graphics panel. Stop from motor current overload trip.	8.6.2.9	1.6
2.6.2.8	Pump start from graphics panel. Stop from motor overtemp trip.	8.6.2.10	1.6
2.6.2.9	Pump start from graphics panel. Stop from low coolant flow trip.	8.6.2.11	1.6
2.6.2.10	Pump start from graphics panel. Stop from pump seal leakage trip.	8.6.2.12	1.6
2.6.2.11	Pump start from graphics panel. Stop from inverter overtemp trip.	8.6.2.13	1.6
2.6.2.12	Pump start from graphics panel. Pump speed increase. Stop by HS3414B.	8.6.2.14	1.6
2.6.2.13	Pump start from graphics panel alternate group. Stop by low oil flow trip.	8.6.2.15	1.6

		VERIFICATION PARAGRAPH	OBJECTIVE
2.6.3	Pump P-303		
2.6.3.1	Pump set-up to verify start signal without operating pump motor.	8.6.3.1 8.6.3.2	1.6
2.6.3.2	Pump MANUAL start from TSS function panel. Stop by low oil flow trip.	8.6.3.3 8.6.3.4	1.6
2.6.3.3	Pump AUTO start from graphics panel. Stop by HS3 903B(TSS function panel)	8.6.3.5	1.6
2.6.3.4	Pump start from graphics panel. Stop by HS3 903A (graphics panel)	8.6.3.6	1.6
2.6.3.5	Pump start from graphics panel. Stop from RLU.	8.6.3.7	1.6
2.6.3.6	Pump start from graphics panel. Stop from GFI trip.	8.6.3.8	1.6
2.6.3.7	Pump start from graphics panel. Stop from motor current overload trip.	8.6.3.9	1.6
2.6.3.8	Pump start from graphics panel. Stop from motor overtemp trip.	8.6.3.10	1.6
2.6.3.9	Pump start from graphics panel. Stop from low coolant flow trip.	8.6.3.11	1.6
2.6.3.10	Pump start from graphics panel. Stop from pump seal leakage trip.	8.6.3.12	1.6
2.6.3.11	Pump start from graphics panel. Stop from inverter overtemp trip.	8.6.3.13	1.6
2.6.3.12	Pump start from graphics panel. Pump speed increase. Stop by HS3 903A.	8.6.3.14	1.6
2.6.3.13	Pump start from graphics panel alternate group. Stop by low oil flow trip.	8.6.3.15	1.6

		VERIFICATION PARAGRAPH	OBJECTIVE
2.6.4	Pump P-304		
2.6.4.1	Pump set-up to verify start signal without operating pump motor.	8.6.4.1 8.6.4.2	1.6
2.6.4.2	Pump MANUAL start from TSS function panel. Stop by low oil flow trip.	8.6.4.3 8.6.4.4	1.6
2.6.4.3	Pump AUTO start from graphics panel. Stop by HS3904B(TSS function panel)	8.6.4.5	1.6
2.6.4.4	Pump start from graphics panel. Stop by HS3904A (graphics panel)	8.6.4.6	1.6
2.6.4.5	Pump start from graphics panel. Stop from RLU.	8.6.4.7	1.6
2.6.4.6	Pump start from graphics panel. Stop from GFI trip.	8.6.4.8	1.6
2.6.4.7	Pump start from graphics panel. Stop from motor current overload trip.	8.6.4.9	1.6
2.6.4.8	Pump start from graphics panel. Stop from motor overtemp trip.	8.6.4.10	1.6
2.6.4.9	Pump start from graphics panel. Stop from low coolant flow trip.	8.6.4.11	1.6
2.6.4.10	Pump start from graphics panel. Stop from pump seal leakage trip.	8.6.4.12	1.6
2.6.4.11	Pump start from graphics panel. Stop from inverter overtemp trip.	8.6.4.13	1.6
2.6.4.12	Pump start from graphics panel. Pump speed increase. Stop by HS3904A.	8.6.4.14	1.6
2.6.4.13	Pump start from graphics panel alternate group. Stop by low oil flow trip.	8.6.4.15	1.6

		VERIFICATION PARAGRAPH	OBJECTIVE
2.6.5	Pump P-305		
2.6.5.1	Pump set-up to verify start signal without operating pump motor.	8.6.5.1	1.6
2.6.5.2	Pump start from graphics panel. Stop by low oil flow trip.	8.6.5.2 8.6.5.3	1.6
2.6.5.3	Pump start from graphics panel. Stop by HS3909 (graphics panel).	8.6.5.4	1.6
2.6.5.4	Pump start from graphics panel. Stop from RLU.	8.6.5.5	1.6
2.6.5.5	Pump start from graphics panel. Stop from motor current overload trip.	8.6.5.6	1.6
2.6.5.6	Pump start from graphics panel. Stop from low coolant flow trip.	8.6.5.7	1.6
2.6.5.7	Pump start from graphics panel. Stop from pump seal leakage trip.	8.6.5.8	1.6
2.6.5.8	Pump start from graphics panel. Pump speed increase. Stop by HS3909.	8.6.5.9	1.6

		VERIFICATION PARAGRAPH	OBJECTIVE
2.6.6	Pump P-307	8.6.6	1.6
2.6.6.1	Pump start disable at low level of LT3112 from CHU.	8.6.6.1	1.6
2.6.6.2	Pump enable and START/STOP from graphics panel HS3112.	8.6.6.2	1.6
2.6.6.3	Pump auto START/STOP at high level of LT3112 from CHU.	8.6.6.3	1.6
2.6.6.4	TSS Flash Tank LO-LO alarm from LT3112 from CHU.	8.6.6.4	1.6
2.6.6.5	Pump START from graphics panel HS3112, STOP from low level of LT3112 from CHU.	8.6.6.5	1.6
2.6.7	Pump P-306	8.6.7	1.6
2.6.7.1	Pump START/STOPfrom local HS1901.	8.6.7.1	1.6

3.0 REFERENCES

3.1 Mechanical

(a)	40P3005132192	Rev. 3	P&ID	Thermal Storage System (TSS) Charging Oil
(b)	40P3005132193	Rev. 3	P&ID	Thermal Storage System (TSS) Charging Steam and Condensate
(c)	40P3005132194	Rev. 3	P&ID	Thermal Storage System (TSS) Extraction Oil
(d)	40P3005132195	Rev. 3	P&ID	Thermal Storage System (TSS) Extraction Steam and Condensate
(e)	40P3005132196	Rev. 2	P&ID	Thermal Storage System (TSS) Thermal Storage Unit and Ullage Maintenance Unit

3.2 Control Logic Diagrams

(a)	40I7002133046	(I15-30)	Rev. 0	Thermal Storage Fluid Auxiliary Pump P305 (TFAP) Control
(b)	40I7002133047	(I15-31)	Rev. 0	TSS Fluid Oil Pump Control (Charging and Extraction Pumps P301, P302, P303, and P304)
(c)	40I7002133048	(I15-33)	Rev. 0	AOV Valves: -3220, -3320, -3209, -3309, -3905, -3906, -3708, -3808, -3707, -3807, -3218, -3318, -2903
(d)	40I7002133049	(I15-34)	Rev. 0	Thermal Storage Hot Standby Fluid Control Valve - AOV 3005
(e)	40I7002133050	(I15-35)	Rev. 0	Valves AOV 3001, AOV 3002, AOV 3003, AOV 3004, AOV 3907
(f)	40I7002133051	(I15-36)	Rev. 0	Valves AOV 3717, and AOV 3817
(g)	40I7002133052	(I15-37)	Rev. 0	TSS Steam Generator Bleed Control Valves AOV 3117 and AOV 3118
(h)	40I7002133053	(I15-38)	Rev. 0	Thermal Storage Heater Steam Inlet Control AOV 3206 and AOV 3306
(i)	40I7002133031	(I5-30)	Rev. 0	Thermal Storage Fluid Auxiliary Pump Control (P-305)
(j)	40I7002133032	(I5-31 & I5-31a)	Rev. 0	TSS Fluid Oil Pump Control (Charging - P301 and P302: Extraction - P303 and P304) and TSS Fluid Oil Pump Control Table
(k)	40I7002133033	(I5-33 & I5-33a)	Rev. 0	AOV Valves: -3220, -3320, -3209, -3309, -3905, -3906, -3708, -3808, -3707, -3807, -3218, -3318, -2903 and I5-33 Valves-Control Table

(l) 4017002133034 Rev. 0 (I5-34) Thermal Storage Hot Standby Fluid Control Valve AOV 3005

(m) 4017002133035 Rev. 0 (I5-35) & (I5-35a) AOV Valves: -3001, -3002, -3003, -3907 and I-35 Valves-Control Table

(n) 4017002133036 Rev. 0 (I5-36) Superheater Steam Outlet Control Valves AOV 3717 and AOV 3817

(o) 4017002133037 Rev. 0 (I5-37 & 15-37a) TSS Steam Generator Bleed Control Valves AOV 3117 and AOV 3118 and I5-37 Valves-Control Table

(p) 4017002133038 Rev. 0 (I5-38) Thermal Storage Heater Steam Inlet Control Valve AOV 3206 and AOV 3306

(q) ILS and RLU Logic Requirements, Rockwell International Internal Letter IL-141-42-8357, D. Landy, 20 November 1980

(r) RLU Alarm System, Rockwell International Internal Letter ES-1-140-0088, G. Batoog, 9 March 1981

(s) RLU Trip Identification Table, Rockwell International Internal Letter ES-1-140-0086, G. Batoog, 20 March 1981

(t) ROD of 10 MWe Pilot Plant Safety Cutoffs, Rockwell International Internal Letter SE 81-43, J. G. Absalom, 1 May 1981.

(u) Interlock Logic System Trip Reset Requirements, Rockwell International Internal Letter SE 81-54, J. G. Absalom, 27 May 1981.

(v) 40E7005133120, Overall Plant Trip Logic Rev. 5

3.3 Electrical

(a) 40E7005133192 Rev. 1 One-Line Diagram 480 Volt MCC-B

(b) 40E3005132029 Rev. 1 One-Line Diagram Load Center "A" and Receiver F.W. Pump

(c) 40E7005133187 Rev. 2 Electrical Equipment - General Arrangement Bldg. 712 and 709 and 710

3.4 Electrical Construction

40E3005132	100	Rev. 0	Electrical Block Diagram #1
	101	2	Electrical Block Diagram #2
	102	4	Stop Valve Schematic
	103	1	Modulating Valve Schematic
	104	5	SSR Schematic
	105	1	Pressure Schematic Sheet No. 1
	106	1	Pressure Schematic Sheet No. 2
	107	1	Misc. Instrumentation Schematic
	108	4	Flow Schematic
	109	3	TSU Strain Gauge Schematic
	110	1	Resistance Temperature Device Schematic
	111	1	Thermocouple System Schematic
	112	1	Thermocouple System Schematic
	113	1	TSU Thermocouple System Schematic
	114	1	TSU Thermocouple System Schematic
	115	1	TSU Thermocouple System Schematic
	116	1	TSU Thermocouple System Schematic
	122	1	TSU Misc. Instrumentation Schematic
	124	1	TSU Thermocouple System Schematic
	125	3	Pressure Schematic Sheet No. 3
40E3005132	126	Rev. 2	Misc. Switch Schematic

40E2005131	690	Rev. 2	Interface Equipment Plan
	691	2	Block Diagram & One Line Diagram
	692	1	Termination & Installation Details
	693	1	Recept. & Lighting Plans - Levels 15, 16, 17
	694	1	Recept. & Lighting Plans - Levels 18 - 21
	695	2	Conduit & Power Plans - Levels 15, 16, 17
	696	1	Conduit & Power Plans - Levels 18 - 21
	697	3	Conduit & Panel Schedules, Schematics
	698	0	Level 14: T-Boxes & SSR Box Plan
	699	4	Instrument Plan
	700	4	Instrument Plan
	701	0	Instrument Plan & Elev.
	702	0	T-Box RS-11 thru RS-21
	704	2	Modulating Valve Schematic
	705	3	Stop Valve Switches
	706	3	SSR Schematic
	707	1	Pressure Switch Schematic
	708	0	Thermocouple Schematic OCS
	709	0	Thermocouple Schematic OCS
	710	0	Thermocouple Schematic OCS
	711	0	Thermocouple Schematic OCS
40E2005131	712	Rev. 1	Thermocouple Schematic DAS

3.4 Electrical Construction (Cont'd)

40E2005131	713	Rev. 1	Thermocouple Schematic DAS
	714	2	Thermocouple Schematic DAS
	715	1	Thermocouple Schematic DAS
	716	2	Thermocouple Schematic DAS
	717	1	Thermocouple Schematic DAS
	718	1	Thermocouple Schematic DAS
	719	1	Thermocouple Schematic DAS
	720	3	Thermocouple Schematic DAS
	721	1	Pressure & Level Schematic
	722	1	Resistance Temp. Device Schematic
	723	1	Resistance Temp. Device Schematic
	724	0	Heat Flux Sensor Schematic
	725	0	Heat Flux Sensor Schematic
	726	2	Flow Measurements Schematic
	727	1	Linear Potentiometer Schematic
	728	2	Linear Potentiometer Schematic
	730	1	Differential Pressure Schematic
	731	0	T-Box Partial Wiring Diagram
	732	4	Valve Instl. Plan
	733	3	Valve Instl. Plan
40E2005131	734	Rev. 2	Misc. Details

GA000-90907-E1	Rev. 1	LEGEND AND DETAILS
-E2	5	SKID ASSEMBLY 301 - CONDUIT PLAN
-E3	4	SKID ASSEMBLY 302 & 303 - CONDUIT PLAN
-E4	1	SKID ASSEMBLY 304 - CONDUIT PLAN
-E5	2	SKID ASSEMBLY 305 & 306 - CONDUIT PLAN
-E6	3	SKID ASSEMBLY 307 & 308 - CONDUIT PLAN
-E7	1	SKID ASSEMBLY 309 - CONDUIT PLAN
-E9	4	INST. BOXES SA301I, SA302I, SA303I T-GRID NO.
-E10	2	INST. BOXES SA304I, SA305I, SA306I T-GRID NO.
-E11	3	INST. BOXES SA307I, SA308I, SA309I T-GRID NO.
-E12	1	CONTROL BOXES SA301-C THRU SA309-C T-GRID NO.
-E17	4	UMU TERMINATION BOXES
GA000-90907-E20	Rev. 1	UMU ELECTRICAL DIAGRAM

40E700513XXXX & 40300513XXXX (E8) Drawings

40E7005133202	(E8-3)	Rev. 2	Wiring & Connections, TSS Interface J-Boxes SA301 & SA302
40E7005133203	(E8-4)	Rev. 2	Wiring & Connections, TSS Interface J-Boxes SA303 & SA304
40E7005133204	(E8-5)	Rev. 0	Wiring & Connections, TSS Interface J-Boxes SA305 & SA306
40E7005133205	(E8-6)	Rev. 2	Wiring & Connections, TSS Interface J-Boxes SA307 & SA308
40E7005133206	(E8-7)	Rev. 2	Wiring & Connections, TSS Interface J-Boxes SA309

3.4 Electrical Construction (Cont'd)

40E7005133207	(E8-8)	Rev. 3	Wiring & Connection, TSS Interface J-Box R.S. #2 Instrumentation (Left Side)
40E7005133062	(E8-8A)	Rev. 3	Wiring & Connection, TSS Interface J-Box R.S. #2 Instrumentation (Right Side)
40E7005133208	(E8-9)	Rev. 2	Wiring & Connection, TSS Interface J-Box R.S. #3 Instrumentation
40E7005133209	(E8-10)	Rev. 3	Wiring & Connection, TSS Interface J-Boxes R.S. #2 & 3 Control
40E7005133138	(E8-11)	Rev. 1	Wiring & Connection, TSS Interface J-Boxes R.S. #2 Thermocouples, Junction #1-3
40E7005133181	(E8-12)	Rev. 1	Wiring & Connection, TSS Interface J-Boxes R.S. #2 Thermocouples, Junctions #4-6.
40E7005133191	(E8-13)	Rev. 1	Wiring & Connection, TSS Interface J-Boxes R.S. #3 Thermocouples, Junction #7
40E7005133211	(E8-14)	Rev. 0	Wiring & Connection, TSU Instrument J-Box Left Side
40E7005133058	(E8-15)	Rev. 0	Wiring & Connection, TSU Instrument J-Box Right Side
40E7005133173	(E8-21)	Rev. 3	Wiring & Connections, J-Box No. 1951
40E7005133174	(E8-22)	Rev. 2	Wiring & Connections, J-Box No. 1952
40E3005132050	(E8-71)	Rev. 2	Wiring & Connection, MVCU Termination Rack Term SDP-205 (MVCU2-1A)
40E3005132051	(E8-72)	Rev. 1	Wiring & Connection, MVCU Termination Rack Term. SDP-205 (MVCU2-2A)
40E3005132052	(E8-73)	Rev. 1	Wiring & Connection, MVCU Termination Rack Term. SDP-205 (MVCU2-3A)
40E3005132053	(E8-74)	Rev. 0	Wiring & Connection, MVCU Termination Rack Term. SDP-205 (MVCU2-4A)
40E3005132055	(E8-76)	Rev. 0	Wiring & Connection, Signal Conditioning Unit SCU-201 R.S. #2 Rack 1-2 (Front)
40E3005132056	(E8-77)	Rev. 1	Wiring & Connection, Signal Conditioning Unit SCU-201 R.S. #2 Rack 1-2 (Rear)
40E3005132057	(E8-78)	Rev. 0	Wiring & Connection, Signal Conditioning Unit SCU-202 R.S. #2 Rack 2-2 (Front)
40E3005132058	(E8-79)	Rev. 1	Wiring & Connection, Signal Conditioning Unit SCU-202 R.S. #2 Rack 2-2 (Rear)
40E3005132059	(E8-80)	Rev. 1	Wiring & Connection, Data Acquisition Remote Monitor Term. DARM-202 (Front)
40E3005132060	(E8-81)	Rev. 1	Wiring & Connection, Data Acquisition Remote Monitor Term. DARM-202 (Side & Rear)
40E3005132061	(E8-82)	Rev. 2	Wiring & Connection, R.S. #2 Interlock Logic System ILS-201
40E3005132062	(E8-83)	Rev. 0	Wiring & Connection, R.S. #2 Red Line Unit RLU-202 (Front)
40E3005132063	(E8-84)	Rev. 1	Wiring & Connection, R.S. #2 Red Line Unit RLU-202 (Rear)
40E3005132064	(E8-85)	Rev. 1	Wiring & Connection, R.S. #2 Multiplexer MUX SDP-204 (Terminal Panels 2-1A & 2-1B)
40E3005132065	(E8-86)	Rev. 2	Wiring & Connection, R.S. #2 Multiplexer MUX SDP-204 (Terminal Panels 2-2A & 2-2B)

3.4 Electrical Construction (Cont'd)

40E3005132066	(E8-87)	Rev. 1	Wiring & Connection, R.S. #2 Interlock Logic System ILS-201
40E3005132067	(E8-88)	Rev. 0	Wiring & Connection, MVCU Termination Rack Term. SDP-305 (MVCU3-1A)
40E3005132068	(E8-89)	Rev. 0	Wiring & Connection, MVCU Termination Rack Terminal SDP-305 (MVCU3-2A)
40E3005132069	(E8-90)	Rev. 0	Wiring & Connection, Signal Conditioning Unit SCU-301 R.S. #3 Rack 1-3 (Front)
40E3005132070	(E8-91)	Rev. 1	Wiring & Connection, Signal Conditioning Unit SCU-301 R.S. #3 Rack 1-3 (Rear)
40E3005132071	(E8-92)	Rev. 0	Wiring & Connection, Data Acquisition Remote Monitor Term. DARM-302 (Front & Side)
40E3005132072	(E8-93)	Rev. 1	Wiring & Connection, R.S. #3 Interlock Logic System ILS-301
40E3005132073	(E8-94)	Rev. 2	Wiring & Connection, R.S. #3 Multiplexer MUX SDP-304 (Terminal Panels 3-1A & 3-1B)
40E3005132074	(E8-95)	Rev. 1	Wiring & Connection, R.S. #3 Interlock Logic System ILS-301
40E7005133260	(E8-96)	Rev. 0	Wiring & Connection, R.S. #1, R.S. #2, and R.S. #3 Data Hy-way to MVCU's
40E7005133179	(E8-101)	Rev. 2	Plant Trip Relay Panel Wiring Diagram & Schematic

3.5 Mechanical Construction

GA000-90907-M25	Rev. 2	SKID ASSEMBLY - 301 FLOW DIAGRAM
-M26	2	SKID ASSEMBLIES - 302 & 303 FLOW DIAGRAM
-M27	1	SKID ASSEMBLIES - 304 & 309 FLOW DIAGRAM
-M28	1	SKID ASSEMBLIES - 305, 306, 307 & 308 FLOW DIAGRAM
-M30	4	SKID ASSEMBLY - 301 PIPING PLAN & ELEVATION
-M31	4	SKID ASSEMBLY - 301 PIPING SECTIONS & ELEV.
-M32	0	SKID ASSEMBLY - 301 STEEL PLAN & ELEVATION
-M35	3	SKID ASSEMBLY - 302 & 303 PIPING PLAN
-M36	3	SKID ASSEMBLY - 302 & 303 PIPING ELEVATIONS
-M37	0	SKID ASSEMBLY - 302 & 303 STEEL PLAN AND ELEVATION
-M40	2	SKID ASSEMBLY - 304 PIPING PLAN & ELEVATION
-M41	1	SKID ASSEMBLY - 304 STEEL PLAN & ELEVATION
-M50	1	SKID ASSEMBLY - 305 & 306 PIPING PLAN, ELEVATION, AND SECTION
-M51	0	SKID ASSEMBLY - 305 & 306 STEEL PLAN AND ELEVATION
-M55	3	SKID ASSEMBLY - 307 & 308 PIPING PLAN
-M56	3	SKID ASSEMBLY - 307 & 308 SIDE ELEVATION
-M57	2	SKID ASSEMBLY - 307 & 308 FRONT & END ELEV.
-M58	1	SKID ASSEMBLY - 307 & 308 STEEL PLAN
-M59	0	SKID ASSEMBLY - 307 & 308 STEEL ELEVATION
-M60	3	SKID ASSEMBLY - 309 PIPING PLAN & ELEVATION
GA000-90907-M61	Rev. 2	SKID ASSEMBLY - 309 STEEL PLAN & ELEVATION

3.5 Mechanical Construction (Cont'd)

GA000-90907-M70	Rev. 1	SKID ASSEMBLIES TYP. PIPING DETAILS SHEET 1
-M71	1	SKID ASSEMBLIES TYP. PIPING DETAILS SHEET 2
-M72	2	SKID ASSEMBLIES TYP. PIPING DETAILS SHEET 3
-M73	0	SKID ASSEMBLIES TYP. STEEL DETAILS SHEET 4
-M74	1	SKID ASSEMBLIES TYP. STEEL DETAILS SHEET 5
-M75	1	SKID ASSEMBLIES TYP. SLING ASSEMBLY
-M76	1	SKID ASSEMBLIES TYP. INSTRUMENTATION DETAILS
-M8	4	UMU SKID ASSEMBLY
-M77	4	UMU FLOW DIAGRAM
-M33	1	FLASH TANK PLAN & ELEVATION (V-304)
-M34	1	FLASH TANK DETAILS
-M38	2	OIL HEATER STEAM TRAP (V-305 & V-306)
GA000-90907-M39	Rev. 2	TSS SURGE TANKS (V-309 & V-310)

3.6 Specifications

(a)	GA000-90907-T10	Rev. 2	Charging and Extraction Pumps & Drives
(b)	GA000-90907-T11	Rev. 0	Seal Steam Oil Pump and Motor
(c)	GA000-90907-T9	Rev. 0	UMU
(d)	SP78-001	Rev. A	Instrumentation-Flowmeters, Oil
(e)	SP78-003	Rev. 0	Instrumentation - RTD's
(f)	SP78-004	Rev. 0	Instrumentation - Thermocouples
(g)	SP78-005	Rev. A	Instrumentation - Heat Flux Transducers
(h)	SP78-006	Rev. 0	Instrumentation - Linear Position Transducers
(i)	SP78-007	Rev. 0	Instrumentation - Pressure, Diff. Pressure and Level Transmitters
(j)	SP42-025	Rev. A	Equipment - TSU Stop Control Valves
(k)	SP42-029	Rev. A	Equipment - TS Aux. Fluid Control Valve
(l)	SP42-042	Rev. C	Equipment - Pump Interconnect Control Valve
(m)	SP42-063	Rev. A	Equipment - Thermal Fluid Control Valve
(n)	SP42-068	Rev. B	Equipment - Superheater Fluid Control Valve

3.7	Instrumentation Index
3.7.1	MEL and Measurement List, STMPP, MDAC
3.8	Material Requisition or Specification
3.9	Vendor Data
3.9.1	RLU Description
3.9.2	SCU Description
3.10	Startup Schedule
3.10.1	Procedural Development & Test Schedule
3.10.2	Solar One Startup Schedule

4.0 PREREQUISITES

4.1 Turnover of the system to SCE is complete and in accordance with Section 5.4 of the SCE Startup Manual.

_____/_____
INITIAL DATE

4.2 Reference material has been reviewed and later revisions (if any) will not affect this test.

_____/_____
INITIAL DATE

4.3 The Master Tracking System has been reviewed and outstanding items (if any) will not affect this test. A summary list of outstanding items is attached on Appendix 10A.

_____/_____
INITIAL DATE

4.4 The Abnormal Equipment and Circuitry Log has been reviewed, is current, and is satisfactory for this test. A summary list is attached on Appendix 10B.

_____/_____
INITIAL DATE

4.5 The system has been walked through and verified complete to the extent required to conduct this test.

_____/_____
INITIAL DATE

4.6 Prerequisite component tests and calibration have been completed for components listed on Appendix 10C, 10D, and 10E.

_____/_____
INITIAL DATE

4.7 All test equipment as per Section 6.0 is available, calibrated, and in working order.

_____/_____
INITIAL DATE

4.8 A pretest coordination meeting has been held to familiarize test and operations personnel with the requirements of this test.

_____/_____
INITIAL DATE

5.0 LIMITS AND PRECAUTIONS

5.1 Pneumatic valve operations using keyboard control shall be directed by the operator observing the valve under test.

5.2 The operator at the component under test shall confirm other personnel in and around the immediate area have been notified of the intended dynamic test.

5.3 Unless specified, components shall not be operated with the system under pressure to preclude flow of gas or fluid in the system.

5.4 The SCE safety and operating procedures shall be adhered to in the conduct of these tests. If there is a conflict between this procedure and SCE requirement, the SCE operating requirements or engineering instructions shall prevail.

5.5 This procedure is intended to prove the end to end operation and logic of TSS components. This procedure is not intended to move fluids, or operationally demonstrate the complex control systems.

6.0 TEST EQUIPMENT
(For equipment details, see appropriate O&M manuals)

6.1 Check Out Unit (CHU), Rocketdyne

6.2 Multimeter, Tektronix, DM502

6.3 Comparator Pressure Determination System, Ametek

6.4 Current Calibrator, Applied Research, Series 822

6.5 Universal Calibrator for Thermocouples, ANALOGIC DIGI-CAL-II, AN 6520

6.6 Resistance Substitution Unit, Phipps & Bird, Inc.

6.7 Irradience Source for Heat f lux Transducers, Medtherm Co.

6.8 Deflection Measurement Gauge

6.9 Function Generator, Tektronix, FG 503

6.10 Frequency Counter, Tektronix, FC503

6.11 Strain Gage Simulator/Calibrator, Saber, Model TS350-2.

7.0 INITIAL CONDITIONS

7.1 Environmental conditions

7.1.1 The control rooms should be at their normal operating temperatures.

7.2 Temporary Installations

7.2.1 N/A

7.3 Support Systems - Plant Operating Status

7.3.1 The instrumentation and service air system procedure 901 is completed.

_____/_____
INITIAL DATE

7.3.2 The TSS instrumentation and valve control air is operating at the skids.

_____/_____
INITIAL DATE

7.3.3 The nitrogen system procedure 905 is completed.

_____/_____
INITIAL DATE

7.3.4 Nitrogen pressure is available for tests.

_____/_____
INITIAL DATE

7.3.5 DC and UPS procedure 860 is completed.

_____/_____
INITIAL DATE

7.3.6 Low voltage systems procedure 855 is completed.

_____/_____
INITIAL DATE

7.3.7 System Dist. Process Controllers Procedure 305 is completed.

_____/_____
INITIAL DATE

7.4 Component Line Up

7.4.1 Initial circuit breaker positioning for step 8.0 as noted in Appendix 10F completed.

_____ / _____
INITIAL DATE

7.4.2 Initial control switch positioning for step 8.0 as noted in Appendix 10G completed.

_____ / _____
INITIAL DATE

7.4.3 Initial valve lineup for step 8.0 as noted in Appendix 10H completed.

_____ / _____
INITIAL DATE

7.5 Other Initial Conditions

7.5.1 The SDPC, ILS, RLU, DARMS, PLANT TRIP and operator's console are set up for operation.

_____ / _____
INITIAL DATE

7.5.2 Communications have been established between the control operator and the field operator.

_____ / _____
INITIAL DATE

7.5.3 TSS 120 VAC and 28 VDC valve control power is turned on.

_____ / _____
INITIAL DATE

8.0 PROCEDURE AND DATA COLLECTION

8.1 Demonstrate RLU-201 trip logic as follows:

8.1.1 Confirm a RLU-201 trip energizes an TSCH Trip Signal from RLU-202 Term 6D (8 & 9) to DARMS 601 term TB-1 (35 & 36).

_____/_____
INITIAL DATE

8.1.2 Confirm a RLU-201 trip energizes an TSEXT Trip Signal from RLU-202 Term 6D (10 & 11) to DARMS 601 term TB-1 (38 & 39)

_____/_____
INITIAL DATE

8.1.3 Confirm an RLU-201 trip energizes a signal from RLU-202 term 6D (3 & 4) to TSCH plant trip logic (PTL) relay R5 of the PTL and the following logic occurs:

_____/_____
INITIAL DATE

1. TSCH Trip Alarm QAI6004 is alarmed (R5 term 4 & 8)

_____/_____
INITIAL DATE

2. Receiver trip (RS term 3 & 7) if "Steam Dump Trip" from HS-1001A AND "Turbine Generator Trip" from pushbuttons are actuated.

_____/_____
INITIAL DATE

8.1.4 Confirm an RLU-201 trip energizes a signal from RLU-202 term 6D (5 & 6) to TSEXT plant trip logic (PTL) relay R6 of the PTL and the following logic occurs:

_____ / _____
INITIAL DATE

1. TSEXT Trip Alarm QAI6005 is alarmed (R6 term 2 & 5)

_____ / _____
INITIAL DATE

2. Closure of the Admission Steam Stop Valve (R6 term 3 & 6)

_____ / _____
INITIAL DATE

3. Trip of the Turbine generator if RSS "Not in Service to Turbine Generator" Switch ZSK-902 is "ON".

_____ / _____
INITIAL DATE

8.1.5 Test each TSCH and TSEXT trip parameter feeding the RLU-202 and confirm the RLU latches the trip. Confirm that the trip condition is retained by the RLU unless all trip conditions are off and then reset is achieved by HS6301B (TSCH) and HS6302B (TSEXT) on the TSS console. Confirm each trip occurs at the proper conditions, and the discrete trip is relayed to the operator console as a combination of discrete indications. The indications are found in overview group 125, slots 2 and 4.

Confirm the trip number and trip condition or value is in accordance with the attached TSS trip identification table.

Reset RLU after each trip.

8.1.5 Continued

1. Master trip HS6000D.

Charging Trip (Alarm QAI-6004)

_____/_____
INITIAL DATE

Extraction Trip (Alarm QAI-6005)

_____ _____
INITIAL DATE

2. Operator trip HS6301A.

_____/_____
INITIAL DATE

3. Charging Loop Plant trip logic (PTL) (Receiver Trip, e.g. HS6200A).

_____/_____
INITIAL DATE

4. Operator trip HS6302A.

_____/_____
INITIAL DATE

5. Extraction Loop Plant trip logic (PTL) (Turbine generator trip plus TSS Extraction Not in Service switch (ZSL-901)).

_____/_____
INITIAL DATE

6. TSS Feedwater Pump trip (P-303).

_____/_____
INITIAL DATE

8.1.5 Continued

7. Trips 10 thru 48 are achieved by increasing the analog signal to the RLU above the trip level. See attached identification table.

_____ / _____
INITIAL DATE

Check the parameters on the attached list as each trip and value is confirmed.

_____ / _____
INITIAL DATE

Verify that the following trips actuate both a Charging Trip (Alarm QAI-6004) and an Extraction Trip (Alarm QAI-6005)

TRIP	CHARGING	EXTRACTION
12	—	—
13	—	—
44	—	—
45	—	—

_____ / _____
INITIAL DATE

********** THERMAL STORAGE TRIP IDENTIFICATION TABLE **********

NO.	PARAMETER	8	7	6	5	4	3	2	1
1	MASTER TRIP ---------- HS 6000D	O	O	O	O	O	O	O	X
2	TSS CHARGING OPERATOR TRIP --- HS 6301A	O	O	O	O	O	O	X	O
3	TSS EXTR OPERATOR TRIP ------- HS 6302A	O	O	O	O	O	O	X	X
4	CHARGING LOOP, PLANT LOGIC TRIP -------	O	O	O	O	O	X	O	O
5	EXTRACTION LOOP, PLANT LOGIC TRIP -----	O	O	O	O	O	X	O	X
6	TSS FEEDWATER PUMP TRIP --------- P-303	O	O	O	O	X	O	X	O
10	EXTR OIL PR > 100 PSI ---------- PT 3703	O	O	O	X	O	O	O	O
11	" " " " ---------- PT 3803	O	O	O	X	O	O	O	X
12	STRG TK ULL PR < 02 IN -------- PT 4008	O	O	O	X	O	O	X	O
13	" " " " > 16 IN -------- PT 4008	O	O	O	X	O	O	X	X
16	CHRG OIL TEMP > 600 F -------- TE 3211A	O	O	O	X	O	X	X	O
17	" " " " -------- TE 3211B	O	O	O	X	O	X	X	X
18	" " " " -------- TE 3310A	O	O	O	X	X	O	O	O
19	" " " " -------- TE 3310B	O	O	O	X	X	O	O	X
22	TH HTR STM INL PR > 1500 PSI -- PT 3203	O	O	X	O	O	O	X	O
23	" " " " " " " -- PT 3303	O	O	X	O	O	O	X	X
28	CHRG OIL PR > 100 PSI ---------- PT 3208	O	O	X	O	X	O	O	O
29	" " " " ---------- PT 3308	O	O	X	O	X	O	O	X
30	DS-301 OUTLET TEMP > 690 F --- TE 3105A	O	O	X	X	O	O	O	O
31	" " " " --- TE 3105B	O	O	X	X	O	O	O	X
32	SPRHTR E-307 OUT TMP < 525 F - TE 3710A	O	O	X	X	O	O	X	O
33	" " " " + AOV-3717 OPEN - TE 3710B	O	O	X	X	O	O	X	X
34	" E-308 " " " - TE 3810A	O	O	X	X	O	X	O	O
35	" " " " + AOV-3817 OPEN - TE 3810B	O	O	X	X	O	X	O	X
38	BOILER E-305 LEV HI > 90% + AOV-3717 OP LT 3705	O	O	X	X	X	O	O	O
40	EXTR STM PRESS > 435 PSI ----- PT 3702A	O	X	O	O	O	O	O	O
41	" " " " " ----- PT 3702B	O	X	O	O	O	O	O	X
42	" " " " " ----- PT 3802A	O	X	O	O	O	O	X	O
43	" " " " " ----- PT 3802B	O	X	O	O	O	O	X	X
44	FLASH TK LEV > 90% ---------- LT 3112	O	X	O	O	O	X	O	O
45	FLASH TK STM PR > 150 PSI ----- PT 3114	O	X	O	O	O	X	O	X
48	BOILER E-305 LEV HI > 90% + AOV-3817 OP LT 3805	O	X	O	O	X	O	O	O

8.2 Demonstrate RLU-201 alarm logic:

8.2.1 Check the alarm logic of the "A" and "B" thermocouples of the attached alarm indication table. The alarm indicates that the "B" thermocouple is being monitored for trip instead of the primary "A" thermocouple. The failure will be indicated as the status on the 8 slots shown on the operator console. Use the attached identification table to check off the circuits as they are confirmed.

_____ / _____
INITIAL DATE

8.2.2 Check the alarm logic of the "A" and "B" pressure sensors of the attached alarm indication table. The alarm indicates that the "B" sensor is being monitored for trip instead of the primary "A" sensor. The failure will be indicated as the status on the 8 slots shown on the operator console. Use the attached identification table to check off the circuits as they are confirmed.

_____ / _____
INITIAL DATE

********** THERMAL STORAGE ALARM IDENTIFICATION TABLE **********

NO.	PARAMETER	8	7	6	5	4	3	2	1
1	TE 3211A FAILURE	O	O	O	O	O	O	O	X
2	TE 3310A FAILURE	O	O	O	O	O	O	X	O
3	TE 3105A FAILURE	O	O	O	O	O	O	X	X
4	TE 3710A FAILURE	O	O	O	O	O	X	O	O
5	TE 3810A FAILURE	O	O	O	O	O	X	O	X
6	PT 3702A FAILURE	O	O	O	O	O	X	X	O
7	PT 3802A FAILURE	O	O	O	O	O	X	X	X

8.3 TSU Ullage Pressurization and Purge System

NOTE

If propane fuel is available for UMU pilot light, open propane supply valves and skip steps 8.3.1 and 8.3.2 below and actually light the pilot light. Turn power "ON", system to "MANUAL" and verify operation of FA-302, FA-301, SOV-4016, AOV-4014, and lighting of "power", "limits normal", "purging" and "pilot" lights.

8.3.1 Verify power on to R.S. #3. In UMU thermal ozidizer control panel, turn power "ON" and system to "MANUAL". Verify "power" on light is lit, and air blower fan FA-302 starts. Verify alarm sounds and "burner out" light is lit. Verify flame arrester "off" indications on graphics control panel CRT (group 15, slot 1). Silence alarm. Reset by turning power switch "OFF".

_____ / _____
INITIAL DATE

8.3.2 In UMU thermal oxidizer control panel, jumper from terminals 4 to 8 to simulate proper pilot light (propane) pressure. Also jumper from terminals 7 to 5 on the "flame safeguard" box. Turn power "ON". Verify FA-302 restarts. Verify "limits normal" light is lit. Verify "purging" light is lit until purge timer expires, then goes out. Verify fume blower fan FA-301 starts. Verify AOV-4014 actuates. Verify "fume pressure" and "temp normal" lights not lit. Verify MOV-4015 closes. Verify alarm sounds and "burner out" light is lit. Silence alarm. Reset by turning power switch "OFF".

_____ / _____
INITIAL DATE

8.3.3 In UMU thermal oxidizer control panel, jumper from terminals 9 to 17 to simulate proper fume pressure. Turn power "ON". Verify equipment and lights of 8.3.1 and 8.3.2 operate. Verify "fume pressure" and "temp. normal" lights are lit. Verify MOV-4015 opens. Verify alarm sounds and "burner out" light is lit. Silence alarm. Reset by turning power switch "OFF".

_____ / _____
INITIAL DATE

8.3.4 In the UMU thermal ozidizer control panel, jumper from terminals 3 to 5 to simulate flame detection. Turn power "ON". Verify equipment and lights of 8.3.1, 8.3.2 and 8.3.3 operate. Verify no alarm and operation of dilution air damper control motor. Verify flame arrester "on" indications on graphics control panel CRT (group 15, slot 1). Leave jumpers connected for step 8.3.12 below.

_____ / _____
INITIAL DATE

8.3.5 Disconnect pressure switches PS4010 and PS4011 from hand valves on TSU vent stack. Connect comparator pressure determination system (see 6.3) to PS4010. Verify pressure on gage $\geq$ 3" H_2O.

_____ / _____
INITIAL DATE

8.3.6 Disconnect line 1"-HP-1-BBA from interface connection U8I (at stack on TSU).

_____ / _____
INITIAL DATE

NOTE

Ullage pump P-308 should not be run dry.

8.3.7 Open the ullage pump P-308 disconnect switch in SA311-C T-Box and connect multimeter across switch terminals to observe starting current.

_____ / _____
INITIAL DATE

8.3.8 Increase pressure on PS4010 to 10" H_2O. Reduce pressure slowly to approximately 7" H_2O and verify that ullage pump (P-308) actuates (observe multimeter current). Record actuation pressure: _____" H_2O.

8.3.9 Increase pressure slowly on PS4010 to approximately 9" H_2O. Verify that ullage pump P-308 P-308 deactuates. Record deactuation pressure: _____" H_2O.

_____ / _____
INITIAL DATE

8.3.10 Repeat 8.3.8 and 8.3.9 two additional times.

(1) Actuation pressure: _____" H_2O.

Deactuation pressure: _____" H_2O.

(2) Actuation pressure: _____" H_2O.

Deactuation pressure: _____" H_2O.

_____ / _____
INITIAL DATE

8.3.11 Reduce pressure to 0" H_2O. Disconnect comparator pressure determination system from PS4010 and connect to PS4011. Reconnect PS4010 to hand valve on vent stack.

_____ / _____
INITIAL DATE

8.3.12 In UMU thermal oxidizer control panel, verify power "ON" and place system in "AUTO". Increase pressure on PS4011 to 8" H_2O. Increase pressure slowly to 11" H_2O and verify that the UMU thermal oxidizer control system operates properly: FA-302 starts; "limits normal" light is lit; "purging" light is lit until purging timer expires, then goes out; FA-301 starts; SOV-4016 and AOV-4014 actuate; "fume pressure" and "temp normal" lights are lit; MOV-4015 opens; no alarm and operation of dilution air damper control motor. Verify flame arrester "on" indications on graphics control panel CRT (group 15, slot 1). Record system actuation pressure: _____" H_2O.

_____ / _____
INITIAL DATE

8.3.13 Decrease pressure slowly on PS4011 to 9" H_2O and verify that the UMU burner stack control system deactuates. Record deactuation pressure: _____" H_2O.

8.3.14 Repeat 8.3.12 and 8.3.13 two additional times.

(1) Actuation pressure _____" H_2O.

Deactuation pressure _____" H_2O.

(2) Actuation pressure _____" H_2O.

Deactuation pressure _____" H_2O.

_____ / _____
INITIAL DATE

8.3.15 Reduce pressure to 0" H_2O. Disconnect comparator pressure determination system from PS4011. Reconnect PS4011 to hand valve on vent stack. Remove jumpers installed in 8.3.2, 8.3.3 and 8.3.4.

_____ / _____
INITIAL DATE

8.3.16 Close or Verify closed UN1S-1, UN1S-3, UN1S-4, UN1S-6, UN1S-7 and UN1S-9.

_____ / _____
INITIAL DATE

8.3.17 Open UN1S-2. Verify on PI-4005 that PCV-4004 is set to 25 psig.

_____ / _____
INITIAL DATE

8.3.18 On PI-4007 verify that PCV 4007 regulates (locked up) at 3" H_2O. Uncap and slowly open UNIS-3 and verify that PCV-4007 regulates at 3" H_2O with flow. Close UNIS-3.

_____ / _____
INITIAL DATE

8.8.19 Open UNIS-1. On PI-4007, verify that PCV-4006 regulates (locked up) at 5" H_2O. Slowly open UNIS-3 and verify that PCV-4007 regulates at 5" H_2O with flow.

_____ / _____
INITIAL DATE

8.3.20 Close hand valve UNIS-2 and allow GN_2 downstream pressure to decay to 0 psig (open and close UNIS-3 as required.)

_____ / _____
INITIAL DATE

8.3.21 Reconnect 1"-HP-1-BBA line at interface connection U8I.

_____ / _____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.1 For

Valve No.	Description	P&ID Reference
AOV-3001	TU Charging	40P8005163147

Demonstrate ILS-201 logic and end to end control. (Ref. I5-35) (Refer to attachment 10 D-10 for circuit terminations.)

8.4.1.1 Using SSR switch, turn 120VAC power OFF to SOV-3001, verify AOV-3001 is OPEN . Verify " RED" light is ON.

INITIAL _____ / DATE _____

8.4.1.2 Using SSR switch, turn 120VAC power ON to SOV-3001. At the TSS operator's console, OPEN HS-3001(Group 1 , slot 3) to deenergize SOV-3001, and open AOV-3001.

INITIAL _____ / DATE _____

8.4.1.3 Confirm AOV-3001 position switch ZS-3001B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

INITIAL _____ / DATE _____

8.4.1.4 CLOSE HS-3001 and confirm AOV-3001 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

INITIAL _____ / DATE _____

8.4.1.5 Confirm AOV-3001 position switch ZS-3001 A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

INITIAL _____ / DATE _____

8.4.1.6 Actuate TSS charging and Extraction trips to confirm AOV-3001 opens . Verify HS-3001 will not actuate valve. Reset trips and hand switch.

INITIAL _____ / DATE _____

8.4 Interlock Logic System Checkouts

8.4.2 For

Valve No.	Description	P&ID Reference
AOV-3002	TU Upper Manifold	40P8005163147

Demonstrate ILS-201 logic and end to end control. (Ref. I5-35)
(Refer to attachment 10 D-10 for circuit terminations.)

8.4.2.1 Using SSR switch, turn 120VAC power OFF to SOV-3002, verify AOV-3002 is OPEN . Verify " RED " light is ON.

_____ / _____
INITIAL DATE

8.4.2.2 Using SSR switch, turn 120VAC power ON to SOV-3002. At the TSS operator's console, OPEN HS-3002(Group 1 , slot 3) to deenergize SOV-3002, and open AOV-3002.

_____ / _____
INITIAL DATE

8.4.2.3 Confirm AOV-3002 position switch ZS-3002B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____ / _____
INITIAL DATE

8.4.2.4 CLOSE HS-3002 and confirm AOV-3002 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____ / _____
INITIAL DATE

8.4.2.5 Confirm AOV-3002 position switch ZS-3002A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____ / _____
INITIAL DATE

8.4.2.6 Actuate TSS charging and Extraction trips to confirm AOV-3002 opens . Verify HS-3002 will not actuate valve. Reset trips and hand switch.

_____ / _____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.3 For

Valve No.	Description	P&ID Reference
AOV-3003	TU Bypass Upper/ Lower Manifold	40P8005163147

Demonstrate ILS-201 logic and end to end control. (Ref. I5-35) (Refer to attachment 10 D-10 for circuit terminations.)

8.4.3.1 Using SSR switch, turn 120VAC power OFF to SOV-3003, verify AOV-3003 is OPEN . Verify " RED " light is ON.

_____ / _____
INITIAL DATE

8.4.3.2 Using SSR switch, turn 120VAC power ON to SOV-3003. At the TSS operator's console, OPEN HS-3003 (Group 1 , slot 4) to deenergize SOV-3003, and open AOV-3003.

_____ / _____
INITIAL DATE

8.4.3.3 Confirm AOV-3003 position switch ZS-3003B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____ / _____
INITIAL DATE

8.4.3.4 CLOSE HS-3003 and confirm AOV-3003 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____ / _____
INITIAL DATE

8.4.3.5 Confirm AOV-3003 position switch ZS-3003A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____ / _____
INITIAL DATE

8.4.3.6 Actuate TSS charging and Extraction trips to confirm AOV-3003 opens . Verify HS-3003 will not actuate valve. Reset trips and hand switch.

_____ / _____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.4 For

Valve No.	Description	P&ID Reference
AOV-3004	TU Lower Manifold	40P8005163147

Demonstrate ILS-201 logic and end to end control. (Ref. I5-35) (Refer to attachment 10 D-10 for circuit terminations.)

8.4. 4.1 Using SSR switch, turn 120VAC power OFF to SOV-3004, verify AOV-3004 is CLOSED . Verify "GREEN " light is ON.

_____ / _____
INITIAL DATE

8.4. 4.2 Using SSR switch, turn 120VAC power ON to SOV-3004. At the TSS operator's console, OPEN HS-3004 (Group 1, slot 4) to energize SOV-3004, and open AOV-3004.

_____ / _____
INITIAL DATE

8.4. 4.3 Confirm AOV-3004 position switch ZS-3004 B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____ / _____
INITIAL DATE

8.4. 4.4 CLOSE HS-3004and confirm AOV-3004 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____ / _____
INITIAL DATE

8.4.4 .5 Confirm AOV-3004position switch ZS- 3004A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____ / _____
INITIAL DATE

8.4. 4 .6 Open HS- 3004. Actuate TSS charging and Extraction trips to confirm AOV- 3004 closes. Verify HS-3004 will not actuate valve. Reset trips and hand switch. Close HS-3004.

_____ / _____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.5 For

Valve No.	Description	P&ID Reference
AOV-3005	TU Bypass Upper/ Auxiliary Manifold	40P8005163147

Demonstrate ILS-201 logic and end to end control. (Ref. I5-34) (Refer to attachment 10 D-10 for circuit terminations.)

8.4.5.1 Using SSR switch, turn 120VAC power OFF to SOV-3005, verify AOV-3005 is CLOSED. Verify "GREEN" light is ON.

_____ / _____
INITIAL DATE

8.4.5.2 Using SSR switch, turn 120VAC power ON to SOV-3005. At the TSS operator's console, OPEN HS-3005(Group 1 , slot 7) to energize SOV-3005, and open AOV-3005.

_____ / _____
INITIAL DATE

8.4.5.3 Confirm AOV-3005 position switch ZS-3005B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____ / _____
INITIAL DATE

8.4.5.4 CLOSE HS-3005 and confirm AOV-3005 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____ / _____
INITIAL DATE

8.4.5.5 Confirm AOV-3005 position switch ZS-3005A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____ / _____
INITIAL DATE

8.4.5.6 Open HS-3005. Actuate TSS Extraction trip to confirm AOV-3005 closes. Verify HS-3005 will not actuate valve. Reset trip and hand switch. Close HS-3005.

_____ / _____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.6 For

Valve No.	Description	P&ID Reference
LV-3116	Bootleg Level	40P8005163143

Demonstrate ILS-201 logic and end to end control.

(Refer to attachment 10 D-10 for circuit terminations.)

8.4.6.1 Using SSR switch, turn 120VAC power OFF to SOV-3116, verify LV-3116 is CLOSED. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4.6.2 Using SSR switch, turn 120VAC power ON to SOV-3116. At the TSS operator's console, OPEN HS-3116 (Group 16, slot 8) to energize SOV-3116, and open LV-3116.

_____/_____
INITIAL DATE

8.4.6.3 Confirm LV-3116 position switch ZS-3116B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____/_____
INITIAL DATE

8.4.6.4 Actuate TSS trips and reset to confirm LV-3116 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.6.5 CLOSE HS-3116 and confirm LV-3116 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____/_____
INITIAL DATE

8.4.6.6 Confirm LV-3116 position switch ZS-3116 A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4.6.7 Additional functional of level control valve LV-3116.

A. Activate (or verify) SCU in RS#2.

B. Jumper SA301 Instrumentation Box terminals H46 to H47 to provide simulation of level switch contacts pick-up. Verify that LV-3116 opens. Verify that the high level alarm LAH-3116 is indicated on the Graphics CRT.

C. Remove Jumper and verify that high level alarm LAH-3116 is no longer indicated on Graphics CRT. Verify LV-3116 closes. Verify valve closed indication on Graphics CRT.

_____ / _____

INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.7 For

Valve No.	Description	P&ID Reference
AOV-3117	Superheater Steam Bypass	40P8005163143

Demonstrate ILS-201 logic and end to end control. (Ref. I5-37) (Refer to attachment 10 D-10 for circuit terminations.)

8.4.7.1 Using SSR switch, turn 120VAC power OFF to SOV-3117, verify AOV-3117 is CLOSED . Verify "GREEN" light is ON.

_____ / _____
INITIAL DATE

8.4.7.2 Using SSR switch, turn 120VAC power ON to SOV-3117. At the TSS operator's console, OPEN HS-3117(Group 18, slot 4) to energize SOV-3117, and open AOV-3117.

_____ / _____
INITIAL DATE

8.4.7.3 Confirm AOV-3117 position switch ZS-3117B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____ / _____
INITIAL DATE

8.4.7.4 CLOSE HS-3117 and confirm AOV-3117 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____ / _____
INITIAL DATE

8.4.7.5 Confirm AOV-3117 position switch ZS-3117A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____ / _____
INITIAL DATE

8.4.7.6 Actuate TSS Extraction trip to confirm AOV-3117 opens . Verify HS-3117 will not actuate valve. Reset trip and hand switch.

_____ / _____
INITIAL DATE

8.4.7.7 Additional functionals on valve AOV-3117 requires simulation of pressure transmitter output, or actual application of pressure to each transmitter. If simulation of pressure transmitter output is preferred, connect the CHU (4-20 ma output) to appropriate terminals in the skid instrument box. Otherwise, use a pressure gage and hand regulator to pressurize the transmitters to the levels required for valve actuation. Verify valve open actuation results from high and low pressure conditions (graphics only required).

Skid Assembly	Valve (AOV-)	Pressure Xmitter (PT-)	Instr. Box Terminals	Actuation Press. Level	Graphics Verification
SA301	3117	3702A	B52,B53	≥425 psig	___
		3702B	B55,B56	≤300 psig	___

Verify that High Steam Pressure alarm is indicated on the Graphics CRT when the simulated or actual pressure level is ≥425 psig and the valve is closed.

_____ / _____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.8 For

Valve No.	Description	P&ID Reference
AOV-3118	Superheater Steam Bypass	40P8005163143

Demonstrate ILS-201 logic and end to end control. (Ref. I5-37). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.8.1 Using SSR switch, turn 120VAC power OFF to SOV-3118, verify AOV-3118 is CLOSED . Verify "GREEN " light is ON.

_____ / _____
INITIAL DATE

8.4.8.2 Using SSR switch, turn 120VAC power ON to SOV-3118. At the TSS operator's console, OPEN HS-3118(Group 18, slot 5) to energize SOV-3118, and open AOV-3118.

_____ / _____
INITIAL DATE

8.4.8.3 Confirm AOV-3118 position switch ZS-3118B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____ / _____
INITIAL DATE

8.4.8.4 CLOSE HS-3118 and confirm AOV-3118 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____ / _____
INITIAL DATE

8.4.8.5 Confirm AOV-3118 position switch ZS-3118A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____ / _____
INITIAL DATE

8.4.8.6 Actuate TSS Extraction trip to confirm AOV-3118 opens . Verify HS-3118 will not actuate valve. Reset trip and hand switch.

_____ / _____
INITIAL DATE

8.4.8.7 Additional functionals on valve AOV-3118 requires simulation of pressure transmitter output, or actual application of pressure to each transmitter. If simulation of pressure transmitter output is preferred, connect the CHU (4-20 ma output) to appropriate terminals in the skid instrument box. Otherwise, use a pressure gage and hand regulator to pressurize the transmitters to the levels required for valve actuation. Verify valve open actuation results from high and low pressure conditions (graphics only required).

Skid Assembly	Valve (AOV-)	Pressure Xmitter (PT-)	Instr. Box Terminals	Actuation Press. Level	Graphics Verification
SA301	3118	3802A	B64,B65	≥425 psig	___
		3802B	B67,B68	≤300 psig	___

Verify that High Steam Pressure alarm is indicated on the Graphics CRT when the simulated or actual pressure level is ≥425 psig and the valve is closed.

_____ / _____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.9 For

Valve No.	Description	P&ID Reference
AOV-3206	Condenser Steam Inlet	40P8005163144

Demonstrate ILS-301 logic and end to end control.(Ref. I5-38). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.9.1 Using SSR switch, turn 120VAC power OFF to SOV-3206, verify AOV-3206 is CLOSED . Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4.9.2 Using SSR switch, turn 120VAC power ON to SOV-3206. At the TSS operator's console, OPEN HS-3206(Group 19, slot 4) to energize SOV-3206, and open AOV-3206.

_____/_____
INITIAL DATE

8.4.9.3 Confirm AOV-3206 position switch ZS-3206B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____/_____
INITIAL DATE

8.4.9.4 Actuate TSS trips and reset to confirm AOV-3206 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.9.5 CLOSE HS-3206 and confirm AOV-3206 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____/_____
INITIAL DATE

8.4.9.6 Confirm AOV-3206 position switch ZS-3206A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4. 9.7 Additional functionals of AOV-3206.

A. These require simulation of flow transmitter output. Connect the CHU to FT-3211 and simulate 150 GPM with CHU output of 5.2 ma. At the TSS graphics control panel, OPEN AOV-3206 using HS3206. Slowly reduce CHU output to about 5.0 ma until AOV-3206 closes due to low flow trip. Verify physical closure of AOV-3206, and graphics CRT indications. Verify "VALVE AOV-3206 CLOSED DUE TO LOW OIL FLOW TO CHARGING TRAIN 1" alarm is displayed on graphics CRT.

_____ / _____
INITIAL DATE

B. Do not change CHU output. Reset HS3206 and attempt to OPEN AOV-3206 using HS3206. Verify that AOV-3206 does not open. Verify "VALVE FAILED TO OPEN DUE TO LO OIL FLOW TO CHARGING TRAIN 1" alarm is displayed on graphics CRT.

_____ / _____
INITIAL DATE

C. Disconnect CHU and reconnect FT-3211 connector.

_____ / _____
INITIAL DATE

8.4.9.8 Repeat steps 8.4.9.2, 8.4.9.3, 8.4.9.5, 8.4.9.6 and 8.4.9.7 using HS-3206 from Group 21, Slot 8.

_____ / _____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.10 For

Valve No.	Description	P&ID Reference
SOV-3209	THSIP R-Cal	40P8005163144

Demonstrate ILS-301 logic and end to end control. (Ref. I5-33). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.10.1 Using SSR switch, turn 120VAC power OFF to SOV-3209, verify SOV-3209 is CLOSED.

_____/_____
INITIAL DATE

8.4.10.2 Using SSR switch, turn 120VAC power ON to SOV-3209. At the TSS operator's console, OPEN HS-3209 (Group 19, slot 3) to energize SOV-3209, and open it.

_____/_____
INITIAL DATE

8.4.10.3 Actuate TSS trips and reset to confirm SOV-3209 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.10.4 CLOSE HS-3209 and confirm SOV-3209 closes.

_____/_____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.11 For

Valve No.	Description	P&ID Reference
AOV-3218	Condenser Blanket Steam	40P8005163144

Demonstrate ILS-301 logic and end to end control. (Ref. I5-33). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.11.1 Using SSR switch, turn 120VAC power OFF to SOV-3218, verify AOV-3218 is OPEN . Verify "RED" light is ON.

_____/_____
INITIAL DATE

8.4.11.2 Using SSR switch, turn 120VAC power ON to SOV-3218. At the TSS operator's console, OPEN HS-3218(Group 30, slot 7) to deenergize SOV-3218, and open AOV-3218.

_____/_____
INITIAL DATE

8.4.11.3 Confirm AOV-3218 position switch ZS-3218B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____/_____
INITIAL DATE

8.4.11.4 Actuate TSS trips and reset to confirm AOV-3218 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.11.5 CLOSE HS-3218 and confirm AOV-3218 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____/_____
INITIAL DATE

8.4.11.6 Confirm AOV-3218 position switch ZS-3218A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.12 For

Valve No.	Description	P&ID Reference
AOV-3220	Steam Trap Vent	40P8005163144

Demonstrate ILS-301 logic and end to end control.(Ref. I5-33). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.12.1 Using SSR switch, turn 120VAC power OFF to SOV-3220, verify AOV-3220 is CLOSED . Verify " GREEN" light is ON.

_____/_____
INITIAL DATE

8.4.12.2 Using SSR switch, turn 120VAC power ON to SOV-3220 . At the TSS operator's console, OPEN HS-3220(Group 21, slot 8) to energize SOV- 3220, and open AOV-3220.

_____/_____
INITIAL DATE

8.4.12.3 Confirm AOV-3220position switch ZS-3220B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____/_____
INITIAL DATE

8.4.12.4 Actuate TSS trips and reset to confirm AOV-3220 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.12.5 CLOSE HS-3220 and confirm AOV-3220 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____/_____
INITIAL DATE

8.4.12.6 Confirm AOV-3220 position switch ZS-3220 A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.13 For

Valve No.	Description	P&ID Reference
AOV-3306	Condenser Steam Inlet	40P8005163144

Demonstrate ILS-301 logic and end to end control.

(Refer to attachment 10 D-10 for circuit terminations.)

8.4.13.1 Using SSR switch, turn 120VAC power OFF to SOV-3306, verify AOV-3306 is CLOSED. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4.13.2 Using SSR switch, turn 120VAC power ON to SOV-3306. At the TSS operator's console, OPEN HS-3306(Group 20, slot 4) to energize SOV-3306, and open AOV-3306.

_____/_____
INITIAL DATE

8.4.13.3 Confirm AOV-3306 position switch ZS-3306B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____/_____
INITIAL DATE

8.4.13.4 Actuate TSS trips and reset to confirm AOV-3306 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.13.5 CLOSE HS-3306 and confirm AOV-3306 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____/_____
INITIAL DATE

8.4.13.6 Confirm AOV-3306 position switch ZS-3306A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4.13.7 Additional functionals of AOV-3306.

A. These require simulation of flow transmitter output. Connect the CHU to FT-3310 and simulate 150 GPM with CHU output of 5.2 ma. At the TSS graphics control panel, OPEN AOV-3306 using HS3306. Slowly reduce CHU output to about 5.0 ma until AOV-3306 closes due to low flow trip. Verify physical closure of AOV-3306, and graphics CRT indications. Verify "VALVE AOV-3306 CLOSED DUE TO LOW OIL FLOW TO CHARGING TRAIN 2" alarm is displayed on graphics CRT.

_____/_____
INITIAL DATE

B. Do not change CHU output. Reset HS3306 and attempt to OPEN AOV-3306 using HS3306. Verify that AOV-3306 does not open. Verify "VALVE FAILED TO OPEN DUE TO LO OIL FLOW TO CHARGING TRAIN 2" alarm is displayed on graphics CRT.

_____/_____
INITIAL DATE

C. Disconnect CHU and reconnect FT-3310 connector.

_____/_____
INITIAL DATE

8.4.13.8 Repeat steps 8.4.13.2, 8.4.13.3, 8.4.13.5, 8.4.13.6 and 8.4.13.7 using HS-3306 from Group 22, Slot 8.

_____/_____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.14 For

Valve No.	Description	P&ID Reference
SOV-3309	THSIP R-Cal	40P8005163144

Demonstrate ILS-301 logic and end to end control. (Ref. I5-33). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.14.1 Using SSR switch, turn 120VAC power OFF to SOV-3309, verify SOV-3309 is CLOSED .

_____/_____
INITIAL DATE

8.4.14.2 Using SSR switch, turn 120VAC power ON to SOV-3309. At the TSS operator's console, OPEN HS-3309(Group 20 , slot 3) to energize SOV-3309, and open it.

_____/_____
INITIAL DATE

8.4.14.3 Actuate TSS trips and reset to confirm SOV-3309 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.14.4 CLOSE HS-3309 and confirm SOV-3309 closes.

_____/_____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.15 For

Valve No.	Description	P&ID Reference
AOV-3318	Condenser Blanket Steam	40P8005163144

Demonstrate ILS-301 logic and end to end control. (Ref. I5-33). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.15.1 Using SSR switch, turn 120VAC power OFF to SOV-3318, verify AOV-3318 is OPEN . Verify " RED " light is ON.

_____/_____
INITIAL DATE

8.4.15.2 Using SSR switch, turn 120VAC power ON to SOV-3318. At the TSS operator's console, OPEN HS-3318(Group 30 , slot 3) to deenergize SOV-3318 , and open AOV-3318.

_____/_____
INITIAL DATE

8.4.15.3 Confirm AOV-3318position switch ZS-3318B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____/_____
INITIAL DATE

8.4.15.4 Actuate TSS trips and reset to confirm AOV-3318 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.15.5 CLOSE HS-3318 and confirm AOV-3318closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____/_____
INITIAL DATE

8.4.15.6 Confirm AOV-3318 position switch ZS-3318 A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.16 For

Valve No.	Description	P&ID Reference
AOV-3320	Steam Trap Vent	40P8005163144

Demonstrate ILS-301 logic and end to end control. (Ref. I5-33). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.16.1 Using SSR switch, turn 120VAC power OFF to SOV-3320, verify AOV-3320 is CLOSED . Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4.16.2 Using SSR switch, turn 120VAC power ON to SOV-3320. At the TSS operator's console, OPEN HS-3320(Group 22, slot 8) to energize SOV-3320, and open AOV-3320.

_____/_____
INITIAL DATE

8.4.16.3 Confirm AOV-3320 position switch ZS-3320B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____/_____
INITIAL DATE

8.4.16.4 Actuate TSS trips and reset to confirm AOV-3320 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.16.5 CLOSE HS-3320 and confirm AOV-3320 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____/_____
INITIAL DATE

8.4.16.6 Confirm AOV-3320 position switch ZS-3320A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.17 For

Valve No.	Description	P&ID Reference
AOV-3707	Superheater Blanket Steam	40P8005163146

Demonstrate ILS-201 logic and end to end control. (Ref. I5-33). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.17.1 Using SSR switch, turn 120VAC power OFF to SOV-3707, verify AOV-3707 is OPEN . Verify "RED " light is ON.

_____/_____
INITIAL DATE

8.4.17.2 Using SSR switch, turn 120VAC power ON to SOV-3707. At the TSS operator's console, OPEN HS-3707(Group 25 , slot 8) to deenergize SOV-3707, and open AOV-3707.

_____/_____
INITIAL DATE

8.4.17.3 Confirm AOV-3707 position switch ZS-3707B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____/_____
INITIAL DATE

8.4.17.4 Actuate TSS trips and reset to confirm AOV-3707 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.17.5 CLOSE HS-3707 and confirm AOV-3707 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____/_____
INITIAL DATE

8.4.17.6 Confirm AOV-3707 position switch ZS-3707 A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.18 For

Valve No.	Description	P&ID Reference
AOV-3708	Boiler Water Blowdown	40P8005163146

Demonstrate ILS-201 logic and end to end control. (Ref. I5-32). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.18.1 Using SSR switch, turn 120VAC power OFF to SOV-3708, verify AOV-3708 is CLOSED. Verify "GREEN" light is ON.

_____ / _____
INITIAL DATE

8.4.18.2 Using SSR switch, turn 120VAC power ON to SOV-3708. At the TSS operator's console, OPEN HS-3708 (Group 23, slot 8) to energize SOV-3708 and open AOV-3708.

_____ / _____
INITIAL DATE

8.4.18.3 Confirm AOV-3708 position switch ZS-3708B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____ / _____
INITIAL DATE

8.4.18.4 CLOSE HS-3708 and confirm AOV-3708 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____ / _____
INITIAL DATE

8.4.18.5 Confirm AOV-3708 position switch ZS-3708A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____ / _____
INITIAL DATE

8.4.18.6 Open HS-3708. Actuate TSS Extraction trip to confirm AOV-3708 CLOSES. Verify HS-3708 will not actuate valve. Reset trip and hand switch. Close HS-3708.

_____ / _____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.19 For

Valve No.	Description	P&ID Reference
AOV-3717	Superheater Steam Outlet	40P8005163146

Demonstrate ILS-201 logic and end to end control. (Ref. I5-36). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.19.1 Using SSR switch, turn 120VAC power OFF to SOV-3717, verify AOV-3717 is OPEN . Verify " RED " light is ON.

_____/_____
INITIAL DATE

8.4.19.2 Using SSR switch, turn 120VAC power ON to SOV-3717. At the TSS operator's console, OPEN HS-3717(Group 25 , slot 8) to deenergize SOV-3717, and open AOV-3717.

_____/_____
INITIAL DATE

8.4.19.3 Confirm AOV-3717 position switch ZS-3717B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____/_____
INITIAL DATE

8.4.19.4 Actuate TSS trips and reset to confirm AOV-3717 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.19.5 CLOSE HS-3717 and confirm AOV-3717 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____/_____
INITIAL DATE

8.4.19.6 Confirm AOV-3717 position switch ZS-3717 A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4.19.7 Note that a close command signal from the Graphics Panel for valve AOV-3717 will open valve AOV-3117. Verify this event. Also, verify that "AOV-3717 close command" alarm is indicated on the Graphics CRT.

EVENT: _____/_____
INITIAL DATE

ALARM: _____/_____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.20 For

Valve No.	Description	P&ID Reference
AOV-3807	Superheater Blanket Steam	40P8005163146

Demonstrate ILS-201 logic and end to end control. (Ref. I5-33). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.20.1 Using SSR switch, turn 120VAC power OFF to SOV-3807, verify AOV-3807 is OPEN . Verify " RED " light is ON.

_____/_____
INITIAL DATE

8.4.20.2 Using SSR switch, turn 120VAC power ON to SOV-3807. At the TSS operator's console, OPEN HS-3807(Group 26 , slot 8) to deenergize SOV-3807, and open AOV-3807.

_____/_____
INITIAL DATE

8.4.20.3 Confirm AOV-3807 position switch ZS-3807B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____/_____
INITIAL DATE

8.4.20.4 Actuate TSS trips and reset to confirm AOV-3807 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.20.5 CLOSE HS-3807 and confirm AOV-3807 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____/_____
INITIAL DATE

8.4.20.6 Confirm AOV-3807 position switch ZS-3807 A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.21 For

Valve No.	Description	P&ID Reference
AOV-3808	Boiler Water Blowdown	40P8005163146

Demonstrate ILS-201 logic and end to end control. (Ref. I5-32). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.21.1 Using SSR switch, turn 120VAC power OFF to SOV-3808 , verify AOV-3808 is CLOSED . Verify "GREEN" light is ON.

_____ / _____
INITIAL DATE

8.4.21.2 Using SSR switch, turn 120VAC power ON to SOV-3808. At the TSS operator's console, OPEN HS-3808(Group 24, slot 8) to energize SOV-3808, and open AOV-3808.

_____ / _____
INITIAL DATE

8.4.21.3 Confirm AOV-3808 position switch ZS-3808B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____ / _____
INITIAL DATE

8.4.21.4 CLOSE HS-3808 and confirm AOV-3808 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____ / _____
INITIAL DATE

8.4.21.5 Confirm AOV-3808 position switch ZS-3808A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____ / _____
INITIAL DATE

8.4.21.6 Open HS-3808. Actuate TSS Extraction trip to confirm AOV-3808 closes. Verify HS-3808 will not actuate valve. Reset trip and hand switch. Close HS-3808.

_____ / _____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.22 For

Valve No.	Description	P&ID Reference
AOV-3817	Superheater Steam Outlet	40P8005163146

Demonstrate ILS-201 logic and end to end control. (Ref. I5-36). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.22.1 Using SSR switch, turn 120VAC power OFF to SOV-3817, verify AOV-3817 is OPEN . Verify " RED " light is ON.

_____/_____
INITIAL DATE

8.4.22.2 Using SSR switch, turn 120VAC power ON to SOV-3817 . At the TSS operator's console, OPEN HS- 3817(Group 26, slot 8) to deenergize SOV-3817, and open AOV-3817.

_____/_____
INITIAL DATE

8.4.22.3 Confirm AOV-3817 position switch ZS-3817 B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____/_____
INITIAL DATE

8.4.22.4 Actuate TSS trips and reset to confirm AOV-3817 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.22.5 CLOSE HS-3817 and confirm AOV-3817 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____/_____
INITIAL DATE

8.4.22.6 Confirm AOV-3817 position switch ZS-3817 A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4.22.7 Note that a close command signal from the Graphics Panel for valve AOV-3817 will open valve AOV-3118. Verify this event. Also, verify the "AOV-3817 close command" alarm is indicated on the Graphics CRT.

EVENT: _____/_____
INITIAL DATE

ALARM: _____/_____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.23 For

Valve No.	Description	P&ID Reference
AOV-3905	Extraction Pump Interconnect Oil	40P8005163145

Demonstrate ILS-301 logic and end to end control. (Ref. I5-33).

(Refer to attachment 10 D-10 for circuit terminations.)

8.4.23.1 Using SSR switch, turn 120VAC power OFF to SOV-3905, verify AOV-3905 is CLOSED . Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4.23.2 Using SSR switch, turn 120VAC power ON to SOV-3905. At the TSS operator's console, OPEN HS-3905 (Group 8 , slot 3) to energize SOV-3905, and open AOV-3905.

_____/_____
INITIAL DATE

8.4.23.3 Confirm AOV-3905 position switch ZS-3905B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____/_____
INITIAL DATE

8.4.23.4 Actuate TSS trips and reset to confirm AOV-3905 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.23.5 CLOSE HS-3905 and confirm AOV-3905 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____/_____
INITIAL DATE

8.4.23.6 Confirm AOV-3905 position switch ZS-3905A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4.23.7 Repeat steps 8.4.23.2, 8.4.23.3, 8.4.23.5 and 8.4.23.6 using HS-3905 from Group 14, Slot 6.

_____ / _____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.24 For

Valve No.	Description	P&ID Reference
AOV-3906	Extraction Pump Interconnect Oil	40P8005163145

Demonstrate ILS-301 logic and end to end control. (Ref. I5-33)

(Refer to attachment 10 D-10 for circuit terminations.)

8.4.24.1 Using SSR switch, turn 120VAC power OFF to SOV-3906, verify AOV-3906 is CLOSED . Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4.24.2 Using SSR switch, turn 120VAC power ON to SOV-3906. At the TSS operator's console, OPEN HS-3906(Group 7 , slot 3) to energize SOV-3906, and open AOV-3906.

_____/_____
INITIAL DATE

8.4.24.3 Confirm AOV-3906 position switch ZS-3906B is indicating the open position when the valve is physically open. Verify "RED" light is ON.

_____/_____
INITIAL DATE

8.4.24.4 Actuate TSS trips and reset to confirm AOV-3906 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.24.5 CLOSE HS-3906 and confirm AOV-3906 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from open to closed position.

_____/_____
INITIAL DATE

8.4.24.6 Confirm AOV-3906 position switch ZS-3906 A is indicating the closed position when the valve is physically closed. Verify "GREEN" light is ON.

_____/_____
INITIAL DATE

8.4.24.7 Repeat steps 8.4.24.2, 8.4.24.3, 8.4.24.5, and 8.4.24.6 using HS-3906 from Group 14, Slot 6.

_____ / _____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.25 For

Valve No.	Description	P&ID Reference
AOV-3907	Auxiliary Oil	40P8005163145

Demonstrate ILS-201 logic and end to end control. (Ref. I5-35). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.25.1 Using SSR switch, turn 120VAC power OFF to SOV-3907, verify AOV-3907 is in TOPMAN position. Verify "GREEN" light is ON.

INITIAL / DATE

8.4.25.2 Using SSR switch, turn 120VAC power ON to SOV-3907. At the TSS operator's console, "Open" HS-3907 (Group 1 , slot 7) to energize SOV-3907, and move AOV-3907 to AUXMAN position.

INITIAL / DATE

8.4.25.3 Confirm AOV-3907 position switch ZS-3907B is indicating the AUXMAN position when the valve is physically "open." Verify "RED" light is ON.

INITIAL / DATE

8.4.25.4 "Close" HS-3907 and confirm AOV-3907 closes. Verify that both "GREEN" and "RED" lights are ON when valve moves from AUXMAN to TOPMAN position.

INITIAL / DATE

8.4.25.5 Confirm AOV-3907 position switch ZS-3907A is indicating the TOPMAN position when the valve is physically closed. Verify "GREEN" light is ON.

INITIAL / DATE

8.4.25.6 "Open" HS-3907. Actuate TSS charging and Extraction trips to confirm AOV-3907 to TOPMAN. Verify HS-3907 will not actuate valve. Reset trips and hand switch. "Close" HS-3907.

INITIAL / DATE

8.4.25.7 Repeat steps 8.4.25.2, 8.4.25.3, 8.4.25.4, 8.4.25.5, and 8.4.25.6 using HS-3907 from Group 14, Slot 7.

_____ / _____
INITIAL DATE

8.4 Interlock Logic System Checkouts

8.4.26 For

Valve No.	Description	P&ID Reference
MOV-1030	TSS Main Steam	40P8005163148

Demonstrate ILS-301 logic and end to end control. (Ref. I5-17). (Refer to attachment 10 D-10 for circuit terminations.)

8.4.26.1 Verify that the signal conditioning unit (SCU) in RS#3 is on (electrically). Verify that valve operator power is on from motor control center "B". Verify that the MOV-1030 is in the closed position indicated by physical check and by graphics display. ("GREEN" light is ON.)

_____/_____
INITIAL DATE

8.4.26.2 Actuate the valve from the graphics display panel handswitch (HS1030). Verify that the valve travels from closed to open. ("GREEN" and "RED" lights are both ON.) See Group 16, Slot 8.

_____/_____
INITIAL DATE

8.4.26.3 Confirm MOV-1030 position switch ZS-1030B is indicating the open position when the valve is physically open. ("RED" light is ON.)

_____/_____
INITIAL DATE

8.4.26.4 Actuate TSS trips and reset to confirm MOV-1030 is not part of the TSS trip circuits. (Valve does not actuate).

_____/_____
INITIAL DATE

8.4.26.5 CLOSE HS-1030 and confirm MOV-1030 closes.

NOTE:

Valve cannot be closed until it has reached its full-open position.

_____/ _____
INITIAL DATE

8.4.26.6 Confirm MOV-1030 position switch ZS-1030A is indicating the closed position when the valve is physically closed. ("GREEN" light is ON.)

_____/ _____
INITIAL DATE

8.5. Modulating valve circuit checkouts:

8.5.1 For

Valve No.	Description	P&ID Reference
LV-74B	Flash Tank Level	40P8005163148

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.1.1 Select group 47 , slot 1 (tag number AM74B) on keyboard.

INITIAL _____ DATE _____

8.5.1.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.1.3 Input 90, 50, and 10 percent valve control levels to slot 1 (AM74B) CO and confirm the respective valve position (slot 2 , ZI 74B) indicates 90 ± 2% _____

50 ± 2% _____

10 ± 2% _____

INITIAL _____ DATE _____

8.5.1.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.1.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5.1.6 Functionals of level control valve LV-74B.

A. Activate (or verify) SCU in RS #4.

B. Connect CHU leads to LT-3112 connector (or to SA301 Instrumentation Box terminals H7 and H8) to provide simulation of level transmitter output (4-20 ma).

C. Increase CHU simulation signal to equivalent of level % shown. Verify that that the valve responds and record graphics CRT (EPGS console) level .

Valve	Set Point %	Level Set %	Graphics
LV-74B	20	< 20	——

D. Connect pressure source (ref. 6.3) to PIT-635 and increase pressure slowly to >110 PSIG.
Verify that valve LV-74B closes.
Record closing pressure _____ PSIG.
Disconnect pressure source and reconnect pressure sensing line.

E. Disconnect CHU from LT-3112 connector (or Instrumentation Box Terminals), reconnect connector to level transmitter and secure SCU.

_____/_____
Initial Date

8.5. Modulating valve circuit checkouts:

8.5. 2 For

Valve No.	Description	P&ID Reference
LV-74D-1	Flash Tank Level	40P8005163148

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5. 2.1 Select group 47 , slot 5 (tag number LCM74D1) on keyboard.

INITIAL _____ DATE _____

8.5. 2.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5. 2.3 Input 90, 50, and 10 percent valve control levels to slot 5 (LCM74D1) CO and confirm the respective valve position (slot 6 , ZI 74D1) indicates 90 ± 2% _____
50 ± 2% _____
10 ± 2% _____

INITIAL _____ DATE _____

8.5. 2.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5. 2.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5.2.6 Functionals of level control valve LV-74D-1.

A. Activate (or verify) SCU in RS #4.

B. Connect CHU leads to LT-3112 connector (or to SA301 Instrumentation Box terminals H7 and H8)to provide simulation of level transmitter output (4-20 ma).

C. Increase CHU simulationsignal to equivalent of level % shown. Verify that that the valve responds and record graphics CRT (EPGS console) level .

Valve	Set Point %	Level Set %	Graphics
LV-74D-1	80	> 80	____

D. Valve LV-74D-1 only opens when the level is >80% and valve LV-74D-2 is more than 90% open. Verify this event physically and on graphics CRT.

Physical _____ Graphics _____

E. Disconnect CHU from LT-3112 connector (or Instrumentation Box Terminals), reconnect connector to level transmitter and secure SCU.

_____/ _____
Initial Date

8.5. Modulating valve circuit checkouts:

8.5.3 For

Valve No.	Description	P&ID Reference
LV-74D-2	Flash Tank Level	40P8005163148

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.3.1 Select group 47 , slot 7 (tag number LCM74D2) on keyboard.

INITIAL _____ DATE _____

8.5.3.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.3.3 Input 90, 50, and 10 percent valve control levels to slot 7 (LCM74D2) CO and confirm the respective valve position (slot 8 , ZI 74D2) indicates 90 ± 2% _____

50 ± 2% _____

10 ± 2% _____

INITIAL _____ DATE _____

8.5.3.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.3.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5.3.6 Functionals of level control valve LV-74D-2.

A. Activate (or verify) SCU in RS #4.

B. Connect CHU leads to LT-3112 connector (or to SA301 Instrumentation Box terminals H7 and H8) to provide simulation of level transmitter output (4-20 ma).

C. Increase CHU simulation signal to equivalent of level % shown. Verify that that the valve responds and record graphics CRT (EPGS console) level .

Valve	Set Point %	Level Set %	Graphics
LV-74D-2	80	> 80	——

D. Disconnect CHU from LT-3112 connector (or Instrumentation Box Terminals), reconnect connector to level transmitter and secure SCU.

_____/_____
Initial Date

8.5. Modulating valve circuit checkouts:

8.5. 4 For

Valve No.	Description	P&ID Reference
PV-640	Flash Tank Pressure	40P8005163148

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5. 4.1 Select group 46, slot 5 (tag number AM640) on keyboard.

INITIAL _____ DATE _____

8.5.4 .2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.4 .3 Input 90, 50, and 10 percent valve control levels to slot 5 (AM640) CO and confirm the respective valve position (slot 6 , ZI 640) indicates 90 ± 2% _____

50 ± 2% _____

10 ± 2% _____

INITIAL _____ DATE _____

8.5. 4.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5. 4.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5.4.6 Functionals of pressure control valve PV-640 (normally closed).

A. Activate (or verify) SCU in RS#4.

B. Connect CHU to PT3114 connector (or to SA301 Instrumentation Box Terminals A106 and A107) to provide simulation of pressure transmitter output (4-20 ma).

C. Connect a second CHU (or other simulated pressure source) to condenser pressure Connector PIT640. Simulate condenser pressure of less than 5 inches of mercury absolute.

D. Increase simulated flash tank pressure above MVCU set point shown below. Verify that the valve opens. Record simulated flash tank pressure and flash tank pressure shown on console CRT.

VALVE	MVCU SET POINT PSIG	SIMULATED PRESSURE, PSIG	CONSOLE	CRT PRESSURE PSIG
PV-640	140	_____	EPGS	_____

E. Holding simulated flash tank pressure above 140 PSIG, increase simulated condenser pressure above MVCU set point shown below. Verify that the valve closes. Record simulated condenser pressure and condenser pressure shown on console CRT.

VALVE	MVCU SET POINT IN. HG. ABS.	SIMULATED PRESSURE IN. HG. ABS	CONSOLE	CRT PRESSURE, IN. HG. ABS
PV-640	5 inches	_____	EPGS	_____

F. Reduce simulated condenser pressure to below 5 inches of mercury absolute. Verify that the valve opens.

G. Reduce simulated flash tank pressure to below 140 PSIG. Verify that the valve closes.

H. Disconnect CHU's from PT-3114 and PIT-640 connectors. Reconnect connectors to pressure transmitters. Secure SCU.

_____/_____
INITIAL DATE

8.5. Modulating valve circuit checkouts:

8.5.5 For

Valve No.	Description	P&ID Reference
PV-647C	Flash Bank Pressure	40P8005163148

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.5.1 Select group 46, slot 1 (tag number AM647C) on keyboard.

INITIAL _____ DATE _____

8.5.5.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.5.3 Input 90, 50, and 10 percent valve control levels to slot 1 (AM647C) CO and confirm the respective valve position (slot 2 , ZI 647C) indicates 90 ± 2% _____
50 ± 2% _____
10 ± 2% _____

INITIAL _____ DATE _____

8.5.5.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.5.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5.5.6 Functionals of pressure control valve PV-647C (normally closed).

A. Activate (or verify) SCU in RS#4.

B. Connect CHU to PT3114 connector (or to SA301 Instrumentation Box Terminals A106 and A107) to provide simulation of pressure transmitter output (4-20 ma).

C. Connect a second CHU (or other simulated pressure source) to deaerator pressure Connector PIT647. Simulate deaerator pressure of less than 50 PSIA (35 PSIG).

D. Increase simulated flash tank pressure above MVCU set point shown below. Verify that the valve opens. Record simulated flash tank pressure and flash tank pressure shown on console CRT.

VALVE	MVCU SET POINT PSIG	SIMULATED PRESSURE, PSIG	CONSOLE	CRT PRESSURE PSIG
PV-647	135	_____	EPGS	_____

E. Holding simulated flash tank pressure above 135 PSIG, increase simulated deaerator pressure above MVCU set point shown below. Verify that the valve closes. Record simulated deaerator pressure and deaerator pressure shown on console CRT.

VALVE	MVCU SET POINT PSIG	SIMULATED PRESSURE PSIG	CONSOLE	CRT PRESSURE, PSIG
PV-647	35 PSIG	_____	EPGS	_____

F. Reduce simulated deaerator pressure to below 35 PSIG. Verify that the valve opens.

G. Reduce simulated flash tank pressure to below 135 PSIG. Verify that the valve closes.

H. Disconnect CHU's from PT-3114 and PIT-647 connectors. Reconnect connectors to pressure transmitters. Secure SCU.

_____ / _____
INITIAL DATE

8.5 Modulating valve circuit checkouts:

8.5.6 For

Valve No.	Description	P&ID Reference
TV-1420	Blowdown Tank Water Temperature	40P8005163146

8.5.6.1 Verify that instrument air hand valve TIAIS-8 is closed and instrument air pressure downstream is 0 PSIG (momentarily open accumulator drain valve TIAADV-8).

_____/_____
INITIAL DATE

8.5.6.2 Connect CHU to TC1420 connector. Verify that with no signal (0 mv) from CHU, that valve is closed.

_____/_____
INITIAL DATE

8.5.6.3 Open instrument air hand valve TIAIS-8 and verify instrument air pressure is >60 PSIG (no alarm signal from PS3099.) Verify physically that valve remains closed.

_____/_____
INITIAL DATE

8.5.6.4 Increase signal from CHU to 140°F temperature equivalent. Verify physically that valve responds (opens)

_____/_____
INITIAL DATE

8.5.6.5 Disconnect CHU from TC1420 connector and reconnect temperature controller.

_____/_____
INITIAL DATE

8.5. Modulating valve circuit checkouts:

8.5.7 For

Valve No.	Description	P&ID Reference
UV-3102	Desuperheater Inlet Steam	40P8005163143

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.7.1 Select group 33, slot 1 (tag number AM3102) on keyboard.

INITIAL _____ DATE _____

8.5.7.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.7.3 Input 90, 50, and 10 percent valve control levels to slot 1 (AM3102) CO and confirm the respective valve position (slot 2 , ZI 3102) indicates 90 ± 2% _____
50 ± 2% _____
10 ± 2% _____

INITIAL _____ DATE _____

8.5.7.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.7.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5. Modulating valve circuit checkouts:

8.5.8 For

Valve No.	Description	P&ID Reference
TV-3105	Desuperheater Water	40P8005163143

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.8.1 Select group 34 , slot 1 (tag number FCM3105) on keyboard.

INITIAL _____ DATE _____

8.5.8.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.8.3 Input 90, 50, and 10 percent valve control levels to slot 1 (FCM3105) CO and confirm the respective valve position (slot 2 , ZI 3105) indicates 90 ± 2% _____

50 ± 2% _____

10 ± 2% _____

INITIAL _____ DATE _____

8.5.8.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.8.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5. Modulating valve circuit checkouts:

8.5.9 For

Valve No.	Description	P&ID Reference
PV-3110	Steam Trap Water Pressure	40P8005163143

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.9.1 Select group 39 , slot 1 (tag number PCM3110) on keyboard.

INITIAL _____ DATE _____

8.5.9.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.9.3 Input 90, 50, and 10 percent valve control levels to slot 1 (PCM3110) CO and confirm the respective valve position (slot 2 , ZI 3110) indicates 90 ± 2% _____
50 ± 2% _____
10 ± 2% _____

INITIAL _____ DATE _____

8.5.9.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.9.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5. Modulating valve circuit checkouts:

8.5.10 For

Valve No.	Description	P&ID Reference
PV-3111	Steam Trap Water Pressure	40P8005163143

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.10.1 Select group 39, slot 5 (tag number PCM3111) on keyboard.

INITIAL _____ DATE _____

8.5.10.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.10.3 Input 90, 50, and 10 percent valve control levels to slot 5 (PCM3111) CO and confirm the respective valve position (slot 6 , ZI 3111) indicates 90 ± 2% _____
50 ± 2% _____
10 ± 2% _____

INITIAL _____ DATE _____

8.5.10.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.10.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5. Modulating valve circuit checkouts:

8.5.11 For

Valve No.	Description	P&ID Reference
TV-3410	Condenser Oil Temperature	40P8005163142

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.11.1 Select group 45 , slot 1 (tag number TCM3410) on keyboard.

INITIAL _____ DATE _____

8.5.11.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.11.3 Input 90, 50, and 10 percent valve control levels to slot 1 (TCM3410) CO and confirm the respective valve position (slot 2 , ZI 3410) indicates 90 ± 2% _____

50 ± 2% _____

10 ± 2% _____

INITIAL _____ DATE _____

8.5.11.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.11.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5. Modulating valve circuit checkouts:

8.5.12 For

Valve No.	Description	P&ID Reference
TV-3411	Condenser Oil Temperature	40P8005163142

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.12.1 Select group 41 , slot1 (tag number TCM3411) on keyboard.

INITIAL _____ DATE _____

8.5.12.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.12.3 Input 90, 50, and 10 percent valve control levels to slot 1 (TCM3411) CO and confirm the respective valve position (slot 2 , ZI 3411) indicates 90 ± 2% _____
50 ± 2% _____
10 ± 2% _____

INITIAL _____ DATE _____

8.5.12.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.12.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5. Modulating valve circuit checkouts:

8.5.13 For

Valve No.	Description	P&ID Reference
LV-3505	Boiler Water Level	40P8005163146

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.13.1 Select group 36, slot 1 (tag number LCM3505) on keyboard.

INITIAL _____ DATE _____

8.5.13.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.13.3 Input 90, 50, and 10 percent valve control levels to slot 1 (LCM3505) CO and confirm the respective valve position (slot 2 , ZI 3505) indicates 90 ± 2% _____
50 ± 2% _____
10 ± 2% _____

INITIAL _____ DATE _____

8.5.13.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.13.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5. Modulating valve circuit checkouts:

8.5.14 For

Valve No.	Description	P&ID Reference
LV-3605	Boiler Water Level	40P8005163146

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

_____ _____
INITIAL DATE

8.5.14.1 Select group 36 , slot 5 (tag number LCM3605) on keyboard.

_____ _____
INITIAL DATE

8.5.14.2 Select manual control mode, and output select.

_____ _____
INITIAL DATE

8.5.14.3 Input 90, 50, and 10 percent valve control levels to slot 5 (LCM3605) CO and confirm the respective valve position (slot 6 , ZI 3605) indicates 90 ± 2% _____
50 ± 2% _____
10 ± 2% _____

_____ _____
INITIAL DATE

8.5.14.4 Input 100 percent and confirm valve is fully open.

_____ _____
INITIAL DATE

8.5.14.5 Input 0 percent and confirm valve is fully closed.

_____ _____
INITIAL DATE

8.5. Modulating valve circuit checkouts:

8.5.15 For

Valve No.	Description	P&ID Reference
PV-3702	Boiler Oil	40P8005163145

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.15.1 Select group 35 , slot 1 (tag number AM3702) on keyboard.

INITIAL _____ DATE _____

8.5.15.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.15.3 Input 90, 50, and 10 percent valve control levels to slot 1 (AM3702) CO and confirm the respective valve position (slot 2 , ZI 3702) indicates 90 ± 2% _____
50 ± 2% _____
10 ± 2% _____

INITIAL _____ DATE _____

8.5.15.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.15.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5. Modulating valve circuit checkouts:

8.5.16 For

Valve No.	Description	P&ID Reference
TV-3710	Superheater Oil	40P8005163145

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.16.1 Select group 37, slot 1 (tag number FCM3710) on keyboard.

INITIAL _____ DATE _____

8.5.16.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.16.3 Input 90, 50, and 10 percent valve control levels to slot 1 (FCM3710) CO and confirm the respective valve position (slot 2, ZI 3710) indicates 90 ± 2% _____

50 ± 2% _____

10 ± 2% _____

INITIAL _____ DATE _____

8.5.16.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.16.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5. Modulating valve circuit checkouts:

8.5.17 For

Valve No.	Description	P&ID Reference
PV-3802	Boiler Oil	40P8005163145

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.17.1 Select group 38 , slot 1 (tag number AM3802) on keyboard.

INITIAL _____ DATE _____

8.5.17.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.17.3 Input 90, 50, and 10 percent valve control levels to slot 1 (AM3802) CO and confirm the respective valve position (slot 2 , ZI 3802) indicates 90 ± 2% _____
50 ± 2% _____
10 ± 2% _____

INITIAL _____ DATE _____

8.5.17.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.17.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5. Modulating valve circuit checkouts:

8.5.18 For

Valve No.	Description	P&ID Reference
TV-3810	Superheater Oil	40P8005163145

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.18.1 Select group 37, slot 5 (tag number FCM3810) on keyboard.

INITIAL _____ DATE _____

8.5.18.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.18.3 Input 90, 50, and 10 percent valve control levels to slot 5 (FCM3810) CO and confirm the respective valve position (slot 6 , ZI 3810) indicates 90 ± 2% _____
50 ± 2% _____
10 ± 2% _____

INITIAL _____ DATE _____

8.5.18.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.18.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.5. Modulating valve circuit checkouts:

8.5.19 For

Valve No.	Description	P&ID Reference
PV-3910	Auxiliary Pump Oil	40P8005163145

Manually exercise the modulating control valves from the operator's console to confirm the control and valve position indication is functioning properly. Confirm that the end to end checkouts in Appendix 10D-11 have been completed prior to this functional test.

INITIAL _____ DATE _____

8.5.19.1 Select group 44, slot 1 (tag number PCM3910) on keyboard.

INITIAL _____ DATE _____

8.5.19.2 Select manual control mode, and output select.

INITIAL _____ DATE _____

8.5.19.3 Input 90, 50, and 10 percent valve control levels to slot 1 (PCM3910) CO and confirm the respective valve position (slot 2, ZI 3910) indicates 90 ± 2% _____
50 ± 2% _____
10 ± 2% _____

INITIAL _____ DATE _____

8.5.19.4 Input 100 percent and confirm valve is fully open.

INITIAL _____ DATE _____

8.5.19.5 Input 0 percent and confirm valve is fully closed.

INITIAL _____ DATE _____

8.6 Pump Functionals

8.6.1	For	Pump No.	Description	P&ID Reference	I5 Ref.
		P-301	Charging Oil Pump	40P8005163142	-31

Verify that all mechanical, electrical and control checks have been completed per Appendices 10C, D and E for the pump. Verify that couplings between motor and pump are NOT connected. Verify that pump breaker trips are reset and annunciators lit.

_____ / _____
INITIAL DATE

8.6.1.1 Trip main pump breaker LT-1T. Disconnect output motor cables from bottom of Starter unit of the Variable Speed Drive Control. Also remove blower motor starter heater overload links (for the pump motor blower) in the Variable Speed Drive Control Cabinet. Tests will not energize pump motor, but will energize pump motor Starter Contacts. Pump motor operation will be verified by observing Starter Contacts engage (pull-in), or by also installing multimeter on output motor cable lugs. After disconnecting cables, reset main pump breaker LT-IT.

_____ / _____
INITIAL DATE

8.6.1. 2 Place AUTO/MANUAL switch on TSS Function Panel in MANUAL prior to checking the pump P-301 control. Verify MANUAL switch backlighted. Call up pump P-301 display on the graphics control panel CRT (group 3, slot 4) and activate HS3413B (check both light pen and keyboard "loop activate"). Verify MANUAL light lit on CRT. Verify that HS3413B on graphics control panel does not START pump (contacts don't pull-in).

_____ / _____
INITIAL DATE

NOTE

On TSS Function Panel, handswitch START will light red START light and green STOP light will also stay lit until flow increases to >100 GPM, then green STOP light will go out. On graphics control panel CRT, handswitch START will light red START indication, but red RUN indication will not light until flow increases to >100 GPM.

8.6.1.3 On the TSS Function Panel, stroke HS3413A to START, then to STOP after a maximum of 15 seconds.

NOTE

The low oil flow timer should STOP the pump in 10 seconds (See 8.6.1.4).

Verify TSS Function Panel indications (both START and STOP lights lit). In the Starter unit of the Variable Speed Drive Control, verify that the Starter Contacts engage (pull-in).

INITIAL _____ / DATE _____

8.6.1.4 After 10 sec. verify that pump STOP occurs due to low oil flow trip (red START light goes out.) Verify LO FLO alarm on CRT and acknowledge. Verify that pump START cannot now be accomplished (no contact pull-in) until trip is reset by pushing STOP position of HS3413A. Verify LO FLO alarm disappears after reset.

INITIAL _____ / DATE _____

8.6.1.5 Connect CHU to FT3211 flow meter connector. Adjust CHU output to simulate <100 GPM (4.7 ma). Place AUTO/MANUAL switch on TSS Function Panel in AUTO. Verify AUTO switch backlighted on TSS Function Panel and on graphics control panel CRT. Verify that pump P-301 will not START from HS3413A on the TSS Function Panel (Red START light does not go on and starter contacts don't pull-in). Start pump P-301 from the graphics control panel by key stroke START switch HS3413B . Increase CHU output to ~150 GPM (5.2 ma) within 10 seconds to avoid low oil flow trip.

NOTE

In all cases, CHU simulated flow must be increased to >100 GPM after pump START to obtain proper startup indications, and reduced to <100 GPM after pump STOP to obtain proper shutdown indications.

Verify pump P-301 STOP from TSS Function Panel HS3413A . Verify that pump motor starter contacts engage and disengage, and operation is verified on the TSS Function Panel and on graphics CRT. (Must reduce CHU output to 4.7 ma after STOP). Verify that AUTO/MANUAL switch and lights return to MANUAL.

_____/_____
INITIAL DATE

8.6.1.6 Again place AUTO/MANUAL switch on TSS Function Panel in AUTO. Again START pump P-301 from the graphics control panel HS3413B , and then STOP from graphics control panel HS3413B . Verify that pump motor starter contacts engage and disengage, and operation is verified on graphics CRT, and TSS Function Panel.

INITIAL _____ / DATE _____

8.6.1.7 Repeat 8.6.1.6 but do not signal pump stop from the hand switch. Provide a charge or extraction trip signal to the RLU from the TSS Function Panel. Verify that pump motor starter contacts break; verify STOP indications on the graphics CRT, and on the TSS Function Panel.

INITIAL _____ / DATE _____

8.6.1.8 Repeat 8.6.1.6 but do not signal pump stop from the hand switch. Provide a pump controller GFI trip signal at GD relay (terminals 7 and 8) in the Variable Speed Drive cabinet. Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove GFI trip signal after contacts break. Verify contacts remain broken after GFI trip signal removed.

INITIAL _____ / DATE _____

8.6.1.9 Repeat 8.6.1.6 but do not signal pump stop from the hand switch. Provide a pump motor current overload signal by operating overload contacts in the motor starter in the Variable Speed Drive Cabinet. Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove current overload signal after starter contacts break. Verify starter contacts remain broken after reset (or signal removal) of overload contacts.

INITIAL _____ / DATE _____

8.6.1.10 Repeat 8.6.1.6 but do not signal pump stop from the hand switch. Provide a pump motor overtemp signal at pump P-301 skid control T-box (terminals 19 and 20). Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove motor overtemp signal after starter contacts break. Verify starter contacts remain broken after motor overtemp signal removed.

INITIAL _____ / DATE _____

8.6. 1.11 Repeat 8.6.1.6 but do not signal pump stop from the hand switch. Provide a pump low coolant flow signal at pump P-301 skid control T-box (terminals 19 and 25). Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove low coolant flow signal after starter contacts break. Verify starter contacts remain broken after low coolant flow signal removed.

_____ / _____
INITIAL DATE

8.6. 1.12 Repeat 8.6.1.6 but do not signal pump stop from the hand switch. Provide a pump seal leakage signal at pump P-301 skid control T-box (terminals 19 and 23). Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove seal leakage signal after starter contacts break. Verify starter contacts remain broken after seal leakage signal removed.

_____ / _____
INITIAL DATE

8.6.1.13 Repeat 8.6.1.6 but do not signal pump stop from the hand switch. Provide an inverter overtemp signal by disconnecting THSW terminals 1 or 2 in the Variable Speed Drive Cabinet. Verify that pump motor starter contacts break and verify by STOP indications on the graphics CRT and on the TSS Function Panel. Remove inverter overtemp signal after starter contacts break. Verify starter contacts remain broken after inverter overtemp signal removed.

INITIAL / DATE

8.6.1.14 Trip main pump breaker LT-1T. Reconnect output motor cables to bottom of Starter unit of the Variable Speed Drive Control. Replace blower motor starter heater overload links. Reset main pump breaker LT-1T. Repeat 8.6.1.6 but do not signal pump stop from the hand switch. Increase CHU simulation signal to equivalent of flow transmitter output = 500 GPM (8.0 ma). Verify speed and power indications on graphics CRT. Verify pump operation is also shown on graphics display (page 47). Verify HS3413B on this display STOPS and STARTS pump. Verify speed and power indications on this display. Verify physical operation of the motor, and correct motor rotation. Stop the pump (motor) by placing hand switch HS3413B in STOP position. Verify pump motor stop. Remove CHU from FT3211 flow meter connector and reconnect.

INITIAL / DATE

8.6.1.15 On graphics control panel CRT, call up P-301 display on group 42, slot 4. Place AUTO/MANUAL switch on TSS Function Panel in AUTO. Verify that HS3413B on this display STARTS pump and low oil flow trip STOPS pump. Verify LO FLO alarm on CRT, acknowledge and reset by pushing STOP position of HS3413A. Verify LO FLO alarm disappears after reset.

_____ / _____
INITIAL DATE

8.6 Pump Functionals

8.6.2	For	Pump No.	Description	P&ID Reference	I5 Ref.
		P-302	Charging Oil Pump	40P8005163142	-31

Verify that all mechanical, electrical and control checks have been completed per Appendices 10C, D and E for the pump. Verify that couplings between motor and pump are NOT connected. Verify that pump breaker trips are reset and annunciators lit.

_____ / _____
INITIAL DATE

8.6.2.1 Trip main pump breaker LT-1T. Disconnect output motor cables from bottom of Starter unit of the Variable Speed Drive Control. Also remove blower motor starter heater overload links (for the pump motor blower) in the Variable Speed Drive Control Cabinet. Tests will not energize pump motor, but will energize pump motor Starter Contacts. Pump motor operation will be verified by observing Starter Contacts engage (pull-in), or by also installing multimeter on output motor cable lugs. After disconnecting cables, reset main pump breaker LT-IT.

_____ / _____
INITIAL DATE

8.6.2.2 Place AUTO/MANUAL switch on TSS Function Panel in MANUAL prior to checking the pump P-302 control. Verify MANUAL switch backlighted. Call up pump P-302 display on the graphics control panel CRT (group 4, slot 4) and activate HS3414B(check both light pen and keyboard "loop activate"). Verify MANUAL light lit on CRT. Verify that HS3414B on graphics control panel does not START pump (contacts don't pull-in).

_____ / _____
INITIAL DATE

NOTE

On TSS Function Panel, handswitch START will light red START light and green STOP light will also stay lit until flow increases to >100 GPM, then green STOP light will go out. On graphics control panel CRT, handswitch START will light red START indication, but red RUN indication will not light until flow increases to >100 GPM.

8.6.2.3 On the TSS Function Panel, stroke HS3414A to START, then to STOP after a maximum of 15 seconds.

NOTE

The low oil flow timer should STOP the pump in 10 seconds (See 8.6.2.4).

Verify TSS Function Panel indications (both START and STOP lights lit). In the Starter unit of the Variable Speed Drive Control, verify that the Starter Contacts engage (pull-in).

_____ / _____
INITIAL DATE

8.6.2.4 After 10 sec. verify that pump STOP occurs due to low oil flow trip (red START light goes out.) Verify LO FLO alarm on CRT and acknowledge. Verify that pump START cannot now be accomplished (no contact pull-in) until trip is reset by pushing STOP position of HS3414A. Verify LO FLO alarm disappears after reset.

_____ / _____
INITIAL DATE

8.6.2.5 Connect CHU to FT3310 flow meter connector. Adjust CHU output to simulate <100 GPM (4.7 ma). Place AUTO/MANUAL switch on TSS Function Panel in AUTO. Verify AUTO switch backlighted on TSS Function Panel and on graphics control panel CRT. Verify that pump P-302 will not START from HS3414A on the TSS Function Panel (Red START light does not go on and starter contacts don't pull-in). Start pump P-302 from the graphics control panel by key stroke START switch HS3414B . Increase CHU output to ~150 GPM (5.2 ma) within 10 seconds to avoid low oil flow trip.

NOTE

In all cases, CHU simulated flow must be increased to >100 GPM after pump START to obtain proper startup indications, and reduced to <100 GPM after pump STOP to obtain proper shutdown indications.

Verify pump P-302 STOP from TSS Function Panel HS3414A . Verify that pump motor starter contacts engage and disengage, and operation is verified on the TSS Function Panel and on graphics CRT. (Must reduce CHU output to 4.7 ma after STOP). Verify that AUTO/MANUAL switch and lights return to MANUAL.

_____/_____
INITIAL DATE

8.6.2.6 Again place AUTO/MANUAL switch on TSS Function Panel in AUTO. Again START pump P-302 from the graphics control panel HS3414B , and then STOP from graphics control panel HS3414B . Verify that pump motor starter contacts engage and disengage, and operation is verified on graphics CRT, and TSS Function Panel.

INITIAL / DATE

8.6.2.7 Repeat 8.6.2.6 but do not signal pump stop from the hand switch. Provide a charge or extraction trip signal to the RLU from the TSS Function Panel. Verify that pump motor starter contacts break; verify STOP indications on the graphics CRT, and on the TSS Function Panel.

INITIAL / DATE

8.6.2.8 Repeat 8.6.2.6 but do not signal pump stop from the hand switch. Provide a pump controller GFI trip signal at GD relay (terminals 7 and 8) in the Variable Speed Drive cabinet. Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove GFI trip signal after contacts break. Verify contacts remain broken after GFI trip signal removed.

INITIAL / DATE

8.6.2.9 Repeat 8.6.2.6 but do not signal pump stop from the hand switch. Provide a pump motor current overload signal by operating overload contacts in the motor starter in the Variable Speed Drive Cabinet. Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove current overload signal after starter contacts break. Verify starter contacts remain broken after reset (or signal removal) of overload contacts.

INITIAL _____ / DATE _____

8.6.2.10 Repeat 8.6.2.6 but do not signal pump stop from the hand switch. Provide a pump motor overtemp signal at pump P-302 skid control T-box (terminals 29 and 30). Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove motor overtemp signal after starter contacts break. Verify starter contacts remain broken after motor overtemp signal removed.

INITIAL _____ / DATE _____

8.6.2.11 Repeat 8.6.2.6 but do not signal pump stop from the hand switch. Provide a pump low coolant flow signal at pump P-302 skid control T-box (terminals 29 and 35). Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove low coolant flow signal after starter contacts break. Verify starter contacts remain broken after low coolant flow signal removed.

_____ / _____
INITIAL DATE

8.6.2.12 Repeat 8.6.2.6 but do not signal pump stop from the hand switch. Provide a pump seal leakage signal at pump P-302 skid control T-box (terminals 29 and33). Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove seal leakage signal after starter contacts break. Verify starter contacts remain broken after seal leakage signal removed.

_____ / _____
INITIAL DATE

8.6.2.13 Repeat 8.6.2.6 but do not signal pump stop from the hand switch. Provide an inverter overtemp signal by disconnecting THSW terminals 1 or 2 in the Variable Speed Drive Cabinet. Verify that pump motor starter contacts break and verify by STOP indications on the graphics CRT and on the TSS Function Panel. Remove inverter overtemp signal after starter contacts break. Verify starter contacts remain broken after inverter overtemp signal removed.

_____ / _____
INITIAL DATE

8.6.2.14 Trip main pump breaker LT-1T. Reconnect output motor cables to bottom of Starter unit of the Variable Speed Drive Control. Replace blower motor starter heater overload links. Reset main pump breaker LT-1T. Repeat 8.6.2.6 but do not signal pump stop from the hand switch. Increase CHU simulation signal to equivalent of flow transmitter output = 500 GPM (8.0 ma). Verify speed and power indications on graphics CRT. Verify pump operation is also shown on graphics display (page 48). Verify HS3414B on this display STOPS and STARTS pump. Verify speed and power indications on this display. Verify physical operation of the motor, and correct motor rotation. Stop the pump (motor) by placing hand switch HS3414B in STOP position. Verify pump motor stop. Remove CHU from FT3310 flow meter connector and reconnect.

_____ / _____
INITIAL DATE

8.6.2.15 On graphics control panel CRT, call up P-302 display on group 42, slot 8. Place AUTO/MANUAL switch on TSS Function Panel in AUTO. Verify that HS3414B on this display STARTS pump and low oil flow trip STOPS pump. Verify LO FLO alarm on CRT, acknowledge and reset by pushing STOP position of HS3414A. Verify LO FLO alarm disappears after reset.

_____ / _____
INITIAL DATE

8.6 Pump Functionals

8.6.3 For	Pump No.	Description	P&ID Reference	I5 Ref.
	P-303	Extraction Oil Pump	40P8005163145	-31

Verify that all mechanical, electrical and control checks have been completed per Appendices 10C, D and E for the pump. Verify that couplings between motor and pump are NOT connected. Verify that pump breaker trips are reset and annunciators lit.

_____ / _____
INITIAL DATE

8.6.3.1 Trip main pump breaker LT-1T. Disconnect output motor cables from bottom of Starter unit of the Variable Speed Drive Control. Also remove blower motor starter heater overload links (for the pump motor blower) in the Variable Speed Drive Control Cabinet. Tests will not energize pump motor, but will energize pump motor Starter Contacts. Pump motor operation will be verified by observing Starter Contacts engage (pull-in), or by also installing multimeter on output motor cable lugs. After disconnecting cables, reset main pump breaker LT-IT.

_____ / _____
INITIAL DATE

8.6.3.2 Place AUTO/MANUAL switch on TSS Function Panel in MANUAL prior to checking the pump P-303 control. Verify MANUAL switch backlighted. Call up pump P-303 display on the graphics control panel CRT (group 7, slot 4) and activate HS3903A (check both light pen and keyboard "loop activate"). Verify MANUAL light lit on CRT. Verify that HS3903A on graphics control panel does not START pump (contacts don't pull-in).

_____ / _____
INITIAL DATE

NOTE

On TSS Function Panel, handswitch START will light red START light and green STOP light will also stay lit until flow increases to >100 GPM, then green STOP light will go out. On graphics control panel CRT, handswitch START will light red START indication, but red RUN indication will not light until flow increases to >100 GPM.

8.6.3.3 On the TSS Function Panel, stroke HS3903B to START, then to STOP after a maximum of 15 seconds.

NOTE

The low oil flow timer should STOP the pump in 10 seconds (See 8.6.3.4).

Verify TSS Function Panel indications (both START and STOP lights lit). In the Starter unit of the Variable Speed Drive Control, verify that the Starter Contacts engage (pull-in).

_____ / _____
INITIAL DATE

8.6.3.4 After 10 sec. verify that pump STOP occurs due to low oil flow trip (red START light goes out.) Verify LO FLO alarm on CRT and acknowledge. Verify that pump START cannot now be accomplished (no contact pull-in) until trip is reset by pushing STOP position of HS3903B. Verify LO FLO alarm disappears after reset.

_____ / _____
INITIAL DATE

8.6.3.5 Connect CHU to FT3712 flow meter connector. Adjust CHU output to simulate <100 GPM (4.7 ma). Place AUTO/MANUAL switch on TSS Function Panel in AUTO. Verify AUTO switch backlighted on TSS Function Panel and on graphics control panel CRT. Verify that pump P-303 will not START from HS3903B on the TSS Function Panel (Red START light does not go on and starter contacts don't pull-in). Start pump P-303 from the graphics control panel by key stroke START switch HS3903A . Increase CHU output to ~150 GPM (6.6 ma) within 10 seconds to avoid low oil flow trip.

NOTE

In all cases, CHU simulated flow must be increased to >100 GPM after pump START to obtain proper startup indications, and reduced to <100 GPM after pump STOP to obtain proper shutdown indications.

Verify pump P-303 STOP from TSS Function Panel HS3903B . Verify that pump motor starter contacts engage and disengage, and operation is verified on the TSS Function Panel and on graphics CRT. (Must reduce CHU output to 4.7 ma after STOP). Verify that AUTO/MANUAL switch and lights return to MANUAL.

_____/_____
INITIAL DATE

Repeat above with CHU connected to FT3706 with 5.5 ma output. Reconnect FT3712 flowmeter.

_____/_____
INITIAL DATE

8.6.3.6 Again place AUTO/MANUAL switch on TSS Function Panel in AUTO. Again START pump P-303 from the graphics control panel HS3903A , and then STOP from graphics control panel HS3903A . Verify that pump motor starter contacts engage and disengage, and operation is verified on graphics CRT, and TSS Function Panel.

INITIAL _____ / DATE _____

8.6.3.7 Repeat 8.6.3.6 but do not signal pump stop from the hand switch. Provide a charge or extraction trip signal to the RLU from the TSS Function Panel. Verify that pump motor starter contacts break; verify STOP indications on the graphics CRT, and on the TSS Function Panel.

INITIAL _____ / DATE _____

8.6.3.8 Repeat 8.6.3.6 but do not signal pump stop from the hand switch. Provide a pump controller GFI trip signal at GD relay (terminals 7 and 8) in the Variable Speed Drive cabinet. Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove GFI trip signal after contacts break. Verify contacts remain broken after GFI trip signal removed.

INITIAL _____ / DATE _____

8.6.3.9 Repeat 8.6.3.6 but do not signal pump stop from the hand switch. Provide a pump motor current overload signal by operating overload contacts in the motor starter in the Variable Speed Drive Cabinet. Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove current overload signal after starter contacts break. Verify starter contacts remain broken after reset (or signal removal) of overload contacts.

INITIAL _____ / DATE _____

8.6.3.10 Repeat 8.6.3.6 but do not signal pump stop from the hand switch. Provide a pump motor overtemp signal at pump P-303 skid control T-box (terminals 19 and 20). Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove motor overtemp signal after starter contacts break. Verify starter contacts remain broken after motor overtemp signal removed.

INITIAL _____ / DATE _____

8.6.3.11 Repeat 8.6.3.6 but do not signal pump stop from the hand switch. Provide a pump low coolant flow signal at pump P-303 skid control T-box (terminals 19 and 25). Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove low coolant flow signal after starter contacts break. Verify starter contacts remain broken after low coolant flow signal removed.

_____ / _____
INITIAL DATE

8.6.3.12 Repeat 8.6.3.6 but do not signal pump stop from the hand switch. Provide a pump seal leakage signal at pump P-303 skid control T-box (terminals 19 and 23). Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove seal leakage signal after starter contacts break. Verify starter contacts remain broken after seal leakage signal removed.

_____ / _____
INITIAL DATE

8.6.3.13 Repeat 8.6.3.6 but do not signal pump stop from the hand switch. Provide an inverter overtemp signal by disconnecting THSW terminals 1 or 2 in the Variable Speed Drive Cabinet. Verify that pump motor starter contacts break and verify by STOP indications on the graphics CRT and on the TSS Function Panel. Remove inverter overtemp signal after starter contacts break. Verify starter contacts remain broken after inverter overtemp signal removed.

_____ / _____
INITIAL DATE

8.6.3.14 Trip main pump breaker LT-1T. Reconnect output motor cables to bottom of Starter unit of the Variable Speed Drive Control. Replace blower motor starter heater overload links. Reset main pump breaker LT-1T. Repeat 8.6.3.6 but do not signal pump stop from the hand switch. Increase CHU simulation signal to equivalent of flow transmitter output = 500 GPM (9.2 ma). Verify speed and power indications on graphics CRT. Verify pump operation is also shown on graphics display (page 49). Verify HS3 903A on this display STOPS and STARTS pump. Verify speed and power indications on this display. Verify physical operation of the motor, and correct motor rotation. Stop the pump (motor) by placing hand switch HS3 903A in STOP position. Verify pump motor stop. Remove CHU from FT3 706 flow meter connector and reconnect.

_____ / _____
INITIAL DATE

8.6.3.15 On graphics control panel CRT, call up P-303 display on group 43, slot 4. Place AUTO/MANUAL switch on TSS Function Panel in AUTO. Verify that HS3903A on this display STARTS pump and low oil flow trip STOPS pump. Verify LO FLO alarm on CRT, acknowledge and reset by pushing STOP position of HS3903B. Verify LO FLO alarm disappears after reset.

_____ / _____
INITIAL DATE

8.6 Pump Functionals

8.6.4	For	Pump No.	Description	P&ID Reference	I5 Ref.
		P-304	Extraction Oil Pump	40P800516314 5	-31

Verify that all mechanical, electrical and control checks have been completed per Appendices 10C, D and E for the pump. Verify that couplings between motor and pump are NOT connected. Verify that pump breaker trips are reset and annunciators lit.

INITIAL _____ / DATE _____

8.6.4.1 Trip main pump breaker LT-1T. Disconnect output motor cables from bottom of Starter unit of the Variable Speed Drive Control. Also remove blower motor starter heater overload links (for the pump motor blower) in the Variable Speed Drive Control Cabinet. Tests will not energize pump motor, but will energize pump motor Starter Contacts. Pump motor operation will be verified by observing Starter Contacts engage (pull-in), or by also installing multimeter on output motor cable lugs. After disconnecting cables, reset main pump breaker LT-IT.

INITIAL _____ / DATE _____

8.6.4.2 Place AUTO/MANUAL switch on TSS Function Panel in MANUAL prior to checking the pump P-304 control. Verify MANUAL switch backlighted. Call up pump P-304 display on the graphics control panel CRT (group 8, slot 4) and activate HS3904A(check both light pen and keyboard "loop activate"). Verify MANUAL light lit on CRT. Verify that HS3904A on graphics control panel does not START pump (contacts don't pull-in).

INITIAL _____ / DATE _____

NOTE

On TSS Function Panel, handswitch START will light red START light and green STOP light will also stay lit until flow increases to >100 GPM, then green STOP light will go out. On graphics control panel CRT, handswitch START will light red START indication, but red RUN indication will not light until flow increases to >100 GPM.

8.6.4.3 On the TSS Function Panel, stroke HS3904B to START, then to STOP after a maximum of 15 seconds.

NOTE

The low oil flow timer should STOP the pump in 10 seconds (See 8.6.4.4).

Verify TSS Function Panel indications (both START and STOP lights lit). In the Starter unit of the Variable Speed Drive Control, verify that the Starter Contacts engage (pull-in).

_____ / _____
INITIAL DATE

8.6.4.4 After 10 sec. verify that pump STOP occurs due to low oil flow trip (red START light goes out.) Verify LO FLO alarm on CRT and acknowledge. Verify that pump START cannot now be accomplished (no contact pull-in) until trip is reset by pushing STOP position of HS3904B. Verify LO FLO alarm disappears after reset.

_____ / _____
INITIAL DATE

8.6.4.5 Connect CHU to FT3812 flow meter connector. Adjust CHU output to simulate <100 GPM (4.7 ma). Place AUTO/MANUAL switch on TSS Function Panel in AUTO. Verify AUTO switch backlighted on TSS Function Panel and on graphics control panel CRT. Verify that pump P-304 will not START from HS3 904B on the TSS Function Panel (Red START light does not go on and starter contacts don't pull-in). Start pump P-304 from the graphics control panel by key stroke START switch HS3 904A. Increase CHU output to ~150 GPM (6.6 ma) within 10 seconds to avoid low oil flow trip.

NOTE

In all cases, CHU simulated flow must be increased to >100 GPM after pump START to obtain proper startup indications, and reduced to <100 GPM after pump STOP to obtain proper shutdown indications.

Verify pump P-304 STOP from TSS Function Panel HS3904B. Verify that pump motor starter contacts engage and disengage, and operation is verified on the TSS Function Panel and on graphics CRT. (Must reduce CHU output to 4.7 ma after STOP). Verify that AUTO/MANUAL switch and lights return to MANUAL.

_____/_____
INITIAL DATE

Repeat above with CHU connected to FT3806 with 5.5 ma output. Reconnect FT3812 flowmeter.

_____/_____
INITIAL DATE

8.6.4.6 Again place AUTO/MANUAL switch on TSS Function Panel in AUTO. Again START pump P-304 from the graphics control panel HS3904A , and then STOP from graphics control panel HS3904A . Verify that pump motor starter contacts engage and disengage, and operation is verified on graphics CRT, and TSS Function Panel.

INITIAL / DATE

8.6.4.7 Repeat 8.6.4.6 but do not signal pump stop from the hand switch. Provide a charge or extraction trip signal to the RLU from the TSS Function Panel. Verify that pump motor starter contacts break; verify STOP indications on the graphics CRT, and on the TSS Function Panel.

INITIAL / DATE

8.6.4.8 Repeat 8.6.4.6 but do not signal pump stop from the hand switch. Provide a pump controller GFI trip signal at GD relay (terminals 7 and 8) in the Variable Speed Drive cabinet. Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove GFI trip signal after contacts break. Verify contacts remain broken after GFI trip signal removed.

INITIAL / DATE

8.6.4.9 Repeat 8.6.4.6 but do not signal pump stop from the hand switch. Provide a pump motor current overload signal by operating overload contacts in the motor starter in the Variable Speed Drive Cabinet. Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove current overload signal after starter contacts break. Verify starter contacts remain broken after reset (or signal removal) of overload contacts.

INITIAL _____ / DATE _____

8.6.4.10 Repeat 8.6.4.6 but do not signal pump stop from the hand switch. Provide a pump motor overtemp signal at pump P-304 skid control T-box (terminals 29 and 30). Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove motor overtemp signal after starter contacts break. Verify starter contacts remain broken after motor overtemp signal removed.

INITIAL _____ / DATE _____

8.6. 4.11 Repeat 8.6.4.6 but do not signal pump stop from the hand switch. Provide a pump low coolant flow signal at pump P-304 skid control T-box (terminals 29 and 35). Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove low coolant flow signal after starter contacts break. Verify starter contacts remain broken after low coolant flow signal removed.

_____ / _____
INITIAL DATE

8.6. 4 .12 Repeat 8.6.4 .6 but do not signal pump stop from the hand switch. Provide a pump seal leakage signal at pump P-304 skid control T-box (terminals 29 and 33). Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the TSS Function Panel and the graphics CRT. Remove seal leakage signal after starter contacts break. Verify starter contacts remain broken after seal leakage signal removed.

_____ / _____
INITIAL DATE

8.6.4.13 Repeat 8.6.4.6 but do not signal pump stop from the hand switch. Provide an inverter overtemp signal by disconnecting THSW terminals 1 or 2 in the Variable Speed Drive Cabinet. Verify that pump motor starter contacts break and verify by STOP indications on the graphics CRT and on the TSS Function Panel. Remove inverter overtemp signal after starter contacts break. Verify starter contacts remain broken after inverter overtemp signal removed.

INITIAL _____ / DATE _____

8.6.4.14 Trip main pump breaker LT-1T. Reconnect output motor cables to bottom of Starter unit of the Variable Speed Drive Control. Replace blower motor starter heater overload links. Reset main pump breaker LT-1T. Repeat 8.6.4.6 but do not signal pump stop from the hand switch. Increase CHU simulation signal to equivalent of flow transmitter output = 500 GPM (9.2 ma). Verify speed and power indications on graphics CRT. Verify pump operation is also shown on graphics display (page 50). Verify HS3904A on this display STOPS and STARTS pump. Verify speed and power indications on this display. Verify physical operation of the motor, and correct motor rotation. Stop the pump (motor) by placing hand switch HS3904A in STOP position. Verify pump motor stop. Remove CHU from FT3806 flow meter connector and reconnect.

INITIAL _____ / DATE _____

8.6.4.15 On graphics control panel CRT, call up P-304 display on group 43, slot 8. Place AUTO/MANUAL switch on TSS Function Panel in AUTO. Verify that HS3904A on this display STARTS pump and low oil flow trip STOPS pump. Verify LO FLO alarm on CRT, acknowledge and reset by pushing STOP position of HS3904B. Verify LO FLO alarm disappears after reset.

_____ / _____
INITIAL DATE

8.6 Pump Functionals

8.6.5 For	Pump No.	Description	P&ID Reference	I5 Ref.
	P-305	Auxiliary Oil Pump	40P8005163145	-30

Verify that all mechanical, electrical and control checks have been completed per Appendices 10C, D and E for the pump. Verify that couplings between motor and pump are NOT connected. Verify that pump breaker trips are reset and annunciators lit.

_____ / _____
INITIAL DATE

8.6.5.1 Trip main pump breaker. Remove motor overload links from Local Starter unit. Tests will not energize pump motor, but will energize pump motor Starter Contacts. Pump motor operation will be verified by observing Starter Contacts engage (pull-in), or by also installing multimeter on output motor cable lugs. After removing links, reset main pump breaker.

_____ / _____
INITIAL DATE

8.6.5.2 Call up pump P-305 display on the graphics control panel CRT (group 13, slot 1) and activate HS3909 (check both light pen and keyboard "loop activate"). On graphics control panel CRT, handswitch START will light red START indication, but red RUN indication will not light until flow increases to >30 GPM.

On the graphics control panel, stroke HS3909 to START, then to STOP after a maximum of 15 seconds.

NOTE

The low oil flow timer should STOP the pump in 10 seconds (See 8.6.5.3).

Verify graphics control panel indications (START light lit). In the Starter unit, verify that the Starter Contacts engage (pull-in).

_____ / _____
INITIAL DATE

8.6.5.3 After 10 sec. verify that pump STOP occurs due to low oil flow trip (red START light goes out.) Verify LO FLO alarm on CRT and acknowledge. Verify LO FLO alarm disappears (turns green) within 0.5 second.

_____ / _____
INITIAL DATE

8.6.5.4 Connect CHU to FT3913 flow meter connector. Adjust CHU output to simulate <30 GPM (4.7 ma). Start pump P-305 from the graphics control panel by key stroke START switch HS3909. Increase CHU output to ~50 GPM (6.2 ma) within 10 seconds to avoid low oil flow trip.

NOTE

In all cases, CHU simulated flow must be increased to >30 GPM after pump START to obtain proper startup indications, and reduced to < 30 GPM after pump STOP to obtain proper shutdown indications.

Verify pump P-305 STOP from graphics control panel HS3909. Verify that pump motor starter contacts engage and disengage, and operation is verified on the graphics CRT. (Must reduce CHU output to 4.7 ma after STOP).

_____ / _____
INITIAL DATE

8.6.5.5 Repeat 8.6.5.4 but do not signal pump stop from the hand switch. Provide an extraction trip signal to the RLU. Verify that pump motor starter contacts break; verify STOP indications on the graphics CRT.

_____ / _____
INITIAL DATE

8.6.5.6 Repeat 8.6.5.4 but do not signal pump stop from the hand switch. Provide a pump motor current overload signal at pump P-305 control T-box (terminal 16). Verify that the pump motor starter contacts break and verify on the graphics CRT trouble alarm, followed by STOP indications on the graphics CRT. Remove current overload signal after contacts break. Verify starter contacts remain broken after removal of overload signal.

_____ / _____
INITIAL DATE

8.6.5.7 Repeat 8.6.5.4 but do not signal pump stop from the hand switch. Provide a pump low coolant flow signal at pump P-305 skid control T-box (terminals 45 and 46). Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the graphics CRT. Remove low coolant flow signal after starter contacts break. Verify starter contacts remain broken after low coolant flow signal removed.

_____ / _____
INITIAL DATE

8.6.5.8 Repeat 8.6.5.4 but do not signal pump stop from the hand switch. Provide a pump seal leakage signal at pump P-305 skid control T-box (terminals 43 and 44). Verify that the pump motor starter contacts break and verify the graphics CRT trouble alarm, followed by STOP indications on the graphics CRT. Remove seal leakage signal after starter contacts break. Verify starter contacts remain broken after seal leakage signal removed.

_____ / _____
INITIAL DATE

8.6.5.9 Trip main pump breaker. Replace motor overload links in local Starter unit. Reset main pump breaker. Repeat 8.6.5.4 but do not signal pump stop from the hand switch. Increase CHU simulation signal to equivalent of flow transmitter output = 150 GPM (10.8 ma). Verify pump operation is also shown on graphics display (page 51). Verify HS3909 on this display STOPS and STARTS pump. Verify physical operation of the motor, and correct motor rotation. Stop the pump (motor) by placing hand switch HS3909 in STOP position. Verify pump motor stop. Remove CHU from FT3913 flow meter connector and reconnect.

_____ / _____
INITIAL DATE

8.6 Pump Functionals

CAUTION

THE FOLLOWING PROCEDURE INCLUDES STARTING AND STOPPING THE PUMP BEFORE FLUID IS IN THE SYSTEM. THEREFORE, IT IS ESSENTIAL THAT THE PUMP BREAKER PANEL BE MANNED FOR EMERGENCY POWER INTERRUPTION AS REQUIRED. ALSO, THE PUMP MUST NOT BE ALLOWED TO OPERATE MORE THAN 2 SECONDS AT A GIVEN TIME.

8.6.6 For	Pump No.	Description	P&ID Reference	I5 Ref.
	P-307	TSS Flash Tank Drain Pump	40P8005163143	-20

Verify that all mechanical, electrical and control checks have been completed per Appendices 10C, D and E for the pump. Verify that couplings between motor and pump are connected. Verify that pump breaker trips are reset and annunciators lit.

_____/_____
INITIAL DATE

8.6.6.1 For pump P-307, connect CHU to LT3112 Connector and simulate TSS Flash Tank level. Call up pump P-307 display on the graphics control panel CRT (group 18, slot 3) and activate HS3112 (check both light pen and keyboard "loop activate"). On the CHU, simulate L<24 in on LT3112 with 7.5 ma. Verify that pump P-307 can not be started from HS3112 on the graphics control panel.

_____ / _____
INITIAL DATE

8.6.6.2 On the CHU, simulate 24<L<48 in on LT3112 with 8.8 ma. START pump P-307 from HS3112, and within 2 seconds, STOP pump P-307 from HS3112. Verify physical operation of pump, and run indications on graphics CRT (Red "Pump On" light is lit while pump is on).

_____ / _____
INITIAL DATE

8.6.6.3 On the CHU, simulate L>48 in on LT3112 by slowly increasing CHU output to about 11.7 ma. Pump P-307 will start automatically. Within 2 seconds after pump P-307 STARTS, STOP pump by reducing CHU output to <10 ma. If pump does not STOP, immediately trip pump P-307 breaker (3A, MCP) in MCC-B. Verify physical operation of pump and run indications on graphics CRT (Red "Pump On" light is lit while pump is on).

_____ / _____
INITIAL DATE

8.6.6.4 On the CHU, simulate L>48 in on LT3112 with 11.7 ma. Open pump P-307 breaker (3A,MCP) in MCC-B to prevent pump from starting. Verify that P-307 trouble alarm shows on graphics CRT. Reduce CHU output to 8.2 ma. Verify alarm disappears.

_____ / _____
INITIAL DATE

8.6.6.5 On the CHU, simulate L>24 in on LT3112 with 8.2 ma. START pump P-307 from HS3112, and within 2 seconds STOP pump P-307 by reducing CHU output to < 7.5 ma. If pump does not STOP, STOP using HS3112. Verify physical operation of pump and run indications on graphics CRT (Red "Pump On" light is lit while pump is on).

Disconnect CHU and reconnect LT3112 connector.

_____ / _____
INITIAL DATE

8.6 Pump Functionals

CAUTION

THE FOLLOWING PROCEDURE INCLUDES STARTING AND STOPPING THE PUMP BEFORE FLUID IS IN THE SYSTEM. THEREFORE, IT IS ESSENTIAL THAT THE PUMP BREAKER PANEL BE MANNED FOR EMERGENCY POWER INTERRUPTION AS REQUIRED. ALSO, THE PUMP MUST NOT BE ALLOWED TO OPERATE MORE THAN 2 SECONDS AT A GIVEN TIME.

8.6.7 For

Pump No.	Description	P&ID Reference
P-306	Caloria Make-up Pump	40P8005163163

Verify that all mechanical, electrical and control checks have been completed per Appendices 10C, D and E for the pump. Verify that couplings between motor and pump are connected. Verify that pump breaker trips are reset and annunciators lit.

_____/_____
INITIAL DATE

8.6.7.1 Verify that pump P-306 starts and stops when actuated from the local handswitch HS 1901 (stop pump within 2 seconds).

_____/_____
INITIAL DATE

9.0 SYSTEM RESTORATION

9.1 Remove all temporary test equipment.

_____/_____
INITIAL DATE

9.2 As required, inform the SCE operating foreman of the test progress so that the components may be placed in service in accordance with station operating procedures.

10.0 ATTACHMENTS

Appendix 10A Master Tracking System

Appendix 10B Abnormal Equipment and Circuits

Appendix 10C Electrical Prerequisite Tests

Appendix 10D Instrumentation and Control Prerequisite Test and Calibrations

Appendix 10E Mechanical Prerequisite Tests

Appendix 10F Initial Status of Breakers for Test Procedure Step 8.1.1

Appendix 10G Initial Status of Switches for Test Procedure Step 8.1.1

Appendix 10H Initial Status - Valve Lineup for Test Procedure Step 8.1.1

APPENDIX 10A

MASTER TRACKING SYSTEM

ITEM NO.	DESCRIPTION	SECTION AFFECTED	INITIAL/DATE

APPENDIX 10B

ABNORMAL EQUIPMENT AND CIRCUITS

ITEM NO.	DESCRIPTION	SECTION AFFECTED	INITIAL/DATE

APPENDIX 10C

ELECTRICAL PREREQUISITE TESTS

Component Number	Component Description	Generic Test Procedure No.	Test Complete Initial/Date
	Load Centers and MMC's	SCE 5.5	
	(836) Load Center "A"		
P-301 P-302 P-303 P-304	a. Charging and Extraction Oil Pump Motor Drive Units		
	b. Pump Motor phase, rotation and run-in checks.		
	c. Pump breakers		
	(848) MMC "B"		
P-305	a. Aux. Oil Pump Controller		
	Low Voltage Systems	SCE 5.5	
	(851) Plant Low Voltage System		
	Grounding Systems	SCE 5.5	
	(832) Equipment Grounding Sys.		
	(833) Instrument Grounding Sys.		

APPENDIX 10D - ATTACHMENTS

APPENDIX 10D-1	PRESSURE SWITCH END TO END CHECKOUT
10D-2	FLOWMETER END TO END CHECKOUT
10D-3	THERMOCOUPLE END TO END CHECKOUT
10D-4	RTD END TO END CHECKOUT
10D-5	HEAT FLUX TRANSDUCER END TO END CHECKOUT
10D-6	STRAIN GAGE END TO END CHECKOUT
10D-7	PRESSURE TRANSMITTER END TO END CHECKOUT
10D-8	DIFFERENTIAL PRESSURE TRANSMITTER END TO END CHECKOUT
10D-9	LEVEL TRANSMITTER END TO END CHECKOUT
10D-10	STOP VALVE END TO END CHECKOUT
10D-11	MODULATING VALVE END TO END CHECKOUT
10D-12	PUMP RUN CIRCUIT END TO END CHECKOUT
10D-13	PUMP SPEED END TO END CHECKOUT
10D-14	PUMP MOTOR POWER END TO END CHECKOUT

APPENDIX 10D-1

END TO END PRESSURE SWITCH PARAMETER CHECKOUT PROCEDURE

1.0 OBJECTIVES:

The purpose of these checks are to perform element and circuit tests to determine the following:

a. Proper distribution of circuit signal.

b. Proper adjustment of switch.

2.0 ACCEPTANCE CRITERIA:

a. The parameter output distribution is proper.

b. Signal is proper at the distribution end terminals.

3.0 REFERENCES

a. Construction Drawing 40E3005132126

b. Construction Drawings E8 (71 thru 96)

4.0 PREREQUISITES

a. The pressure circuits are completely installed.

b. The IPAC is completely installed and wiring is completed.

c. The IPAC is functioning properly.

d. The programming of the TSS operator's console, and the DAS, are completed. If not, the checks will be done from the terminals of the IPAC.

5.0 LIMITS AND PRECAUTIONS

a. The checkouts will be accomplished from the first terminal of the pressure switch to the input terminals of the IPAC. The input check can be omitted for the IPAC if the signals are to be monitored at the operator's console and the DAS console.

6.0 TEST EQUIPMENT

a. CHU

b. Multimeter

c. Comparator Pressure Determination System

7.0 CRITICAL CONDITIONS

a. The IPAC is operating.

b. If available, the DAS and operator consoles are programmed and operating.

8.0 PROCEDURE AND DATA COLLECTING

a. Connect a test gauge to the pressure switch test port.

b. Monitor the switch contacts to determine switch make and break.

c. Confirm the low pressure switch contacts are closed at ambient pressure and the high pressure switch contacts are open.

d. Test the pressure setting of the low pressure switch by confirming contact closure at the set pressure with a descending pressure. Confirm the high level pressure setting by confirming contact closure at the set pressure during increasing pressure. Adjust as required.

e. Confirm the proper signal at the terminals of the IPAC during the contact closure tests. Note any discrepancies.

f. Repeat the pressure switch tests in accordance with the parameter list attached, and initial and verify those acceptable.

```
RRRRRR       AAA   TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA   TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22   2
RRR  RR    AAA A      TTT     CC      HH   HH  EEEEEEE     TTT           2
RRRRRR    AAAAAA      TTT     CC      HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A      TTT      CC   C HH   HH  EE          TTT      22
RRR  RR AAA    A      TTT       CCCC  HH   HH  EEEEEEE     TTT      222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	OPR CRT CHECK	DAS CRT CHECK	PRESS. CHECK
PS 4001	100 PSIG	TSS	5A311-I E150			2-2B 2A,B-15 3-1B 6A,B-7			
PS 4010	9" H_2O 7" H_2O		5A311-C 3						
PS 4011	11" H_2O 9" H_2O		5A311-C 6						
PS 3099	60 PSIG	TSS	5A301-I H50			2-2B 2A,B-8			

END TO END FLOWMETER PARAMETER CHECKOUT PROCEDURE

1.0 OBJECTIVES

The purpose of these checks are to perform element and circuit tests to determine the following:

a. Proper distribution of circuit signal.
b. Scaling of signal.

2.0 ACCEPTANCE CRITERIA:

a. The parameter output distribution is proper.
b. Scaling is proper at the distribution end terminals.
c. Flowmeter calibration data. (Attachment "A")

3.0 REFERENCES

a. Construction Drawing 40E3005132108
b. Construction Drawings E8 (71 thru 96).
c. Signal conditioning wiring and test procedures manual.

4.0 PREREQUISITES:

a. The flowmeter circuits are completely installed.
b. The flowmeter circuits are scaled and properly signal conditioned.
c. The DARMS and MVCU are completely installed and wiring is completed.
d. The DARMS and MVCU are functioning properly.
e. The programming of the TSS operator's console, and the DAS, are completed. If not, the checks will be done from the terminals of the DARMS and MVCU.

5.0 LIMITS AND PRECAUTIONS:

a. The checkouts will be accomplished from the first terminal box of the flowmeter transducer to the input terminals of the DARMSand MVCU. The input check can be omitted for the MVCU and DARMS if the signals are to be monitored at the operator's console and the DAS console.
b. The input to the circuit will be made with the current calibrator.

6.0 TEST EQUIPMENT

a. Current Calibrator, Series 822.
b. CHU
c. Multimeter

7.0 CRITICAL CONDITIONS

a. The DARMS and MVCU are operating.

b. If available, the DAS and operator consoles are programmed and operating.

8.0 PROCEDURE AND DATA COLLECTING

a. Disconnect the lead wire in the terminal box of the flowmeter and apply a 4 milliamp (ma) and 20 ma signal.

b. Confirm the proper signals at the MVCU and DARMS. Note any discrepancies on the attached parameter list.

c. Reconnect the lead wires.

d. Repeat the above checkout for each flowmeter circuit listed in the attached parameter list.

e. Monitor the signals at the operator's console and DAS to replace the need for reading the signals at the MVCU and DARMS terminal.

f. Check the span of the Ramapo target meters in accordance with the procedure of Attachment "A" (Table 1).

g. Check the span of the turbine flowmeters in accordance with the procedure of Attachment "A" (Table 2) and Attachment "B".

Two types of flowmeters are being supplied to measure the water, steam and oil flow for the receiver and thermal storage systems. The water and steam flowmeters are target type, and the oil are turbine probes. Since the flow is measured using two types of meters, and the water/steam density varies so much through the system, the information for the system flowmeters was consolidated for clarity and is presented herein.

RAMAPO TARGET METERS

The twenty-nine flowmeters in Table 1 are target type. The electrical output of these units is proportional to the force on the target which is located in the flow stream of the fluid medium. The meter output is then converted so that 4 ma is zero force and 20 ma is equivalent to the force of the 100% level of flow. The meter calibration is converted so the fluid density is equivalent to that nominal value expected during plant operations.

As an example, meter FE 3102 is calibrated for a 100% flow range of 130,000 lb/hr of steam which has the density of 1.89 lb/ft^3 and FE 3105 is for a flow range of 25,000 lb/hr of water which has the density of 59.1 lb/ft^3. Refer to Table 1 for calibration ranges and fluid densities of all the target meters.

Each meter can be checked for calibration by determining the force/output relationship. For example, meter FE 3102 requires 4.87 kg force to achieve 1.97 MV/v 100% output. This force is equivalent to the 100% range of 130,000 lb/hr of 1.89 lb/ft^3 steam. The meters were all calibrated using water (ρ = 62.28 lb/ft^3) and the equivalent 100% output is 1493.8 gal/min for meter FE 3102.

The equivalent output, force and water flow for all meters may be found in Table 1. Detail information relating to the calibration and field check of the meters may be found in the individual instruction manuals for each meter.

Whereas the electrical outputs of the meters are proportional to the target force, the flow is proportional to the square root of this force.

$$W_m = K_m \sqrt{\frac{S}{100}}$$

W_m = flowmeter output, nominal lb/hr
K_m = flowmeter range, lb/hr
S = flowmeter electrical output, % of range

The above output is for the nominal density of the medium. If a more precise measured value for flow is required, the following correction factor for the actual density at the flowmeter must be applied:

$$W_{m\ corrected} = W_m \sqrt{\frac{\rho_{actual}}{\rho_{nominal}}}$$

$W_{m\ corrected}$ = flowmeter output, corrected, lb/hr

ρ_{actual} = density (pressure, temperature at flowmeter), lb/ft^3

$\rho_{nominal}$ = density, nominal, for meter scaling, lb/ft^3

Conversion of the flowmeter output to volumetric (gal/min) or any other units may be accomplished; however, standardization using the units of lb/hr is recommended since it is consistent with other units for plant operations. In reference to table 1, the original ranges of the first 8 meters were in lb/hr, and the other 21 were in gal/min. The equivalent conversion to the other unit is in parenthesis.

The detail instruction manuals for the flowmeters contain all the calibration and conversion information discussed herein. This letter is written to clarify the calibration of these meters, and to present all of the ranges and calibration of the meters in a single memo. Additional information, as required, may be obtained in the instruction manuals.

EM TURBINE METER PROBES

The seven flowmeters in Table 2 are turbine probe-type and are used for measuring Caloria oil flow in the thermal storage system. These meters are ranged for Caloria assuming a fluid density of 40.3 lb/ft^3.

The output of these flowmeters is directly proportional to the range of the meter times the percentage of output of the meter.

$$W_m = K_m \times \frac{S}{100}$$

W_m = flowmeter output, nominal, lb/hr

K_m = flowmeter range, lb/hr

S = flowmeter output, % of range

The above output will be for the nominal 40.3 lb/ft^3 density assumed for Caloria. A more precise flow corrected for the actual measured fluid density can be obtained.

$$W_{m\ corrected} = W_m \times \frac{\rho_{actual}}{40.3}$$

$W_{m\ corrected}$ = flowmeter output, corrected lb/hr

ρ_{actual} = density of Caloria (pressure and temperature at flowmeter) lb/ft^3

Table 2 is the calibration factors, 100% span and scaling settings for the Caloria flowmeters in the thermal storage system. The final three columns are full range frequency, and amplifier settings for field scaling. Additional information regarding these meters may be obtained from the manufacturers' information data for the meters.

FLOWMETER TAG NO. •	NOMINAL DENSITY (ρ_n)	100% SPAN CALIBRATED FACTOR @ NOMINAL DENSITY (K_q)	100% SPAN CALIBRATED FACTOR @ NOMINAL DENSITY (K_m)	100% SPAN CALIBRATION FACTOR @ AMBIENT WATER ρ = 62.28 LB/FT^3 (Q_c)	100% SPAN FORCE	100% SPAN OUTPUT
(UNITS)	LB/FT^3	GAL/MIN	LB/HR	GAL/MIN	K_q	MV/V
FE 3102	1.8909	(8573)	130,000	1493.8	4.876	1.970
FE 3105	59.102	(52.74)	25,000	51.39	3.438	1.024
FE 3205	2.7270	(3418)	74,750	715.22	1.707	0.968
FE 3305	2.7270	(3418)	74,750	715.22	1.549	0.911
FE 3504	56.465	(139.68)	63,250	133.0	1.635	1.974
FE 3604	56.465	(139.68)	63,250	133.0	1.640	2.066
FE 3715	0.7644	(10319)	63,250	1143.2	1.316	1.556
FE 3815	0.7644	(10319)	63,250	1143.2	1.201	1.407

TABLE 1 RAMAPO TARGET METERS

FLOWMETER TAG NO.	FLUID DENSITY LB/FT^3	SYSTEM K FACTOR PULSE/LB	K FACTOR$_3$ PULSE/FT^3	SPAN 100% FLOW LB/HR	PULSE/ SEC	SCALE FREQ.	SCALE MA	PAQ SETTING
FE 3211	40.3	2.031	81.85	645,000	363.89	363	19.96	365
FE 3310	40.3	2.026	81.65	645,000	362.99	363	20.00	364
FE 3706	40.3	1.996	80.44	500,000	277.22	277	19.99	278
FE 3806	40.3	2.039	82.17	500,000	283.19	283	19.99	284
FE 3712	40.3	2.025	81.61	300,000	168.75	168	19.93	169
FE 3812	40.3	1.983	79.91	300,000	165.25	165	19.98	166
FE 3913	40.3	8.197	330.3	115,000	261.85	261	19.95	262

TABLE 2 EM TURBINE METER PROBES

PROCEDURE FOR ADJUSTING SPAN ON E M CO. FLOW TRANSMITTERS

INTRODUCTION

Due to a change in the flow ranges, it will be necessary to change the frequency setting on the transmitter electronics. The following procedure will outline how the change is to be made.

REQUIRED TEST EQUIPMENT

1. Frequency generator
   Range 0 - 1000 HZ or greater sine wave
2. Frequency counter
   Range 0 - 1000 HZ or greater.
3. Digital milliammeter
   Range 0 - 25 MA or greater
   Accuracy 0.1%
4. Digital AC voltmeter

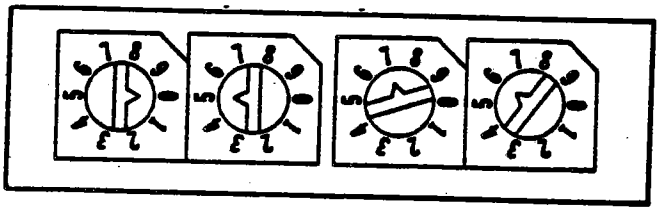
PROCEDURE

Table 1 lists the transmitters' electronics which require span adjustment and the new frequencies to which they will be set.

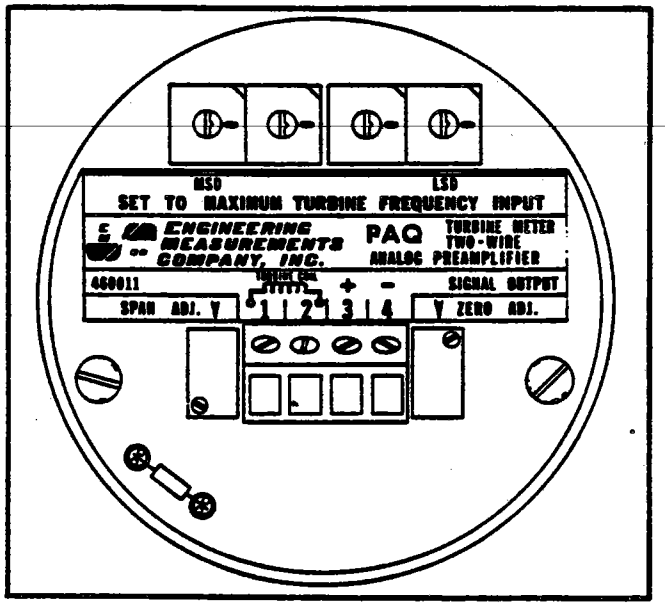
TABLE 1

TAG NO.	PROGRAM SETTING
FT 3211	0365
FT 3310	0364
FT 3706	0278
FT 3806	0284
FT 3712	0169
FT 3812	0166
FT 3913	0262

1. The first step in the span adjustment is to remove the cover of the conduit in which the electronics are located.
2. Using Figure 1, which shows a frequency setting of 0576HZ, set the program switches to the value given in Table 1 for the particular transmitter selected for span adjustment.



3. Using Figure 2 for a guide, perform the following steps.



4. Disconnect the input wires from terminals 1 and 2
5. Connect the digital voltmeter to the frequency generator output terminals.
6. Connect the frequency counter to the frequency generator.
7. Set the frequency generator to approximately 300 HZ.
8. Adjust the output to 1.0 volt.
9. Remove the wire from terminal 3 and connect it to the positive side of the milliammeter.
10. Connect the negative side of milliammeter to terminal 30.
11. Connect the output of the frequency generator to terminals 1 and 2.
12. Set the frequency input to zero HZ.
13. Adjust the zero pot shown in Figure 2 to a 4.0 MA output.
14. Set the frequency input to the span frequency shown in Table 1 for the particular transmitter being adjusted.
15. Adjust the span pot for the scaled MA output.
16. Repeat steps 12 thru 15 until the readings converge.
17. Disconnect the test equipment and return the wiring to the original configuration.
18. Set the span of all transmitters shown in Table 1 and enter initials and date under "Flow Scale Check" in the following list upon completion of each transmitter adjustment.

```
RRRRRR      AAA   TTTTTTTTT   CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC   C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC       HH    HH  EEEEEEE     TTT           22
RRRRRR   AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A     TTT      CC   C  HH    HH  EE          TTT       22
RRR  RR AAA    A     TTT       CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG	ID	RANGE	CRT	T-BOX TERM	TSS TERM	HVCU TERM	IPAC TERM	DARMS TERM	ILS TERM	OPR CRT CHECK	DAS CRT CHECK	FLOW SCALE CHECK
FT	3102	130	TSS	SA301-I A25		2-1A AI-1		202 19-14				
FT	3105	1.3-25	TSS	SA301-I A28		2-1A AI-13		202 19-22				
FT	3205	6.5-75	TSS	SA302-I A31		3-1A AI-4						
FT	3211	53-645	TSS	SA302-I A34		3-1A AI-3			301 AI-2			
FT	3305	6.5-75	TSS	SA303-I A37		3-2A AI-4						
FT	3310	53-645	TSS	SA303-I A40		3-2A AI-3			301 AI-1			
FT	3504	5.5-63	TSS	SA305-I A43		2-2A AI-9		202 20-2				

```
RRRRRR       AAA   TTTTTTTTT    CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA   TTTTTTTTT  CC    C  HH    HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC       HH    HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A      TTT      CC    C  HH    HH  EE          TTT      22
RRR  RR AAA    A      TTT       CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG	ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	ILS TERM	OPR CRT CHECK	DAS CRT CHECK	FLOW SCALE CHECK
FT	3604	5.5-63	TSS	SA306-I A46		2-3A AI-9		202 20-14				
FT	3706	29-500	TSS	SA307-I A49		2-2A AI-11	2-1A 4A-8	202 21-2	201 AI-5			
FT	3712	14.5-	TSS	SA307-I A52		2-2A AI-10	2-1A 2A-16	202 21-5	201 AI-6			
FT	3715	5.5-63	TSS	SA307-I A55		2-2A AI-3		202 21-18				
FT	3806	29-500	TSS	SA308-I A58		2-3A AI-11	2-1A 4A-16	202 22-5	201 AI-7			
FT	3812	14.5-	TSS	SA308-I A61		2-3A AI-10	2-1A 4A-12	202 22-10	201 AI-8			
FT	3815	5.5-63	TSS	SA308-I A64		2-3A AI-3		202 22-22				

```
RRRRRR       AAA   TTTTTTTTT   CCCC   HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA   TTTTTTTTT  CC   C  HH    HH  EE       TTTTTTTTT  22   2
RRR  RR    AAA A      TTT     CC      HH    HH  EEEEEEE     TTT          2
RRRRRR    AAAAAA      TTT     CC      HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A      TTT      CC   C  HH    HH  EE          TTT      22
RRR  RR AAA    A      TTT       CCCC   HH    HH  EEEEEEE     TTT      222222
```

TAG	ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	ILS TERM	OPR CRT CHECK	DAS CRT CHECK	FLOW SCALE CHECK
				SA309-I			3-1A		301			
FT	3913	10-115	TSS	A67			6A-10		AI-3			
				SA311-I								
FTX	4053	50	ANY	A73								

END TO END THERMOCOUPLE CHECKOUT PROCEDURE

1.0 OBJECTIVES:

The purpose of these checks are to perform element and circuit tests to determine the following:

a. Resistance of thermocouple from junction box to element.
b. Prevailing ambient temperature thermocouple output.
c. Proper distribution of circuit signal.
d. Scaling of signal.

2.0 ACCEPTANCE CRITERIA:

a. Resistance is measured and recorded.
b. Thermocouple output is the prevailing temperature equivalent.
c. The thermocouple output distribution is proper.
d. Scaling is proper at the distribution end terminals.

3.0 REFERENCES:

a. Construction Drawings 40E3005132(111 thru 116) and 124.
b. Construction Drawings E8(71 thru 96).
c. Signal conditioning wiring and test procedures manual.

4.0 PREREQUISITES:

a. The thermocouple circuits are completely installed.
b. The thermocouple circuits are scaled and properly signal conditioned.
c. The RLU, ILS, IPAC, MVCU, and DARMS are completely installed and thermocouple wiring is complete.
d. The RLU, ILS, IPAC, MVCU, and DARMS are functioning properly.
e. The programming of the TSS operator's console, and the DAS, are completed. If not, the checks done from the terminals of the RLU, ILS, IPAC, MVCU, and DARMS will be prerequisite for the complete system preoperational acceptance test.

5.0 LIMITS AND PRECAUTIONS:

a. The checkouts will be accomplished from the first terminal box of the thermocouple to the input terminals of the RLU, ILS, IPAC, MVCU, and DARMS. The input check can be omitted for the DARMS, and IPAC if the signals are to be monitored at the operator's console and the DAS console.
b. The input to the circuit will be made with the DIGI-CAL-II unit.

6.0 TEST EQUIPMENT:

a. Universal Calibrator for thermocouples, ANALOGIC DIGI-CAL-II, AN6520.
b. CHU
c. Multimeter

7.0 CRITICAL CONDITIONS:

a. The RLU, ILS, IPAC, MVCU, and DARMS are operating.
b. If available, the DAS and operator consoles are programmed and operating.

8.0 PROCEDURE AND DATA COLLECTION:

a. Confirm the ambient signal values are proper at the RLU, ILS, MVCU, IPAC, DARMS in accordance with the parameter and termination list attached. Note any discrepancies on the following measurement list.
b. Measure thermocouple resistance, and thermocouple output in degrees F of the junction. Record under "TC RESIST" column in following list.
c. Input approximately 80 percent of full range into the circuit terminals from the element terminal box and confirm an 80 percent output at the terminals of the RLU, ILS, MVCU, IPAC or DARM in accordance with the parameter and termination list. Note any discrepancies on the following measurement list.

100% AND 80% VALUES FOR THERMOCOUPLES

100% Range °F	100% MILLIAMP	100% MILLIVOLTS	80% RANGE °F	80% MILLIAMP	80% MILLIVOLTS
1500	20	31.27	1200	16.8	24.32
800	20	14.87	640	16.8	11.12
650	20	11.36	520	16.8	8.36
600	20	10.20	480	16.8	7.45
400	20	5.65	320	16.8	3.87
140	20	-0.23	112	16.8	-0.87

d. Reinstall the thermocouple lug and tighten screw.

e. Report any discrepancies so that they may be corrected and repeat checkout of corrected circuit.

f. If the operator console and DAS are on line, confirm the end to end checks for the IPAC and DARMS using the respective CRT readouts instead of reading at the equipment terminals.

g. The attached listing of these end to end thermocouple tests will be utilized to post a record of the checks. Mark each circuit that is confirmed acceptable.

```
RRRRRR      AAA   TTTTTTTTT    CCCC    HH    HH  EEEEEEE  TTTTTTTTT    22222
RRR  RR    AAAA   TTTTTTTTT  CC    C  HH    HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC       HH    HH  EEEEEEE     TTT           22
RRRRRR    AAAAAA     TTT     CC       HHHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A     TTT      CC    C  HH    HH  EE          TTT     22
RRR  RR AAA    A     TTT       CCCC    HH    HH  EEEEEEE     TTT     2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TE 3006	800	TSS		TSU		2-2A 5A-16				
TE 3007	800	TSS		TSU		2-1A 1A-4				
TE 3009A	800	TSS		TSU-I 1		2-1B 2A-2				
TE 3009B	800	TSS		TSU-I 4		2-1B 2A-4				
TE 3009C	800	TSS		TSU-I 7		2-1B 2A-6				

```
RRRRRR       AAA  TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA  TTTTTTTTT CC   C  HH   HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A     TTT    CC      HH   HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA     TTT    CC      HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT     CC   C HH   HH  EE          TTT      22
RRR  RR AAA    A    TTT      CCCC  HH   HH  EEEEEEE     TTT      2222222
```

TAG	ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TE	3009D	800	TSS	TSU-I 10			2-1B 2A-8				
TE	3009E	800	TSS	TSU-I 13			2-1B 2A-10				
TE	3009F	800	TSS	TSU-I 16			2-1B 2A-12				
TE	3009G	800	TSS	TSU-I 19			2-1B 2A-14				
TE	3009H	800	TSS	TSU-I 22			2-1B 2A-16				
TE	3009I	800	TSS	TSU-I 25			2-1B 4A-2				
TE	3009J	800	TSS	TSU-I 28			2-1B 4A-4				

```
RRRRRR      AAA   TTTTTTTTT   CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC   C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC       HH    HH  EEEEEEE     TTT           22
RRRRRR   AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A     TTT      CC   C  HH    HH  EE          TTT       22
RRR  RR AAA    A     TTT      CCCC   HH    HH  EEEEEEE     TTT       2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MUCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TE 3009K	800	TSS	TSU-I 31			2-1B 4A-6				
TE 3009L	800	TSS	TSU-I 34			2-1B 4A-8				
TE 3009M	800	TSS	TSU-I 37			2-1B 4A-10				
TE 3009N	800	TSS	TSU-I 40			2-1B 4A-12				
TE 3009P	800	TSS	TSU-I 43			2-1B 4A-14				
TE 3009Q	800	TSS	TSU-I 46			2-1B 4A-16				
TE 3009R	800	TSS	TSU-I 49			2-1B 6A-2				

```
RRRRRR      AAA   TTTTTTTTT   CCCC   HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC   C  HH    HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC      HH    HH  EEEEEEE     TTT           22
RRRRRR   AAAAAA      TTT     CC      HHHHHHHH  EEEEEEE     TTT       22222
RRR RR  AAA   A      TTT      CC   C HH    HH  EE          TTT      22
RRR  RR AAA   A      TTT       CCCC  HH    HH  EEEEEEE     TTT      2222222
```

TAG	ID	RANGE	CRT	T-BOX TERM	TSS TERM	MUCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TE	3009S	800	TSS	TSU-I 52			2-1B 6A-4				
TE	3009T	800	TSS	TSU-I 55			2-1B 6A-6				
TE	3009U	800	TSS	TSU-I 58			2-1B 6A-8				
TE	3009V	800	TSS	TSU-I 61			2-1B 6A-10				
TE	3009W	800	TSS	TSU-I 64			2-1B 6A-12				
TE	3009X	800	TSS	TSU-I 67			2-1B 6A-14				
TE	3009Y	800	TSS	TSU-I 70			2-1B 6A-16				

```
RRRRRR       AAA   TTTTTTTTT   CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA   TTTTTTTTT  CC   C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC       HH    HH  EEEEEEE     TTT          22
RRRRRR     AAAAAA     TTT     CC       HHHHHHHH  EEEEEEE     TTT       22222
RRR RR    AAA   A     TTT      CC   C  HH    HH  EE          TTT      22
RRR  RR AAA     A     TTT       CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	HVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TE 3009Z	800	TSS	TSU-I 73			2-1A 1A-6				
TE 3010A	800	TSS	TSU-I 76			2-2A 1A-4				
TE 3010B	800	TSS	TSU-I 79			2-2A 1A-6				
TE 3010C	800	TSS	TSU-I 82			2-2A 1A-8				
TE 3010D	800	TSS	TSU-I 85			2-2A 1A-10				
TE 3010E	800	TSS	TSU-I 88			2-2A 1A-12				
TE 3010F	800	TSS	TSU-I 91			2-2A 1A-14				

```
RRRRRR      AAA   TTTTTTTTT    CCCC    HH    HH   EEEEEEE   TTTTTTTTT   222
RRR  RR    AAAA   TTTTTTTTT  CC    C   HH    HH   EE        TTTTTTTTT  22  22
RRR  RR   AAA A      TTT     CC        HH    HH   EEEEEEE      TTT         22
RRRRRR    AAAAAA     TTT     CC        HHHHHHHH   EEEEEEE      TTT       22222
RRR RR   AAA   A     TTT      CC    C  HH    HH   EE           TTT      22
RRR  RR AAA    A     TTT       CCCC    HH    HH   EEEEEEE      TTT      2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TE 3010G	800	TSS	TSU-I 94			2-2A 1A-16				
TE 3010H	800	TSS	TSU-I 97			2-2A 3A-2				
TE 3010I	800	TSS	TSU-I 100			2-2A 3A-4				
TE 3010J	800	TSS	TSU-I 103			2-2A 3A-6				
TE 3010K	800	TSS	TSU-I 106			2-2A 3A-8				
TE 3010L	800	TSS	TSU-I 109			2-2A 3A-10				
TE 3010M	800	TSS	TSU-I 112			2-2A 3A-12				

```
RRRRRR      AAA   TTTTTTTTT   CCCC    HH    HH   EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT CC    C   HH    HH   EE       TTTTTTTTT 22   2
RRR  RR   AAA A      TTT    CC        HH    HH   EEEEEEE     TTT          2
RRRRRR   AAAAAA      TTT    CC        HHHHHHHH   EEEEEEE     TTT      22222
RRR RR   AAA   A     TTT     CC    C  HH    HH   EE          TTT     22
RRR  RR AAA    A     TTT      CCCC    HH    HH   EEEEEEE     TTT     222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TE 3010N	800	TSS	TSU-I 115			2-2A 3A-14				
TE 3010P	800	TSS	TSU-I 118			2-2A 3A-16				
TE 3103	1500	TSS	SA301-I 1		2-1A AI-14					
TE 3105A	800	TSS	SA301-I 4		2-1A AI-11					
TE 3105B	800	TSS	SA301-I 7		2-1A AI-12					
TE 3108	800	TSS	SA301-I 13			2-2A 5A-2				
TE 3204	800	TSS	SA302-I 4		3-1A AI-5					

```
RRRRRR      AAA   TTTTTTTTT   CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC   C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC       HH    HH  EEEEEEE     TTT           22
RRRRRR   AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A     TTT      CC   C  HH    HH  EE          TTT       22
RRR  RR AAA    A     TTT      CCCC   HH    HH  EEEEEEE     TTT       2222222
```

TAG	ID	RANGE	CRT	T-Box TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TE	3211A	800	TSS	SA302-I 10		2-1A AI-7 3-1A AI-1					
TE	3211B	800	TSS	SA302-I 13		2-1A AI-8 3-1A AI-2					
TE	3214	800	TSS	SA302-I 7			3-1A 5A-4				
TE	3217	600	TSS	SA302-I 1			3-1A 5A-12				
TE	3304	800	TSS	SA303-I 4		3-2A AI-5					
TE	3310A	800	TSS	SA303-I 10		2-1A AI-5 3-2A AI-1					
TE	3310B	800	TSS	SA303-I 13		2-1A AI-6 3-2A AI-2					

```
RRRRRR      AAA   TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC      HH   HH  EEEEEEE     TTT           22
RRRRRR   AAAAAA      TTT     CC      HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT      CC   C HH   HH  EE          TTT      22
RRR  RR AAA    A     TTT       CCCC  HH   HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	HVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TE 3314	800	TSS	5A303-I 7			3-1A 5A-6				
TE 3317	600	TSS	5A303-I 1			3-1A 5A-10				
TE 3412	600	TSS	5A304-I 28			3-1A 5A-2				
TE 3503	400	TSS	5A305-I 1			2-2A 5A-12				
TE 3603	400	TSS	5A306-I 1			2-2A 5A-14				
TE 3704	800	TSS	5A307-I 1			2-2A 5A-6				
TE 3710A	800	TSS	5A307-I 7		2-2A AI-5					

```
RRRRRR       AAA  TTTTTTTTT   CCCC   HH    HH  EEEEEEE  TTTTTTTTT   22
RRR  RR     AAAA  TTTTTTTTT  CC   C  HH    HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A     TTT     CC      HH    HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA     TTT     CC      HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT      CC   C HH    HH  EE          TTT       22
RRR  RR AAA    A    TTT       CCCC  HH    HH  EEEEEEE     TTT       2222222
```

TAG	ID	RANGE	CRT	T-BOX TERM	TSS TERM	MUCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TE	3710B	800	TSS	SA307-I 10		2-2A AI-6					
TE	3711	650	TSS	SA307-I 4			2-2A 5A-4				
TE	3804	800	TSS	SA308-I 1			2-2A 5A-10				
TE	3810A	800	TSS	SA308-I 7		2-3A AI-5					
TE	3810B	600	TSS	SA308-I 10		2-3A AI-6					
TE	3811	800	TSS	SA308-I 4			2-2A 5A-8				
TE	3912	800	TSS	SA309-I 1			3-1A 5A-14				

```
RRRRRR      AAA   TTTTTTTTT   CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC   C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC       HH    HH  EEEEEEE     TTT          22
RRRRRR   AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT      CC   C  HH    HH  EE          TTT      22
RRR  RR AAA    A     TTT      CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TE 3914A	600	TSS	SA309-I 4			3-1A 1A-4				
TE 3914B	600	TSS	SA309-I 25			3-1A 5A-16				
TEX 3065A	800	ANY	TSU-I 415				202 1-2			
TEX 3065B	800	ANY	TSU-I 418				202 1-5			
TEX 3065C	800	ANY	TSU-I 421				202 1-8			
TEX 3065D	800	ANY	TSU-I 424				202 1-11			
TEX 3065E	800	ANY	TSU-I 427				202 1-14			

```
RRRRRR       AAA   TTTTTTTTT   CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA   TTTTTTTTT  CC   C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC       HH    HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A      TTT      CC   C  HH    HH  EE          TTT      22
RRR  RR AAA    A      TTT       CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	PARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TEX 3065F	400 F	ANY	TSU-I 430							
TEX 3065G	800	ANY	TSU-I 433							
TEX 3065H	800	ANY	TSU-I 436							
TEX 3065I	800	ANY	TSU-I 439							
TEX 3065J	800	ANY	TSU-I 442							
TEX 3066	800	ANY	TSU-I 121				202 1-17			
TEX 3066A	800	ANY	TSU-I 124				202 1-20			

```
RRRRRR      AAA   TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT CC   C  HH   HH  EE       TTTTTTTTT 22   22
RRR  RR   AAA A      TTT    CC      HH   HH  EEEEEEE     TTT          22
RRRRRR   AAAAAA      TTT    CC      HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT     CC   C HH   HH  EE          TTT      22
RRR  RR AAA    A     TTT      CCCC  HH   HH  EEEEEEE     TTT      2222222
```

TAG	ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TEX	3066B	800	ANY	TSU-I 127				202 1-23			
TEX	3066C	800	ANY	TSU-I 130				202 1-26			
TEX	3066D	800	ANY	TSU-I 133							
TEX	3066E	800	ANY	TSU-I 136							
TEX	3066F	800	ANY	TSU-I 139				202 1-29			
TEX	3066G	800	ANY	TSU-I 142							
TEX	3066H	800	ANY	TSU-I 145							

```
RRRRRR       AAA   TTTTTTTTT   CCCC    HH    HH   EEEEEEE   TTTTTTTTT   22222
RRR  RR     AAAA   TTTTTTTTT  CC   C   HH    HH   EE        TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC       HH    HH   EEEEEEE      TTT          22
RRRRRR    AAAAAA      TTT     CC       HHHHHHHH   EEEEEEE      TTT       22222
RRR RR   AAA   A      TTT      CC   C   HH    HH   EE           TTT      22
RRR  RR AAA    A      TTT       CCCC    HH    HH   EEEEEEE      TTT      2222222
```

TAG ID	RANGE	CRT	T-Box TERM	TSS TERM	MUCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TEX 3066I	800	ANY	TSU-I 148				202 1-32			
TEX 3066J	800	ANY	TSU-I 151							
TEX 3066K	800	ANY	TSU-I 154							
TEX 3066L	800	ANY	TSU-I 157							
TEX 3066M	800	ANY	TSU-I 160							
TEX 3066N	800	ANY	TSU-I 163							
TEX 3066P	800	ANY	TSU-I 166							

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RRRRRR       AAA  TTTTTTTTT   CCCC   HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA  TTTTTTTTT  CC   C  HH    HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A     TTT     CC      HH    HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA     TTT     CC      HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT      CC   C  HH    HH  EE          TTT      22
RRR  RR AAA    A     TTT       CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-Box TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TEX 3066Q	800	ANY	TSU-I 169							
TEX 3066R	800	ANY	TSU-I 172							
TEX 3066S	800	ANY	TSU-I 175							
TEX 3066T	800	ANY	TSU-I 178							
TEX 3066U	800	ANY	TSU-I 181							
TEX 3066V	800	ANY	TSU-I 184							
TEX 3066W	800	ANY	TSU-I 187							

```
RRRRRR       AAA   TTTTTTTTT   CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22   2
RRR  RR     AAAA   TTTTTTTTT  CC   C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC       HH    HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA      TTT     CC       HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A      TTT      CC   C  HH    HH  EE          TTT      22
RRR  RR AAA    A      TTT       CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MUCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TEX 3066X	800	ANY	TSU-I 190							
TEX 3066Y	800	ANY	TSU-I 193							
TEX 3066Z	800	ANY	TSU-I 196							
TEX 3067	800	ANY	TSU-I 211				202 1-35			
TEX 3067A	800	ANY	TSU-I 214				202 1-38			
TEX 3067B	800	ANY	TSU-I 217				202 1-41			
TEX 3067C	800	ANY	TSU-I 220				202 1-44			

```
RRRRRR       AAA  TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA  TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A     TTT     CC      HH   HH  EEEEEEE     TTT            22
RRRRRR    AAAAAA     TTT     CC      HHHHHHH  EEEEEEE     TTT         22222
RRR RR   AAA   A     TTT      CC   C HH   HH  EE          TTT        22
RRR  RR AAA   A     TTT       CCCC  HH   HH  EEEEEEE     TTT        2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MUCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	T-C RESIST. OHMS
TEX 3067D	800	ANY	TSU-I 223							
TEX 3067E	800	ANY	TSU-I 226							
TEX 3067F	800	ANY	TSU-I 229							
TEX 3067G	800	ANY	TSU-I 232							
TEX 3067H	800	ANY	TSU-I 235							
TEX 3067I	800	ANY	TSU-I 238							
TEX 3067J	800	ANY	TSU-I 241							

```
RRRRRR      AAA   TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT CC   C  HH   HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT    CC      HH   HH  EEEEEEE     TTT          22
RRRRRR   AAAAAA      TTT    CC      HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT     CC   C HH   HH  EE          TTT      22
RRR  RR AAA    A     TTT      CCCC  HH   HH  EEEEEEE     TTT      2222222
```

TAG	ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TEX	3067K	800	ANY	TSU-I 244							
TEX	3067L	800	ANY	TSU-I 247							
TEX	3067M	800	ANY	TSU-I 250							
TEX	3067N	800	ANY	TSU-I 253							
TEX	3067P	800	ANY	TSU-I 256							
TEX	3067Q	800	ANY	TSU-I 259							
TEX	3067R	800	ANY	TSU-I 262							

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RRRRRR      AAA  TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA  TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A     TTT     CC      HH   HH  EEEEEEE     TTT           22
RRRRRR   AAAAAA     TTT     CC      HHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A     TTT      CC   C HH   HH  EE          TTT       22
RRR  RR AAA    A     TTT       CCCC  HH   HH  EEEEEEE     TTT       2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	HVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TEX 3067S	800	ANY	TSU-I 265							
TEX 3067T	800	ANY	TSU-I 268							
TEX 3067U	800	ANY	TSU-I 331							
TEX 3067V	800	ANY	TSU-I 334							
TEX 3067W	800	ANY	TSU-I 337							
TEX 3067X	800	ANY	TSU-I 340							
TEX 3067Y	800	ANY	TSU-I 343							

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RRRRRR      AAA   TTTTTTTTT   CCCC    HH    HH  EEEEEEE  TTTTTTTTT   222
RRR  RR    AAAA   TTTTTTTTT  CC   C   HH    HH  EE       TTTTTTTTT  22  22
RRR  RR   AAA A      TTT     CC       HH    HH  EEEEEEE     TTT         22
RRRRRR   AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT      CC   C  HH    HH  EE          TTT      22
RRR  RR AAA    A     TTT      CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MUCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TEX 3067Z	800	ANY	TSU-I 346							
TEX 3068A	800	ANY	TSU-I 367				202 1-47			
TEX 3068B	800	ANY	TSU-I 370							
TEX 3068C	800	ANY	TSU-I 373							
TEX 3068D	800	ANY	TSU-I 376							
TEX 3068E	800	ANY	TSU-I 379							
TEX 3068F	800	ANY	TSU-I 382							

```
RRRRRR       AAA   TTTTTTTTT    CCCC    HH    HH  EEEEEEE  TTTTTTTTT    22222
RRR  RR     AAAA   TTTTTTTTT  CC    C   HH    HH  EE       TTTTTTTTT  22    22
RRR  RR    AAA A      TTT     CC        HH    HH  EEEEEEE     TTT           22
RRRRRR    AAAAAA      TTT     CC        HHHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A      TTT      CC    C  HH    HH  EE          TTT       22
RRR  RR AAA    A      TTT       CCCC    HH    HH  EEEEEEE     TTT       2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MUCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TEX 3068G	800	ANY	TSU-I 385							
TEX 3068H	800	ANY	TSU-I 388							
TEX 3068I	800	ANY	TSU-I 391				202 2-2			
TEX 3068J	800	ANY	TSU-I 394				202 2-5			
TEX 3068K	800	ANY	TSU-I 397							
TEX 3068L	800	ANY	TSU-I 400							
TEX 3068M	800	ANY	TSU-I 403				202 2-11			

```
RRRRRR      AAA   TTTTTTTTT   CCCC    HH    HH   EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC   C   HH    HH   EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC       HH    HH   EEEEEEE     TTT          22
RRRRRR   AAAAAA      TTT     CC       HHHHHHHH   EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT      CC   C  HH    HH   EE          TTT      22
RRR  RR AAA    A     TTT       CCCC   HH    HH   EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TEX 3068N	800	ANY	TSU-I 406							
TEX 3068P	800	ANY	TSU-I 409							
TEX 3068Q	800	ANY	TSU-I 412							
TEX 3069A	800	ANY	TSU-I 298				202 2-14			
TEX 3069B	800	ANY	TSU-I 301				202 2-17			
TEX 3069C	800	ANY	TSU-I 304				202 2-20			
TEX 3070	800	ANY	TSU-I 199				202 2-23			

```
RRRRRR       AAA  TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA  TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A     TTT     CC      HH   HH  EEEEEEE     TTT           22
RRRRRR    AAAAAA     TTT     CC      HHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A     TTT      CC   C HH   HH  EE          TTT       22
RRR  RR AAA    A     TTT      CCCC  HH   HH  EEEEEEE     TTT       2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MUCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TEX 3070A	800	ANY	TSU-I 202							
TEX 3070B	800	ANY	TSU-I 205							
TEX 3070C	800	ANY	TSU-I 208							
TEX 3070D	800	ANY	TSU-I 271				202 2-26			
TEX 3070E	800	ANY	TSU-I 274				202 2-29			
TEX 3070F	800	ANY	TSU-I 277				202 2-32			
TEX 3070G	800	ANY	TSU-I 280				202 2-35			

```
RRRRRR       AAA   TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA   TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC      HH   HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA      TTT     CC      HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A      TTT      CC   C HH   HH  EE          TTT      22
RRR  RR AAA    A      TTT       CCCC  HH   HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	HUCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC REGIST. OHMS
TEX 3070H	800	ANY	TSU-I 283				202 2-38			
TEX 3070I	800	ANY	TSU-I 286							
TEX 3070J	800	ANY	TSU-I 289							
TEX 3070K	800	ANY	TSU-I 292							
TEX 3070L	800	ANY	TSU-I 295							
TEX 3070M	800	ANY	TSU-I 307							
TEX 3070N	800	ANY	TSU-I 310							

```
RRRRRR      AAA  TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA  TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A     TTT     CC      HH   HH  EEEEEEE     TTT           22
RRRRRR   AAAAAA     TTT     CC      HHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A     TTT      CC   C HH   HH  EE          TTT       22
RRR  RR AAA    A     TTT       CCCC  HH   HH  EEEEEEE     TTT       2222222
```

TAG ID	RANGE	CRT	T-Box TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TEX 3070P	800	ANY	TSU-I 313							
TEX 3070Q	800	ANY	TSU-I 316							
TEX 3070R	800	ANY	TSU-I 319							
TEX 3070S	800	ANY	TSU-I 322							
TEX 3070T	800	ANY	TSU-I 325							
TEX 3070U	800	ANY	TSU-I 349							
TEX 3070V	800	ANY	TSU-I 352							

```
RRRRRR      AAA   TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC      HH   HH  EEEEEEE     TTT          22
RRRRRR   AAAAAA      TTT     CC      HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT      CC   C HH   HH  EE          TTT      22
RRR  RR AAA    A     TTT       CCCC  HH   HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MUCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST-OHMS
TEX 3070W	800	ANY	TSU-I 355							
TEX 3070X	800	ANY	TSU-I 358							
TEX 3070Y	800	ANY	TSU-I 361							
TEX 3070Z	800	ANY	TSU-I 364							
TEX 3086	800	ANY	TSU-I 328				202 2-41			
TEX 3150	1500	ANY	SA301-I 16				202 2-44			
TEX 3153	400	ANY	SA301-I 19				202 2-47			

```
RRRRRR      AAA  TTTTTTTTT   CCCC   HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA  TTTTTTTTT  CC   C  HH    HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A     TTT     CC      HH    HH  EEEEEEE     TTT          22
RRRRRR   AAAAAA     TTT     CC      HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT      CC   C HH    HH  EE          TTT      22
RRR  RR AAA    A     TTT       CCCC  HH    HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-Box TERM	TSS TERM	MUCN TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TEX 3155	400	ANY	SA301-I 22				202 3-2			
TEX 3250	800	ANY	SA302-I 19							
TEX 3251	800	ANY	SA302-I 22							
TEX 3253	800	ANY	SA302-I 28							
TEX 3254	800	ANY	SA302-I 25							
TEX 3350	800	ANY	SA303-I 19							
TEX 3351	800	ANY	SA303-I 22							

```
RRRRRR       AAA   TTTTTTTTT    CCCC    HH    HH  EEEEEEE  TTTTTTTTT    22222
RRR  RR     AAAA   TTTTTTTTT  CC    C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC        HH    HH  EEEEEEE     TTT           22
RRRRRR    AAAAAA      TTT     CC        HHHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A      TTT      CC    C  HH    HH  EE          TTT     22
RRR  RR AAA    A      TTT       CCCC    HH    HH  EEEEEEE     TTT     2222222
```

TAG	ID	RANGE	CRT	T-BOX TERM	TSS TERM	MUCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
TEX	3353	800	ANY	SA303-I 25							
TEX	3354	800	ANY	SA303-I 16							
TEX	3551	600	ANY	SA305-I 4				202 3-5			
TEX	3651	600	ANY	SA306-I 4				202 3-8			
TEX	3750	600	ANY	SA307-I 25				202 3-11			
TEX	3752	600	ANY	SA307-I 16				202 3-14			
TEX	3753	600	ANY	SA307-I 28							

```
RRRRRR       AAA   TTTTTTTTT    CCCC   HH    HH  EEEEEEE  TTTTTTTTT    22222
RRR  RR     AAAA   TTTTTTTTT  CC    C  HH    HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC       HH    HH  EEEEEEE     TTT           22
RRRRRR    AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A      TTT      CC    C  HH    HH  EE          TTT     22
RRR  RR AAA    A      TTT       CCCC   HH    HH  EEEEEEE     TTT     2222222
```

TAG	ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST OHMS
TEX	3754	600	ANY	SA307-I 19				202 3-17			
TEX	3755	600	ANY	SA307-I 22				202 3-20			
TEX	3850	600	ANY	SA308-I 19				202 3-23			
TEX	3852	600	ANY	SA308-I 22				202 3-26			
TEX	3853	600	ANY	SA308-I 28							
TEX	3854	600	ANY	SA308-I 25							
TEX	3855	600	ANY	SA308-I 31				202 3-29			

```
RRRRRR       AAA   TTTTTTTTT    CCCC   HH    HH   EEEEEEE   TTTTTTTTT    22222
RRR  RR     AAAA   TTTTTTTTT   CC   C  HH    HH   EE        TTTTTTTTT   22   22
RRR  RR    AAA A      TTT     CC        HH    HH   EEEEEEE      TTT           22
RRRRRR    AAAAAA      TTT     CC        HHHHHHHH   EEEEEEE      TTT        22222
RRR RR   AAA   A      TTT      CC   C   HH    HH   EE           TTT       22
RRR  RR AAA    A      TTT       CCCC    HH    HH   EEEEEEE      TTT       2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCW TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	TC RESIST. OHMS
			SA309-I							
TEX 3953	650	ANY	28							
			SA309-I							
TEX 3955	650	ANY	31							
			SA311-1							
TEX 4051	+140 F	ANY	1							

END TO END RTD CHECKOUT PROCEDURE

1.0 OBJECTIVES:

The purpose of these checks are to perform element and circuit tests to determine the following:

a. Resistance of RTD from junction box to elements.

b. Proper distribution of circuit signal.

c. Scaling of signal.

2.0 ACCEPTANCE CRITERIA:

a. Resistance is measured and recorded.

b. The RTD output distribution is proper.

c. Scaling is proper at the distribution end terminals.

3.0 REFERENCES

a. Construction Drawings 40E3005132110

b. Construction Drawings E8(71 thru 96).

c. Signal conditioning wiring and test procedures manual.

4.0 PREREQUISITES

a. The RTD circuits are completely installed.

b. The RTD circuits are scaled and properly signal conditioned.

c. The IPAC and DARMS are completely installed and RTD wiring is complete.

d. The IPAC and DARMS are functioning properly.

e. The programming of the TSS operator's console, and the DAS, are completed. If not, the checks will be done from the terminals of the IPAC and DARMS.

5.0 LIMITS AND PRECAUTIONS

a. The checkouts will be accomplished from the first terminal box of the RTD to the input terminals of the IPAC and DARMS. The input check can be omitted for the DARMS and IPAC if the signals are to be monitored at the operator's console and the DAS console.

b. The input to the circuit will be made with the resistance substitution unit.

6.0 TEST EQUIPMENT

a. Resistance Substitution Unit, Phipps & Bird, Inc.

b. CHU

c. Multimeter

7.0 CRITICAL CONDITIONS

a. IPAC and DARMS are operating.

b. If available, the DAS and operator consoles are programmed and operating.

8.0 PROCEDURE AND DATA COLLECTION

a. Monitor the signal at the IPAC and DARMS to confirm the proper signal levels.

b. The following ranges and calibrations have been used for the RTD parameters.

RANGE	TEMPERATURE DEGREE F	ELEMENT RESISTANCE OHMS
800°F, HIGH	800	256.23
800°F, LOW	400	177.47
AMBIENT, HIGH	100	114.68
AMBIENT, LOW	40	101.74

8.0

c. Disconnect the RTD terminal in the terminal box for the transducer and measure the element resistance to confirm it is the approximate ambient temperature in ohms.

d. Using the resistance substitution unit, input the resistance for the zero and span output for the parameter and confirm the DARMS and IPAC are properly scaled. After the end points are set, input resistance equivalent to 50% span (400°F) and measure output in ma. Record values under "RTD RESIST" column on following list.

e. If the DAS and operator console are in operation, confirm the proper temperature is displayed relative to the input resistance.

f. After confirmation of proper scaling and distribution of the circuits, replace the element terminal connection.

g. Record and report any discrepancy in the RTD circuits on the attached parameter list.

```
RRRRRR       AAA   TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA   TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC      HH   HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA      TTT     CC      HHHHHHH  EEEEEEE     TTT        22222
RRR RR    AAA   A     TTT      CC   C HH   HH  EE          TTT     22
RRR  RR AAA     A     TTT       CCCC  HH   HH  EEEEEEE     TTT     222222
```

TAG ID	RANGE	CRT	T-BOX TERM	R TERM	MVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	RTD RESIST ma
TT	3106	800	TSS	SA301-I A1			2-1A 2A-6			
TT	3212	800	TSS	SA302-I A5			3-1A 4A-8			
TT	3312	800	TSS	SA303-I A9			3-1A 5A-8			

END TO END HEAT FLUX PARAMETER CHECKOUT PROCEDURE

1.0 OBJECTIVES:

The purpose of these checks are to perform element and circuit tests to determine the following:

a. Resistance of heat flux transducer from junction box to element.
b. Prevailing ambient level transducer output.
c. Proper distribution of circuit signal.
d. Scaling of signal.

2.0 ACCEPTANCE CRITERIA:

a. Resistance is measured and recorded.
b. Heat flux transducer output is zero millivolts.
c. The parameter output distribution is proper.
d. Scaling is proper at the distribution end terminals.

3.0 REFERENCES:

a. Construction Drawings 40E3005132122
b. Construction Drawings E8 (71 thru 96).
c. Signal conditioning wiring and test procedures manual.

4.0 PREREQUISITES:

a. The heat flux circuits are completely installed.
b. The heat flux circuits are scaled and properly signal conditioned.
c. The IPAC and MVCU are completely installed and wiring is completed.
d. The IPAC and MVCU are functioning properly.
e. The programming of the TSS operator's console, and the DAS, are completed. If not, the checks will be done from the terminals of the IPAC and MVCU.

5.0 LIMITS AND PRECAUTIONS:

a. The checkouts will be accomplished from the first terminal box of the heat flux transducer to the input terminals of the IPAC and MVCU. The input check can be omitted for the MVCU and IPAC if the signals are to be monitored at the operator's console and the DAS console.
b. The input to the circuit will be made with the DIGI-CAL-II unit.

6.0 TEST EQUIPMENT:

a. Universal Calibrator for thermocouples, ANALOGIC DIGI-CAL-II, AN6520.

b. CHU

c. Multimeter

7.0 CRITICAL CONDITIONS

a. The IPAC and MVCU are operating.

b. If available, the DAS and operator consoles are programmed and operating.

8.0 PROCEDURE AND DATA COLLECTING

a. Confirm the ambient signal value of each heat flux transducer is zero at the MVCU and IPAC terminals in accordance with the attached parameter list. Note any discrepancies.

b. Measure and record the heat flux gauge resistance in ohms.

c. With the flux gauge white terminal disconnected, input 24 millivolts which is equivalent to 100% of full span. Confirm the values are proper at the MVCU and IPAC. Note any discrepancies. After setting the end points, input 12 millivolts and measure output (ma) and record in "RESIST" column.

d. Reinstall the heat flux gauge lug and tighten screw.

e. Report any discrepancies.

f. If the operator and DAS consoles are on line, confirm these tests for the MVCU and IPAC using the respective CRT readouts instead of at the terminals of the equipment, and confirm the output in kilowatts per meter squared is equal to the range of each transducer per the attached list.

g. Confirm the transducer serial number is as listed on the attached assignment and calibration tabulation.

```
RRRRRR      AAA   TTTTTTTTT    CCCC    HH    HH   EEEEEEE   TTTTTTTTT    22222
RRR  RR    AAAA   TTTTTTTTT  CC    C   HH    HH   EE        TTTTTTTTT  22    2
RRR  RR   AAA A      TTT     CC        HH    HH   EEEEEEE      TTT           2
RRRRRR   AAAAAA      TTT     CC        HHHHHHHH   EEEEEEE      TTT       22222
RRR RR   AAA   A     TTT      CC    C  HH    HH   EE           TTT      22
RRR  RR AAA    A     TTT       CCCC    HH    HH   EEEEEEE      TTT      222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	DARMS TERM	IPAC TERM	OPR CRT CHECK	DAS CRT CHECK	RESIST. ma	SPAN CHECK
YTX 3050	0-57	ANY	TSU-I E70		202 9.2					
YTX 3051	0-568	ANY	TSU-I E73		202 9-5					
YTX 3052	0-114	ANY	TSU-I E76		202 9-8					

APPENDIX 10D-6

END TO END STRAIN GAGE CIRCUIT CHECKOUT PROCEDURE

1.0 OBJECTIVE:

The purpose of these tests are to perform strain gage and circuit tests to determine the following:

a. Proper span adjustment of transducer.

b. Proper distribution of circuit signal.

2.0 ACCEPTANCE CRITERIA

a. The strain gage zero and full scale output is simulated and circuit sensitivity adjusted as required.

b. The strain gage signals are properly distributed.

3.0 REFERENCES

a. Construction drawing 40E3005132109.

b. Construction drawings E8 (71 thru 96).

c. Signal conditioning wiring and test procedures manual.

4.0 PREREQUISITES

a. The strain gage circuits are completely installed.

b. The strain gage circuits are scaled.

c. The DARMS is installed.

d. The DARMS is functioning.

e. Programming of the TSS operator console and the DAS are completed. If not, these checks are to be done from the terminals of the equipment.

5.0 LIMITS AND PRECAUTIONS:

a. The checkouts will be accomplished from the first terminal box of the strain gage transducer to the input terminals of the DARMS.

b. The input to the circuit will be made with the SABER unit.

6.0 TEST EQUIPMENT

a. SABER strain gage simulator/calibrator.

b. Multimeter.

c. CHU.

7.0 INITIAL CONDITIONS

a. The DARMS is operating.

b. If available, the DAS and operator console are programmed and operating.

c. The strain gages are installed.

8.0 PROCEDURE AND DATA COLLECTION

a. Confirm the ambient (unstressed) signal value of each strain gage is zero at the DARMS terminals in accordance with the attached parameter list. Note any discrepancies.

b. Attach the SABER strain gage simulator/calibrator to the output leads of strain gage, and input 30,000 psi equivalent stress (TBD MV/V). Confirm proper values at DARMS. Note any discrepancies in "SPAN CHECK" column of attached parameter list.

c. If the DAS terminal is available, the zero and span may be read and confirmed at the CRT, in lieu of monitoring the DARMS terminal current.

d. After checkout completion, remove SABER unit.

```
RRRRRR       AAA   TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA   TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22   2
RRR  RR    AAA A      TTT     CC      HH   HH  EEEEEEE     TTT          2
RRRRRR    AAAAAA      TTT     CC      HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A      TTT      CC   C HH   HH  EE          TTT      22
RRR  RR AAA    A      TTT       CCCC  HH   HH  EEEEEEE     TTT      222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	DARMS TERM	DAS CRT CHECK	SPAN CHECK
OEX	3020	30,000 ANY	TSU-I F65 F69 F73 F77				
OEX	3012A	30,000 ANY	TSU-I C139		202 13-4 13-5		
OEX	3012B	30,000 ANY	TSU-I C143		202 13-11 13-12		
OEX	3013A	30,000 ANY	TSU-I D153		202 13-18 13-19		

```
RRRRRR       AAA   TTTTTTTTT    CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA   TTTTTTTTT  CC    C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC        HH    HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA      TTT     CC        HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A      TTT      CC    C  HH    HH  EE          TTT      22
RRR  RR AAA    A      TTT       CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	DARMS TERM	DAS CRT CHECK	SPAN CHECK
OEX 3013B	30,000	ANY	TSU-I D157		202 13-25 13-26		
OEX 3014A	30,000	ANY	TSU-I D169		202 14-4 14-5		
OEX 3014B	30,000	ANY	TSU-I D173		202 14-11 14-12		
OEX 3015A	30,000	ANY	TSU-I E116		202 14-18 14-19		
OEX 3015B	30,000	ANY	TSU-I E120		202 14-25 14-26		
OEX 3016A	30,000	ANY	TSU-I F1		202 15-4 15-5		
OEX 3016B	30,000	ANY	TSU-I F5		202 15-11 15-12		

```
RRRRRR       AAA  TTTTTTTTT   CCCC   HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA  TTTTTTTTT  CC   C  HH    HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A     TTT     CC      HH    HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA     TTT     CC      HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT      CC   C HH    HH  EE          TTT      22
RRR  RR AAA    A    TTT       CCCC  HH    HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	DARMS TERM	DAS CRT CHECK	SPAN CHECK
DEX 3017	30,000	ANY	TSU-I F17 F21 F25 F29				
DEX 3018	30,000	ANY	TSU-I F33 F37 F41 F45				
DEX 3019	30,000	ANY	TSU-I F49 F53 F57 F61				
DEX 3021	30,000	ANY	TSU-I F81 F85 F89 F93				
DEX 3022	30,000	ANY	TSU-I F97 F101 F105 F109				
DEX 3023	30,000	ANY	TSU-I F113 F117 G1 G5				
DEX 3024	30,000	ANY	TSU-I G9 G13 G17 G21				

```
RRRRRR       AAA  TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA  TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22   2
RRR  RR    AAA A     TTT     CC      HH   HH  EEEEEEE     TTT          2
RRRRRR    AAAAAA     TTT     CC      HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT      CC   C HH   HH  EE          TTT      22
RRR  RR AAA    A     TTT       CCCC  HH   HH  EEEEEEE     TTT      222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	DARMS TERM	DAS CRT CHECK	SPAN CHECK
DEX 3025	30,000	ANY	TSU-I G25 G29 G33 G37				
DEX 3026	30,000	ANY	TSU-I G41 G45 G49 G53				
DEX 3027	30,000	ANY	TSU-I G57 G61 G65 G69				
DEX 3028	30,000	ANY	TSU-I G73 G77 G81 G85				
DEX 3029	30,000	ANY	TSU-I G89 G93 G97 G101				
DEX 3030	30,000	ANY	TSU-I G105 G109 G113 G117				

END TO END PRESSURE TRANSMITTER CIRCUIT CHECKOUT PROCEDURE

1.0 OBJECTIVE:

The purpose of these tests are to perform transmitter and circuit tests to determine the following:

a) Proper span adjustment of transducer.
b) Proper distribution of circuit signal.
c) Scaling of signal.

2.0 ACCEPTANCE CRITERIA

a) The transmitter zero and full scale output is measured and adjusted as required.
b) The transmitter signals are properly distributed.
c) Scaling is proper at the distribution terminals.

3.0 REFERENCES

a) Procedure for adjusting span of transmitters (attachment A).
b) Construction drawing 40E3005132105,-6, and -125
c) Construction drawings E8(71 thru 96).
d) Signal conditioning wiring and test procedures manual.

4.0 PREREQUISITES

a) The pressure transmitter circuits are completely installed.
b) The pressure transmitter circuits are scaled.
c) The RLU, ILS, IPAC, MVCU, and DARMS are installed.
d) The RLU, ILS, IPAC, MVCU, and DARMS are functioning.
e) Programming of the TSS operator console and the DAS are completed. If not, these checks are to be done from the terminals of the equipment.

5.0 LIMITS AND PRECAUTION

a) The checkouts will be accomplished by pressurizing the transmitters using distilled water and a hand pump. Use precaution to limit the press applied to the transducer to the full range value of the parameter.
b) Upon completing the check for the transducer, open the isolation valve to the systems and close the calibration valve.

6.0 TEST EQUIPMENT

a) Comparator Pressure Determination System.

b) Multimeter.

c) CHU.

7.0 INITIAL CONDITIONS

a) The RLU, ILS, IPAC, MVCU, and DARMS are operating.

b) If available, the DAS and operator console are programmed and operating.

c) The pressure transmitters are installed.

8.0 PROCEDURE AND DATA COLLECTION

a) Connect the appropriate gauge for span and scaling check of the transmitter.

b) Close the transducer isolation valve and open the pump valve.

c) Connect the milliamp (ma) meter to the transmitter to measure the 4 ma value for zero and 20 ma for 100% range.

d) Confirm the transducer excitation voltage is applied.

e) Apply full range of pressure to the transducer and confirm the current output is 4 ma at zero pressure and 20 ma at the full range. Adjust zero and span in accordance with the procedure for adjusting span on pressure transmitter. (Attachment A) After setting end points, apply 50% range pressure and measure transmitter output in ma. Record values in "PRESS CHECK" column on attached parameter list.

f) Confirm proper distribution and scaling of signal in accordance with the parameter list attached. Note any discrepancies.

g) Restore transducer valves to original condition.

h) Remove gauge and pump.

i) Disconnect the milliameter.

j) Report any discrepancies with the span, circuiting or checkout on the parameter list.

k) Checksusing the operator and DAS terminals may be done in place of MVCU, IPAC and DARMS terminal measurements.

PROCEDURE FOR ADJUSTING SPAN ON PRESSURE TRANSMITTERS

INTRODUCTION

The ranges of some pressure transmitters have been changed since the units were received from the vendors; consequently these pressure transmitters will have to be adjusted in their installed locations. The following procedure will detail the method to be used.

TEST EQUIPMENT

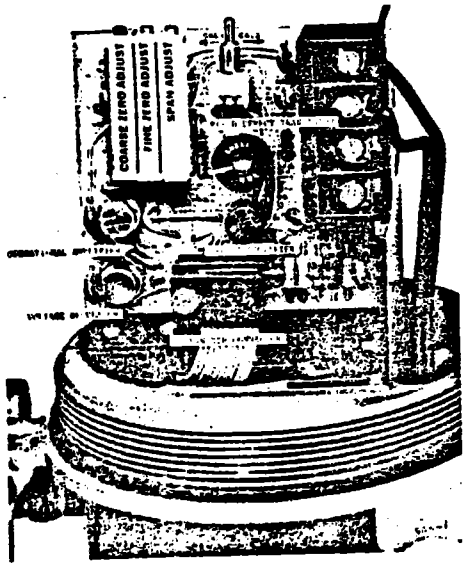
The following equipment will be required for the pressure range adjustments.

1. A distilled water regulated pressure source capable of being controlled from zero to 2500 lbs. per squ. in.
2. A vacuum pump for the absolute pressure transmitter adjustments.
3. Pressure gages with an accuracy of 1/4% of full scale. These gages must be in current calibration at time of use. The following ranges are required.
   a. 0 - 60 in H_2O
   b. 0 - 60 psia
   c. 0 - 200 psig
   d. 0 - 1000 psig
   e. 0 - 3000 psig
4. Digital voltmeter 0.1% accuracy
   Range 0 - 2 volts in current calibration
5. Digital milliammeter 0.1% accuracy
   Range 0 - 25 MA in current calibration
6. All tools, high pressure hoses and plumbing fittings necessary to connect the transmitter to the calibration equipment.

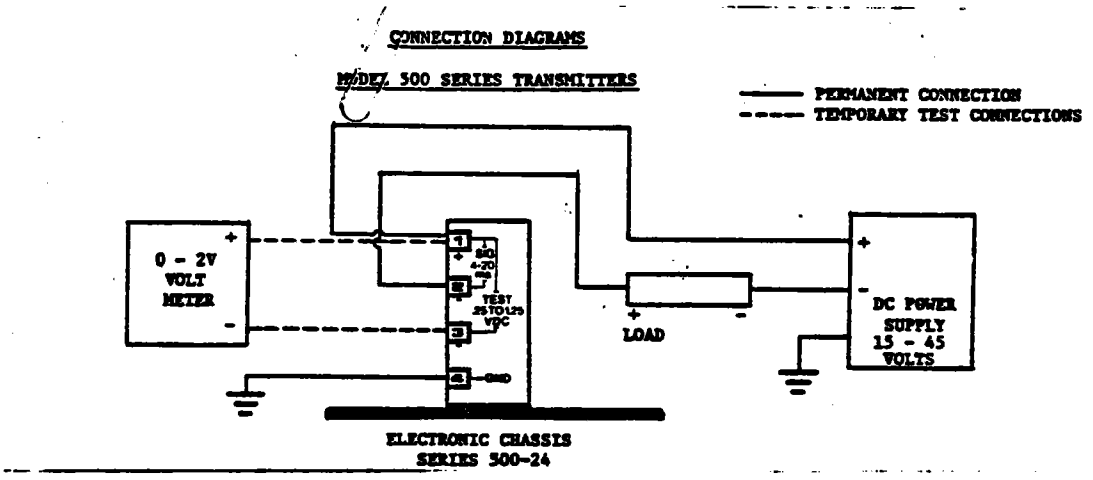
GENERAL PROCEDURE

Table 1 shows the transmitters which require span adjustment and the range desired. The table is divided to separate the Viatran from the Rosemount transmitter. A separate procedure will be given for each type transmitter because of the differences in mechanical and electrical makeup.

1. The selected transmitter will first be disconnected from the input plumbing.
2. Connect the pressure source and proper range gage to the transmitter.
3. Remove the cover of the transmitter to expose the terminal strip and pots as shown in Figure 1.



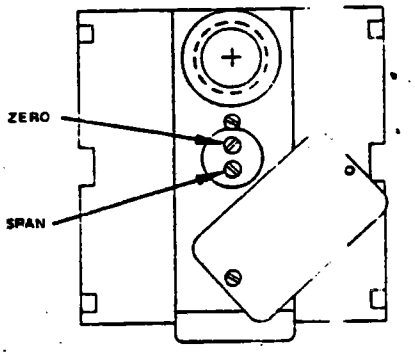
4. Connect the digital voltmeter as shown in Figure 2.



5. Confirm that the cal switch is in the center position.
6. Apply the maximum set pressure.
7. Adjust the span pot for a 1.25 volt output.
8. Reduce the pressure input to zero and adjust the zero pots for an 0.25 volt output.
9. Repeat steps 7 thru 9 until the readings converge.
10. Disconnect the test equipment and return the plumbing and transmitter to the original configuration.
11. Sign and date column in Table 1.

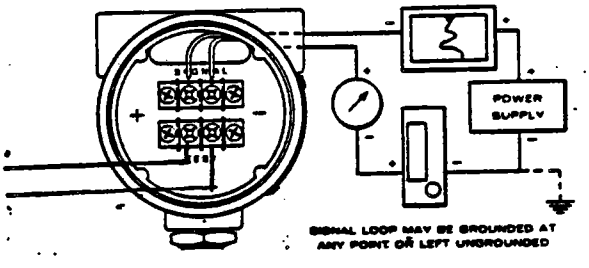
1. The selected transmitter will first be disconnected from the input plumbing.
2. Connect the pressure source and proper range gage to the transmitter.
3. Move the nameplate to show the zero and span pots as shown in Figure 3.

ZERO AND SPAN ADJUSTMENT



4. Remove the transmitter cover to expose the terminal board and connect the digital milliammeter to the test terminals as shown in Figure 4.

WIRING CONNECTIONS



5. Apply the maximum set pressure.
6. Adjust the span pot for a 20.0 MA output
7. Reduce the input to zero and adjust the zero pot for a 4.0 MA output.
8. Repeat steps 6 through 8 until the readings converge.
9. Disconnect the test equipment and return the plumbing and transmitter to the original configuration.
10. Sign and date column in Table 1.

```
RRRRRR       AAA   TTTTTTTTT   CCCC    HH    HH  EEEEEEE  TTTTTTTTT   2  22
RRR  RR     AAAA   TTTTTTTTT  CC   C   HH    HH  EE       TTTTTTTTT  22   2
RRR  RR    AAA A      TTT     CC       HH    HH  EEEEEEE     TTT          2
RRRRRR    AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A      TTT      CC   C   HH    HH  EE          TTT      22
RRR  RR AAA    A      TTT       CCCC   HH    HH  EEEEEEE     TTT      222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	ILS TERM	DARMS TERM	OPR CRT CHECK	PAS CRT CHECK	PRESS. CHECK
PT 3102A	1800	TSS	SA 301-I A94		2-1A AI-3			202 19-18			
PT 3102B	1800	TSS	SA 301-I A97		2-1A AI-4						
PT 3104	1800	TSS	SA301-I A100		2-1A AI-15						
PT 3109	2500	TSS	SA 301-I A103			2-1A 2A-2					

```
RRRRRR       AAA   TTTTTTTTT   CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA   TTTTTTTTT  CC   C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC       HH    HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A      TTT      CC   C   HH    HH  EE          TTT      22
RRR  RR AAA    A      TTT       CCCC    HH    HH  EEEEEEE     TTT      2222222
```

TAG	ID	RANGE	CRT	T-Box TERM	TSS TERM	MVCU TERM	IPAC TERM	ILS TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	PRESS. CHECK
PT	3114	200	TSS	SA301-I A106		4-3A AI-3						
PT	3203	1800	TSS	SA302-I A118		3-1A AI-6						
PT	3208	100	TSS	SA302-I A133			3-1A 4A-6					
PT	3209	1800	TSS	SA302-I E132 E135 E138			3-1A 6A-6					
PT	3210A	1800	TSS	SA302-I A121		2-4A AI-2						
PT	3210B	1800	TSS	SA302-I A124		2-4A AI-3						
PT	3211	100	TSS	SA302-I A130			3-1A 4A-4					

```
RRRRRR      AAA   TTTTTTTTT   CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC   C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC       HH    HH  EEEEEEE     TTT           22
RRRRRR   AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A     TTT      CC   C  HH    HH  EE          TTT       22
RRR  RR AAA    A     TTT       CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MUCU TERM	IPAC TERM	ILS TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	PRESS. CHECK
PT 3216	600	TSS	SA302-I A115			3-1A 6A-4					
PT 3303	1800	TSS	SA303-I A142		3-2A AI-6						
PT 3308	100	TSS	SA303-I B13			3-1A 4A-12					
PT 3309	1800	TSS	SA303-I E141 E146 E147			3-1A 4A-16					
PT 3310	100	TSS	SA303-I B10			3-1A 4A-10					
PT 3311A	1800	TSS	SA303-I B1		2-4A AI-5						
PT 3311B	1800	TSS	SA303-I B4		2-4A AI-6						

```
RRRRRR      AAA   TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC      HH   HH  EEEEEEE     TTT          22
RRRRRR   AAAAAA      TTT     CC      HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT      CC   C HH   HH  EE          TTT      22
RRR  RR AAA    A     TTT       CCCC  HH   HH  EEEEEEE     TTT      2222222
```

TAG	ID	RANGE	CRT	T-BOX TERM	TSS TERM	MUCW TERM	IPAC TERM	ILS TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	PRESS. CHECK
PT	3316	600	TSS	SA303-I A139			3-1A 4A-14					
PT	3405	30	TSS	SA304-I B19			3-1A 4A-2					
PT	3406	30	TSS	SA304-I B22			3-1A 3A-2					
PT	3450	120	TSS	SA304-I B25			3-1A 3A-14					
PT	3451	120	TSS	SA304-I B28			3-1A 3A-8					
PT	3502	600	TSS	SA305-I B31			2-1A 6A-6					
PT	3602	600	TSS	SA306-I B37			2-1A 6A-10					

```
RRRRRR      AAA   TTTTTTTTT   CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC   C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC       HH    HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA     TTT     CC       HHHHHHH  EEEEEEE     TTT       22222
RRR RR    AAA   A    TTT      CC   C  HH    HH  EE          TTT      22
RRR  RR  AAA    A    TTT       CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	ILS TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	PRESS. CHECK
PT 3702A	600	TSS	SA307-I B52		2-2A AI-1		201 AI-2	202 20-26			
PT 3702B	600	TSS	SA307-I B55		2-2A AI-2		201 AI-11				
PT 3703	100	TSS	SA307-I B43			2-1A 4A-6		202 20-30			
PT 3713	100	TSS	SA307-I B46			2-1A 4A-2		202 21-10			
PT 3714	600	TSS	SA307-I B49		2-2A AI-4 3-1A AI-9			202 21-14			
PT 3802A	600	TSS	SA308-I B64		2-3A AI-1		201 AI-3	202 21-30			
PT 3802B	600	TSS	SA308-I B67		2-3A AI-2		201 AI-4				

```
RRRRRR       AAA  TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA  TTTTTTTTT CC   C  HH   HH  EE       TTTTTTTTT 22   22
RRR  RR    AAA A     TTT    CC      HH   HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA     TTT    CC      HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT     CC   C HH   HH  EE          TTT    22
RRR  RR AAA    A    TTT      CCCC  HH   HH  EEEEEEE     TTT    2222222
```

TAG	ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	ILS TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	PRESS. CHECK
PT	3803	100	TSS	SA308-I B58			2-1A 6A-2		202 22-2			
PT	3813	100	TSS	SA308-I B61			2-1A 4A-14		202 22-14			
PT	3814	600	TSS	SA308-I B70		2-3A AI-4 3-1A AI-10			202 22-18			
PT	3903	30PSIA	TSS	SA309-I B73			3-1B 1A-16					
PT	3904	30	TSS	SA309-I B76			3-1B 1A-8					
PT	3908	30	TSS	SA309-I B79			3-1A 6A-16					
PT	3911	60	TSS	SA309-I B82			3-1A 6A-12					

```
RRRRRR       AAA   TTTTTTTTT   CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA   TTTTTTTTT  CC   C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC       HH    HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A      TTT      CC   C  HH    HH  EE          TTT      22
RRR  RR AAA    A      TTT       CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG	ID	RANGE	CRT	T-Box TERM	TSS TERM	MVCU TERM	IPAC TERM	ILS TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	PRESS. CHECK
PT	3950	120	TSS	SA309-I B85			3-1B 1A-10					
PT	3951	120	TSS	SA309-I B88			3-1B 1A-2					
PT	4008	0-20"	TSS	TSU-I E67			2-1A 6A-14					
PTX	3152	200	ANY	SA301-I A109								
PTX	3154	200	ANY	SA301-I A112					202 19-30			
PTX	3252	1800	ANY	SA302-I A196								
PTX	3352	1800	ANY	SA303-I B16								

```
RRRRRR      AAA   TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT CC   C  HH   HH  EE       TTTTTTTTT 22   2
RRR  RR   AAA A      TTT    CC      HH   HH  EEEEEEE     TTT          2
RRRRRR   AAAAAA      TTT    CC      HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT     CC   C HH   HH  EE          TTT      22
RRR  RR AAA    A     TTT      CCCC  HH   HH  EEEEEEE     TTT      222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	ILS TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	PRESS. CHECK
PTX 3550	600	ANY	SA305-I B34					202 20-5			
PTX 3650	600	ANY	SA306-I B40					202 20-18			
PTX 3952	100	ANY	SA309-I B91								
PTX 3954	100	ANY	SA309-I B94								
PTX 4052	150	ANY	SA311-I B100								
PJT 640	0-2	TSS			4-2A AI-19 4-3A AI-11	2-5A AI-4					
PJT 647	0-75	TSS			4-3A AI-4 4-4A AI-2						

END TO END DIFFERENTIAL PRESSURE TRANSMITTER CIRCUIT CHECKOUT PROCEDURE

1.0 OBJECTIVE

The purpose of these tests are to perform transmitter and circuit tests to determine the following:

a. Proper span adjustment of transducer.
b. Proper distribution of circuit signal.
c. Scaling of signal.

2.0 ACCEPTANCE CRITERIA

a. The transmitter zero and full scale output is measured and adjusted as required.
b. The transmitter signals are properly distributed.
c. Scaling is proper at the distribution terminals.

3.0 REFERENCES

a. Procedure for adjusting span of transmitters (attachment A of 10D-7).
b. Construction drawing 40E3005132107
c. Construction drawings E8 (71 thru 96).
d. Signal conditioning wiring and test procedures manual.

4.0 PREREQUISITES

a. The differential pressure transmitter circuits are completely installed.
b. The differential pressure transmitter circuits are scaled.
c. The IPAC and DARMS are installed.
d. The IPAC and DARMS are functioning.
e. Programming of the TSS operator console and the DAS are completed. If not, these checks are to be done from the terminals of the equipment.

5.0 LIMITS AND PRECAUTION

a. The checkouts will be accomplished by pressurizing the transmitters using distilled water and a hand pump. Use precaution to limit the press applied to the transducer to the full range value of the parameter.
b. Upon completing the check for the transducer, open the isolation valve to the systems and close the calibration valve.

6.0 TEST EQUIPMENT

a. Comparator Pressure Determination System.
b. Multimeter.
c. CHU

7.0 INITIAL CONDITIONS

a. The IPAC and DARMS are operating.
b. If available, the DAS and operator console are programmed and operating.
c. The pressure transmitters are installed.

8.0 PROCEDURE AND DATA COLLECTION

a. Connect the appropriate gauge to the high pressure port for span and scaling check of the transmitter. Vent the low pressure port.
b. Close the transducer isolation valve and open the hand pump valve.
c. Connect the milliamp (ma) meter to the transmitter to measure the 4 ma value for zero and 20 ma for 100% range.
d. Confirm the transducer excitation voltage is applied.
e. Apply full range of pressure to the transducer and confirm the current output is 4 ma at zero pressure and 20 ma at the full range. Adjust zero and span in accordance with the procedure for adjusting span on pressure transmitter. (Attachment A of IOD-7). After setting limits apply 50% range pressure and measure transmitter output in ma. Record values in "PRESS CHECK" column on attached parameter list.
f. Confirm proper distribution and scaling of signal in accordance with the parameter list attached. Note any discrepancies.
g. Restore transducer valves to original condition.
h. Remove gauge and pump.
i. Disconnect the milliameter.
j. Report any discrepancies with the span, circuiting or checkout on the parameter list.
k. Checks using the operator and DAS terminals may be done in place of IPAC and DARMS terminal measurements.

```
RRRRRR       AAA  TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   222
RRR  RR     AAAA  TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22  22
RRR  RR    AAA A     TTT     CC      HH   HH  EEEEEEE     TTT         22
RRRRRR    AAAAAA     TTT     CC      HHHHHHH  EEEEEEE     TTT      22222
RRR RR   AAA   A     TTT      CC   C HH   HH  EE          TTT     22
RRR  RR AAA    A    TTT       CCCC  HH   HH  EEEEEEE     TTT     2222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MVCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	PRESS. CHECK
PDT 3401	100	TSS	SA304-I C10							
PDT 3403	100	TSS	SA304-I C13							
PDTX 3072	40	ANY	TSU-I E61				202 19-2			
PDTX 3074	40	ANY	TSU-I E55				202 19-5			
PDTX 3075	40	ANY	TSU-I E58				202 19-10			
PDTX 3151	100	ANY	SA301-I C1				202 19-26			

```
RRRRRR       AAA   TTTTTTTTT    CCCC    HH    HH  EEEEEEE  TTTTTTTTT    22222
RRR  RR     AAAA   TTTTTTTTT  CC    C  HH    HH  EE       TTTTTTTTT  22    2
RRR  RR    AAA A      TTT     CC       HH    HH  EEEEEEE     TTT           2
RRRRRR    AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A      TTT      CC    C  HH    HH  EE          TTT      22
RRR  RR AAA    A      TTT       CCCC   HH    HH  EEEEEEE     TTT      222222
```

TAG ID	RANGE	CRT	T-BOX TERM	TSS TERM	MUCU TERM	IPAC TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	PRESS. CHECK
PDTX 3255	20	ANY	SA302-I C4							
PDTX 3355	20	ANY	SA303-I C7							
PDTX 3552	40	ANY	SA305-I C16				202 20-10			
PDTX 3652	40	ANY	SA306-I C19				202 20-22			
PDTX 3751	40	ANY	SA307-I C25				202 21-22			
PDTX 3756	40	ANY	SA307-I C22				202 21-26			
PDTX 3851	40	ANY	SA308-I C31				202 22-26			
PDTX 3856	40	ANY	SA308-I C28				202 22-30			

END TO END LEVEL TRANSMITTER CIRCUIT CHECKOUT PROCEDURE

1.0 OBJECTIVE:

The purpose of these tests are to perform transmitter and circuit tests to determine the following:

a. Proper span adjustment of transducer.
b. Proper distribution of circuit signal.
c. Scaling of signal.

2.0 ACCEPTANCE CRITERIA

a. The transmitter zero and full scale output is measured and adjusted as required.
b. The transmitter signals are properly distributed.
c. Scaling is proper at the distribution terminals.

3.0 REFERENCES

a. Procedure for adjusting span of transmitters (attachment A of 10D-7).
b. Construction drawing 40E3005132107, 122 and 126.
c. Construction drawings E8 (71 thru 96).
d. Signal conditioning wiring and test procedures manual.

4.0 PREREQUISITES

a. The level transmitter circuits are completely installed.
b. The level transmitter circuits are scaled.
c. The RLU, ILS, IPAC, MVCU, and DARMS are installed.
d. The RLU, ILS, IPAC, MVCU, and DARMS are functioning.
e. Programming of the TSS operator console and the DAS are completed. If not, these checks are to be done from the terminals of the equipment.

5.0 LIMITS AND PRECAUTION

a. The checkouts will be accomplished by pressurizing the transmitters using distilled water. Use precaution to limit the press applied to the transducer to the full range value of the parameter.
b. Upon completing the check for the transducer, open the isolation valve to the systems and close the calibration valve.

6.0 TEST EQUIPMENT

a. Pressure pump and gauge kit.
b. Multimeter.
c. CHU.

7.0 INITIAL CONDITIONS

a. The RLU, ILS, IPAC, MVCU, and DARMS are operating.
b. If available, the DAS and operator console are programmed and operating.
c. The pressure transmitters are installed.

8.0 PROCEDURE AND DATA COLLECTION

a. Connect the appropriate tubing for span and scaling check of the transmitter. Move the height to simulate tank level.
b. Close the transducer isolation valve and open the pump valve.
c. Connect the milliamp (ma) meter to the transmitter to measure the 4 ma value for zero and 20 ma for 100% range.
d. Confirm the transducer excitation voltage is applied.
e. Apply full height of water column to the transducer and confirm the current output is 4 ma at zero pressure and 20 ma at the full range. Adjust zero and span in accordance with the procedure for adjusting span on pressure transmitter. (Attachment A of 10D-7). After full range is set, apply 50 percent level and measure transmitter output. Record values in "SPAN CHECK" column on attached parameter list.
f. Confirm proper distribution and scaling of signal in accordance with the parameter list attached. Note any discrepancies.
g. Restore transducer valves to original condition.
h. Remove gauge and pump.
i. Disconnect the milliameter.
j. Report any discrepancies with the span, circuiting or checkout on the parameter list.
k. Checks using the operator and DAS terminals may be done in place of MVCU, IPAC and DARMS terminal measurements.

```
RRRRRR        AAA  TTTTTTTTT    CCCC    HH    HH  EEEEEEE  TTTTTTTTT    22
RRR  RR      AAAA  TTTTTTTTT  CC    C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR     AAA A     TTT     CC        HH    HH  EEEEEEE     TTT          22
RRRRRR     AAAAAA     TTT     CC        HHHHHHH  EEEEEEE     TTT       22222
RRR RR    AAA   A     TTT      CC    C  HH    HH  EE          TTT       22
RRR  RR AAA    A     TTT       CCCC    HH    HH  EEEEEEE     TTT       2222222
```

TAG ID	RANGE	CRT	T-Box TERM	TSS TERM	MVCU TERM	IPAC TERM	ILS TERM	OPR CRT CHECK	DAS CRT CHECK	SPAN CHECK
LS 3116	HIGH	TSS	A: 5A301-I H46				A: 201 ID-3			
			B				B: 201 ID-4			
LT 3008	0-36"	TSS		TSU-I E64		2-1A 6A-16				
LT 3112	0-100"	TSS		5A301-I H7	4-3A AI-1		201 AI-1			
LT 3213	0-30"	TSS		5A302-I D177	2-4A AI-1					
LT 3219	0-30"	TSS		5A302-I D183		3-1A 6A-8				
LT 3313	0-30"	TSS		SA303-I D180	2-4A AI-4					

```
RRRRRR      AAA   TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22   2
RRR  RR   AAA A      TTT     CC      HH   HH  EEEEEEE     TTT           2
RRRRRR    AAAAAA     TTT     CC      HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT      CC   C HH   HH  EE          TTT      22
RRR  RR AAA    A     TTT       CCCC  HH   HH  EEEEEEE     TTT      222222
```

TAG	ID	RANGE	CRT	T-BOX TERM	TSS TERM	HVCU TERM	IPAC TERM	ILS TERM	OPR CRT CHECK	DAS CRT CHECK	SPAN CHECK
LT	3319	0-30"	TSS	S'A303-I D186			3-1A 6A-2				
LT	3705	0-30"	TSS	S'A307-I H1		2-2A AI-8		201 AI-9			
LT	3805	0-30"	TSS	S'A308-I H4		2-3A AI-5		201 AI-10			

END TO END STOP VALVE AND CIRCUIT CHECKOUT PROCEDURE

1.0 OBJECTIVE

a. Confirm the solid state relay (SSR) load circuit breaker is functional.
b. Confirm the stop valve solenoid operates properly from the SSR.
c. Confirm the air operated valve (AOV) functions properly.
d. Confirm the failure position with air on and power off.
e. Confirm the failure position with air off and power on or off.
f. Confirm the limit switches are properly positioned.
g. Confirm the limit switch circuits are proper.
h. Measure actuator threshold and fully open pressure.

2.0 ACCEPTANCE CRITERIA

a. The SSR load circuit switch interrupts the solenoid valve power.
b. The valve solenoid control the air to drive the valve full open or closed.
c. The fail safe valve position is as specified on the attached valve parameter listing.
d. The valve limit switches are functional.
e. The valve limit switch circuit distribution is proper.
f. The valve SSR control circuit distribution is proper.
g. The threshold and fully open pressures are measured.

3.0 REFERENCES

a. Construction drawings 40E3005132102 and 104.
b. Construction drawings E8 (71 thru 96).

4.0 PREREQUISITES

a. The valves and valve circuits are completely installed.
b. The 140 psig valve control air system is operational.
c. The RLU, ILS, and DARMS are installed and functioning.
d. Programming of the TSS operator's console is completed.

5.0 LIMITS AND PRECAUTIONS

a. The valves will be operated at the local level first with the valve operator observing to insure proper function.
b. The system pressure will be zero or ambient during these checkouts to insure no internal or external fluids or gases are moved.

6.0 TEST EQUIPMENT

a. Current calibrator
b. Multimeter
c. CHU

7.0 INITIAL CONDITIONS

a. The 140 psig control air pressure is functional and active.
b. The 120 _____ VAC valve control buss are active.
c. The RLU and ILS are functional and active.

8.0 PROCEDURE AND DATA COLLECTION

a. Refer to the attached valve lists which have the places to check off for the operation of the AOV and SOV circuit. Record all tests, and report any discrepancies.
b. Prior to turning on the 120 _____ VAC, individually confirm that the SSR box load isolation switches function properly and interrupt the circuit to the respective valve. Measure the open and close circuit resistance of the valve as the switch is thrown. Leave the switch open.
c. Turn on the 120 _____ VAC power for the SSR box.
d. Confirm the 140 psig valve control air is on.
e. Operate the valve circuit from the RLU or ILS. Confirm operation of the AOV or SOV if the load switch is closed (failed position).
f. Confirm the failure position of the valve with and without air is as listed.
g. Confirm the limit switches are positioned for approximately one-eighth inch override.
h. Confirm the limit switches wiring is proper to the IPAC, DARMS, and ILS.
i. Check the limit switches for the TSS modulating valves which have switches.
j. Determine the pressure required to start valve stem travel and record on attached parameter list.
k. Determine the pressure required to move the valve stem full travel and record on attached parameter list.

STOP VALVES

VALVE	T-BOX	TERM	I5 LOGIC	INPUT RLU TERM	OUTPUT RLU TERM	ILS	TERM	FAILED* POSITION
AOV-3001	SSR	33	35	5B-3	4B-3	201	4B-3	O
AOV-3002	SSR	39	35	5B-5	4B-6	201	4B-4	O
AOV-3003	SSR	35	35	5B-4	4B-4	201	4B-5	O
AOV-3004	SSR	37	35	5B-6	4B-5	201	4B-6	C
AOV-3005	SSR	41	34	5B-20	4B-8	201	4B-8	C
LV-3116	SA301-C	15				201	4C-4	C
AOV-3117	SA301-C	9	37	5B-13	4A-10	201	4A-9	C
AOV-3118	SA301-C	11	37	5B-14	4A-16	201	4A-10	C
AOV-3206	SA302-C	3	38			301	4A-15	C
SOV-3209	SA302-C	7	33			301	4A-6	C
AOV-3218	SA302-C	1	33			301	4A-4	O
AOV-3220	SA302-C	5	33			301	4A-10	C
AOV-3306	SA303-C	3	38			301	4A-8	C
SOV-3309	SA303-C	7	33			301	4A-5	C
AOV-3318	SA303-C	1	33			301	4A-3	O
AOV-3320	SA303-C	5	33			301	4A-9	C
AOV-3707	SA307-C	5	33			201	4C-3	O
AOV-3708	SA307-C	7	32	5B-8	4A-13	201	4A-11	C
AOV-3717	SA307-C	3	36			201	4A-3	O
AOV-3807	SA308-C	5	33			201	4C-5	O
AOV-3808	SA308-C	7	32	5B-9	4A-19	201	4A-15	C
AOV-3817	SA308-C	3	36			201	4A-13	O
AOV-3905	SA309-C	3	33			301	4A-13	C
AOV-3906	SA309-C	5	33			301	4A-11	C
AOV-3907	SA309-C	1	35	5B-15	4D-6	201	4A-16	C
AOV-4014	SA311-C	1						C
MOV-4015	SA311-C							C
SOV-4016	SA311-C							C
MOV-1030			17			301	4B-3, -5	C

*O = OPEN C = CLOSED

```
RRRRRR       AAA   TTTTTTTTT    CCCC    HH    HH  EEEEEEE  TTTTTTTTT    22222
RRR  RR     AAAA   TTTTTTTTT  CC    C   HH    HH  EE       TTTTTTTTT  22    22
RRR  RR    AAA A      TTT     CC        HH    HH  EEEEEEE     TTT           22
RRRRRR    AAAAAA      TTT     CC        HHHHHHHH  EEEEEEE     TTT        22222
RRR RR    AAA   A     TTT      CC    C  HH    HH  EE          TTT       22
RRR  RR AAA     A     TTT       CCCC    HH    HH  EEEEEEE     TTT       2222222
```

TAG ID	RANGE	CRT	AOV-	T-BOX TERM	IPAC TERM	ILS TERM	SOV CHECK	OPR CRT CHECK	DAS CRT CHECK	PRESSURE START TRAV.	PRESSURE FULL TRAV.
ZS 3001A	CLOSED	TSS	3001	RS-2 H13	2-2B 6A,B-15						
ZS 3001B	OPEN	TSS	3001	RS-2 H10	2-2B 6A,B-16						
ZS 3002A	CLOSED	TSS	3002	RS-2 H19	2-2B 6A,B-1						
ZS 3002B	OPEN	TSS	3002	RS-2 H16	2-2B 6A,B-2						
ZS 3003A	CLOSED	TSS	3003	RS-2 H25	2-2B 6A,B-5						
ZS 3003B	OPEN	TSS	3003	RS-2 H22	2-2B 6A,B-6						

```
RRRRRR       AAA   TTTTTTTTT    CCCC    HH    HH   EEEEEEE   TTTTTTTTT    22222
RRR  RR     AAAA   TTTTTTTTT   CC   C   HH    HH   EE        TTTTTTTTT   22   22
RRR  RR    AAA A      TTT     CC        HH    HH   EEEEEEE      TTT           22
RRRRRR    AAAAAA      TTT     CC        HHHHHHH   EEEEEEE      TTT         22222
RRR RR   AAA   A      TTT      CC   C   HH    HH   EE           TTT       22
RRR  RR AAA    A      TTT       CCCC    HH    HH   EEEEEEE      TTT       2222222
```

TAG	ID	RANGE	CRT	AOV-	T-BOX TERM	IPAC TERM	ILS TERM	SOV CHECK	OPR CRT CHECK	DAS CRT CHECK	PRESSURE START TRAV.	PRESSURE FULL TRAV.
ZS	3004A	CLOSED	TSS	3004	RS-2 H31	2-2B 6A,B-7						
ZS	3004B	OPEN	TSS	3004	RS-2 H28	2-2B 6A,B-8						
ZS	3005A	CLOSED	TSS	3005	RS-2 H37	2-2B 6A,B-3						
ZS	3005B	OPEN	TSS	3005	RS-2 H34	2-2B 6A,B-4						
ZS	3116A	CLOSED	TSS	LV-3116	SA301-I D64	2-2B 6A,B-11						
ZS	3116B	OPEN	TSS	LV-3116	SA301-I D61	2-2B 6A,B-12						
ZS	3117A	CLOSED	TSS	3117	SA301-I D136		Z01 1D-15					

```
RRRRRR       AAA   TTTTTTTTT   CCCC    HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA   TTTTTTTTT  CC   C   HH   HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC       HH   HH  EEEEEEE     TTT           22
RRRRRR    AAAAAA      TTT     CC       HHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A      TTT      CC   C  HH   HH  EE          TTT       22
RRR  RR AAA    A     TTT       CCCC   HH   HH  EEEEEEE     TTT       2222222
```

TAG	ID	RANGE	CRT	AOV-	T-BOX TERM	IPAC TERM	ILS TERM	SOV CHECK	OPR CRT CHECK	DAS CRT CHECK	PRESSURE START TRAV.	PRESSURE FULL TRAV.
ZS	3117B	OPEN	TSS	3117	SA301-I D133		201 ID-16					
ZS	3118A	CLOSED	TSS	3118	SA301-I E16		201 ID-18					
ZS	3118B	OPEN	TSS	3118	SA301-I E13		201 ID-19					
ZS	3206A	CLOSED	TSS	3206	SA302-I D100	3-1B 5A,B-11						
ZS	3206B	OPEN	TSS	3206	SA302-I D97 D76	3-1B 5A,B-12						
ZS	3218A	CLOSED	TSS	3218	SA302-I D94	3-1B 5A,B-3						
ZS	3218B	OPEN	TSS	3218	SA302-I D91	3-1B 5A,B-4						

```
RRRRRR       AAA  TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   222
RRR  RR     AAAA  TTTTTTTTT  CC   C  HH   HH  EE       TTTTTTTTT  22  22
RRR  RR    AAA A     TTT     CC      HH   HH  EEEEEEE     TTT         22
RRRRRR    AAAAAA     TTT     CC      HHHHHHH  EEEEEEE     TTT      22222
RRR RR   AAA   A     TTT      CC   C HH   HH  EE          TTT      22
RRR  RR AAA    A    TTT       CCCC  HH   HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	AOV-	T-BOX TERM	IPAC TERM	ILS TERM	SOV CHECK	OPR CRT CHECK	DAS CRT CHECK	PRESSURE START TRAV.	PRESSURE FULL TRAV.
ZS 3220A	CLOSED	TSS	3220	SA302-I D106	3-1B 5A,B-15						
ZS 3220B	OPEN	TSS	3220	SA302-I D103	3-1B 5A,B-16						
ZS 3306A	CLOSED	TSS	3306	SA303-I D118	3-1B 5A,B-9						
ZS 3306B	OPEN	TSS	3306	SA303-I D115 D46	3-1B 5A,B-10						
ZS 3318A	CLOSED	TSS	3318	SA303-I D112	3-1B 5A,B-1						
ZS 3318B	OPEN	TSS	3318	SA303-I D109	3-1B 5A,B-2						
ZS 3320A	CLOSED	TSS	3320	SA303-I D124	3-1B 5A,B-13						

```
RRRRRR       AAA   TTTTTTTTT    CCCC    HH    HH  EEEEEEE  TTTTTTTTT    22222
RRR  RR     AAAA   TTTTTTTTT  CC    C   HH    HH  EE       TTTTTTTTT  22    22
RRR  RR    AAA A      TTT     CC        HH    HH  EEEEEEE     TTT           22
RRRRRR    AAAAAA      TTT     CC        HHHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A      TTT      CC    C  HH    HH  EE          TTT      22
RRR  RR AAA    A      TTT       CCCC    HH    HH  EEEEEEE     TTT      2222222
```

TAG	ID	RANGE	CRT	AOV-	T-BOX TERM	IPAC TERM	ILS TERM	SOV CHECK	OPR CRT CHECK	DAS CRT CHECK	PRESSURE START TRAV.	PRESSURE FULL TRAV.
ZS	3320B	OPEN	TSS	3320	SA303-I D121	3-1B 5A,B-14						
ZS	3707A	CLOSED	TSS	3707	SA307-I E4	2-2B 4A,B-7						
ZS	3707B	OPEN	TSS	3707	SA307-I E1	2-2B 4A,B-8						
ZS	3708A	CLOSED	TSS	3708	SA307-I E10	2-2B 4A,B-9						
ZS	3708B	OPEN	TSS	3708	SA307-I E7	2-2B 4A,B-10						
ZS	3717A	CLOSED	TSS	3717	SA307-I D142	2-2B 4A,B-5						
ZS	3717B	OPEN	TSS	3717	SA307-I D139 D49	2-2B 4A,B-6						

```
RRRRRR      AAA   TTTTTTTTT   CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC   C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC       HH    HH  EEEEEEE     TTT          22
RRRRRR   AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT      CC   C  HH    HH  EE          TTT      22
RRR  RR AAA    A     TTT       CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG	ID	RANGE	CRT	AOV-	T-BOX TERM	IPAC TERM	ILS TERM	SOV CHECK	OPR CRT CHECK	DAS CRT CHECK	PRESSURE START TRAV.	PRESSURE FULL TRAV.
ZS	3807A	CLOSED	TSS	3807	SA308-I E28	2-2B 4A,B-13						
ZS	3807B	OPEN	TSS	3807	SA308-I E25	2-2B 4A,B-14						
ZS	3808A	CLOSED	TSS	3808	SA308-I E34	2-2B 4A,B-15						
ZS	3808B	OPEN	TSS	3808	SA308-I E31	2-2B 4A,B-16						
ZS	3817A	CLOSED	TSS	3817	SA308-I E22	2-2B 4A,B-11						
ZS	3817B	OPEN	TSS	3817	SA308-I E19 E79	2-2B 4A,B-12						
ZS	3905A	CLOSED	TSS	3905	SA309-I E46	3-1B 6A,B-1						

```
RRRRRR       AAA   TTTTTTTTT    CCCC    HH    HH  EEEEEEE  TTTTTTTTT    22222
RRR  RR     AAAA   TTTTTTTTT  CC    C   HH    HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC        HH    HH  EEEEEEE     TTT           22
RRRRRR    AAAAAA      TTT     CC        HHHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A      TTT      CC    C  HH    HH  EE          TTT       22
RRR  RR AAA    A      TTT       CCCC   HH    HH  EEEEEEE     TTT       2222222
```

TAG ID	RANGE	CRT	AOV-	T-BOX TERM	IPAC TERM	ILS TERM	SOV CHECK	OPR CRT CHECK	DAS CRT CHECK	PRESSURE START TRAV.	PRESSURE FULL TRAV.
ZS 3905B	OPEN	TSS	3905	SA309-I E43	3-1B 6A,B-2						
ZS 3906A	CLOSED	TSS	3906	SA309-I E52	3-1B 5A,B-7						
ZS 3906B	OPEN	TSS	3906	SA309-I E49	3-1B 5A,B-8						
ZS 3907A	CLOSED	TSS	3907	SA309-I E40	3-1B 5A,B-5						
ZS 3907B	OPEN	TSS	3907	SA309-I E37	3-1B 5A,B-6						
ZS 4014A	CLOSED	TSS	4014	RS-2 H43	2-2B 6A,B-9						
ZS 4014B	OPEN	TSS	4014	RS-2 H40	2-2B 6A,B-10						

```
RRRRRR       AAA   TTTTTTTTT    CCCC    HH    HH  EEEEEEE  TTTTTTTTT    22  2
RRR  RR     AAAA   TTTTTTTTT  CC    C   HH    HH  EE       TTTTTTTTT  22    22
RRR  RR    AAA A      TTT     CC        HH    HH  EEEEEEE     TTT           22
RRRRRR    AAAAAA      TTT     CC        HHHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA    A     TTT      CC    C  HH    HH  EE          TTT       22
RRR  RR AAA     A     TTT       CCCC    HH    HH  EEEEEEE     TTT       2222222
```

TAG ID	RANGE	CRT		T-BOX TERM	IPAC TERM	ILS TERM	DARMS TERM	OPR CRT CHECK	DAS CRT CHECK	SOV CHECK
ZS	4015A	CLOSED	TSS	SOV-4015	SA311-I D192	3-1B 6A,B-5				
ZS	4015B	OPEN	TSS	SOV-4015	SA311-I D189	3-1B 6A,B-6				
ZS	4018A	OFF	TSS		SA311-I 4	3-1B 6A,B-10				
ZS	4018B	ON	TSS		SA311-I 6	3-1B 6A,B-11				
ZS	1030A	CLOSED	TSS	MOV-1030		301 1C-9	301 1C-9			
ZS	1030B	OPEN	TSS	MOV-1030		301 1C-10	301 1C-10			
ZS	4021	RUN	TSS	P-308	SA311-I 8	3-1B 6A,B-9				

END TO END MODULATING VALVE FUNCTIONAL, CIRCUIT AND POSITION CHECKOUT PROCEDURE

1.0 OBJECTIVE

The purpose of these tests are to perform modulating valve function, circuit and position checkout procedures.

a. Span and functional check of current to pressure (I - P) pneumatic control on each valve.
b. Span and functional check of pressure to position control on each valve.
c. Function of override solenoid valves and valve position.
d. Valve failure position with power on and air off.
e. Valve failure position with power off and air on.
f. Valve position linear voltage displacement transducer (LVDT) symmetry and functional check.
g. Manual control valve functional check.
h. The manual shutoff switches to the solid state relays (SSR) are functioning.
i. Measure start to open and fully open actuator pressure.

2.0 ACCEPTANCE CRITERIA

a. The I - P output is 3 to 15 psig for a 4 to 20 ma input.
b. The valve position is controlled closed to open for a 3 to 15 psig input.
c. The override valves are functioning properly.
d. The valve failure position is proper.
e. The valve LVDT is symmetrically adjusted for $\pm$ voltage closed to open.
f. The valve is manually controlled from the operator console.
g. The manual isolation SSR load switches properly isolate the solenoid valve circuit.
h. Pressure required to start to open and fully open valve is determined.

3.0 REFERENCES

a. Valve maintenance manual.
b. Construction drawings 40E3005132103 and 104.
c. Construction drawings E8 (71 thru 96).
d. Signal conditioning wiring and test procedure manual.

4.0 PREREQUISITES

a. The 140 psig valve air supply is open to the valves.
b. The 20 psig I - P air supply is open to the I - P unit.
c. The RLU, ILS, and MVCU are installed.
d. The RLU, ILS, and MVCU are functioning.
e. The 120 VAC SSR supply is active.
f. Manual operation from the operator's CRT console is functioning.

5.0 LIMITS AND PRECAUTIONS

a. Operate valves manually with operator observing movement.
b. Operate valves only with direction of operator who is observing the valve movement.
c. Confirm the punch list procedure is followed and the personnel associated with the TSS are cognizant of the valve operations.

6.0 TEST EQUIPMENT

a. Pressure pump and gauge kit.
b. Current calibrator, 4, 12, and 20 ma.
c. Multimeter
d. CHU

7.0 INITIAL CONDITIONS

a. The RLU, ILS, IPAC, and MVCU are operating.
b. The 120 VAC power supply for solenoid valves is active.
c. The 140 psig and 20 psig air supply are on to the valves.
d. The test equipment is available for valve checkouts.

8.0 PROCEDURE AND DATA COLLECTION

a. Post the checkouts on the attached valve functional, positions, and circuit parameter lists. Note any discrepancy for correction or disposition as it is observed.
b. Disconnect the valve power terminal and connect the valve current calibrator. Confirm the I - P output is as follows and record on attached parameter list.

Current	I - P Output
4 ma	3 psig
12 ma	9 psig
20 ma	15 psig

Adjust the I-P as required in accordance with the manufacturer's instruction pamphlet.

8.0 c. Confirm the valve positioner controls the valve position from closed to open as a function of control pressure as follows:

Control Pressure	Valve Position
3 psig	closed
9 psig	50% open
15 psig	100%open

Adjust the valve control as required in accordance with the manufacturer's instruction pamphlet.

d. As required, functional check the override solenoid to confirm proper operation. Apply voltage to SSR, or control from the ILS.

e. Monitor the LVDT and confirm excitation voltage.

f. Measure the LVDT output and confirm the voltage is symmetrically ± voltage closed to open.

g. Confirm the LVDT indicates zero output closed, and 100 percent output open at the MVCU terminal.

h. Reconnect the valve control terminals.

i. Manually operate the valves from the operator's CRT console and confirm control at 0, 50, and 100% valve position, and proper indication of the LVDT, and record on attached parameter list.

j. Apply air pressure to actuator and determine pressure to start valve stem travel and record on attached parameter list.

k. Continue to apply air pressure to determine pressure to fully open the valve and record on attached parameter list.

l. Actuate SSR switch, and confirm valve failed position.

m. Confirm valve failed position with and without air pressure to actuator.

MODULATING VALVES

VALVE	MANUAL CONTROL	T-BOX	TERM	MVCU	TERM	FAILED* POSITION	ILS	TERM
LV-74B	AM74B			4-3A	AO-1	C		
LV-74D-1	AM74D-1			4-3A	AO-2	C		
LV-74D-2	AM74D-2			4-3A	AO-3	C		
PV-640	AM640			4-3A	AO-4	C		
PV-647C	AM647C			4-3A	AO-5	C		
TV-1420						C		
UV-3102		SA301-C	1	2-1A	AO-1	C		
TV-3105		SA301-C	3	2-1A	AO-2	C		
PV-3110		SA301-C	5	2-4A	AO-1	C	201	4A-8
PV-3111		SA301-C	7	2-4A	AO-2	C	201	4A-6
TV-3410	AM3410	SA304-C	5	3-2A	AO-1	O		
TV-3411	AM3411	SA304-C	3	3-1A	AO-1	O		
LV-3505		SA305-C	1	2-2A	AO-3	C		
LV-3605		SA306-C	1	2-3A	AO-3	C		
PV-3702		SA307-C	11	2-2A 3-1A	AO-1, -2 AI-8	O		
TV-3710		SA307-C	9	2-2A 3-1A	AO-4, -5 AI-7	O		
PV-3802		SA308-C	11	2-3A 3-2A	AO-1, -2 AI-8	O		
TV-3810		SA308-C	9	2-3A 3-2A	AO-4, -5 AI-7	O		
PV-3910		SA309-C	7	3-1A	AO-4	O		

*O = open C = closed

```
RRRRRR       AAA  TTTTTTTTT   CCCC   HH   HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR     AAAA  TTTTTTTTT CC    C  HH   HH  EE       TTTTTTTTT 22   22
RRR  RR    AAA A     TTT    CC       HH   HH  EEEEEEE     TTT          22
RRRRRR    AAAAAA     TTT    CC       HHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT     CC    C HH   HH  EE          TTT      22
RRR  RR AAA    A     TTT      CCCC   HH   HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	VALVE	T-BOX TERM	IPAC TERM	DARMS TERM	PRESSURE START TRAV.	PRESSURE FULL TRAV.	OPR CRT CHECK	DAS CRT CHECK	I-P OUTPUT
ZT 3102	0-100%	TSS	UV-3102	SA301-I C46	2-1A 2A-8	202 9-11					
ZT 3105	0-100%	TSS	TV-3105	SA301-I C61	2-1A 2A-4	202 9-14					
ZT 3110	0-100%	TSS	PV-3110	SA301-I C76	2-1A 2A-10	202 9-17					
ZT 3111	0-100%	TSS	PV-3111	SA301-I C91	2-1A 2A-12	202 9-20					
ZT 3410	0-100%	TSS	TV-3410	SA304-I C121	3-1A 3A-10						

```
RRRRRR      AAA   TTTTTTTTT    CCCC    HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC    C  HH    HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC        HH    HH  EEEEEEE     TTT          22
RRRRRR   AAAAAA      TTT     CC        HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A      TTT      CC    C  HH    HH  EE          TTT      22
RRR  RR AAA    A      TTT       CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG	ID	RANGE	CRT	VALVE	T-BOX TERM	IPAC TERM	DARMS TERM	PRESSURE START TRAV.	PRESSURE FULL TRAV.	OPR CRT CHECK	DAS CRT CHECK	I-P OUTPUT
ZT	3411	0-100%	TSS	TV-3411	SA304-I C106	3-1A 3A-12						
ZT	3505	0-100%	TSS	LV-3505	SA305-I C136	2-1A 6A-8	202 9-23					
ZT	3605	0-100%	TSS	LV-3605	SA306-I D13	2-1A 6A-12	202 9-26					
ZT	3702	0-100%	TSS	PV-3702	SA307-I D43	2-1A 4A-4	202 9-29					
ZT	3710	0-100%	TSS	TV-3710	SA307-I D28	2-1A 2A-14	202 9-32					
ZT	3802	0-100%	TSS	PV-3802	SA308-I D73	2-1A 6A-4	202 9-35					
ZT	3810	0-100%	TSS	TV-3810	SA308-I D58	2-1A 4A-10	202 9-38					

```
RRRRRR       AAA   TTTTTTTTT    CCCC    HH    HH  EEEEEEE  TTTTTTTTT    22222
RRR  RR     AAAA   TTTTTTTTT  CC    C  HH    HH  EE       TTTTTTTTT  22   22
RRR  RR    AAA A      TTT     CC       HH    HH  EEEEEEE     TTT           22
RRRRRR    AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT        22222
RRR RR   AAA   A      TTT      CC    C  HH    HH  EE          TTT     22
RRR  RR AAA    A      TTT       CCCC    HH    HH  EEEEEEE     TTT     2222222
```

TAG	ID	RANGE	CRT	VALUE	T-BOX TERM	IPAC TERM	MVCU TERM	PRESSURE START TRAV.	PRESSURE FULL TRAV.	OPR CRT CHECK	DAS CRT CHECK	I-P OUTPUT
ZT	3910	0-100%	TSS	PV-3910	SA309-I D88	3-1A 6A-14						
ZT	74B	0-100%	TSS	LV-74B			4-3A AI-5					
ZT	74D-1	0-100%	TSS	LV-74D-1			4-3A AI-6					
ZT	74D-2	0-100%	TSS	LV-74D-2			4-3A AI-7					
ZT	640	0-100%	TSS	PV-640			4-3A AI-10					
ZT	647C	0-100%	TSS	PV-647C			4-3A AI-9					

END TO END PUMP RUN CIRCUIT CHECKOUT PROCEDURE

1.0 OBJECTIVE:

The purpose of these tests are to perform run transmitter and circuit tests to determine the proper distribution of circuit signal.

2.0 ACCEPTANCE CRITERIA

a) The transmitter output is measured and adjusted as required.
b) The transmitter signals are properly distributed.

3.0 REFERENCES

a) Construction drawings E8 (71 thru 96).
b) Signal conditioning wiring and test procedures manual.

4.0 PREREQUISITES

a) The transmitter circuits are completely installed.
b) The transmitter circuits are scaled.
c) The RLU, ILS, IPAC, MVCU, and DARMS are installed.
d) The RLU, ILS, IPAC, MVCU, and DARMS are functioning.
e) Programming of the TSS operator console and the DAS are completed. If not, these checks are to be done from the terminals of the equipment.

5.0 LIMITS AND PRECAUTION

a) The input to the circuit will be made with the CHU.

6.0 TEST EQUIPMENT

a) Multimeter.
b) CHU.

7.0 INITIAL CONDITIONS

a) The RLU, ILS, IPAC, MVCU, and DARMS are operating.
b) If available, the DAS and operator console are programmed and operating.
c) The run transmitters are installed.

8.0 PROCEDURE AND DATA COLLECTION

a) Connect the CHU to the transmitter connector to supply the 4 ma value for stopped and 20 ma for running.

b) Confirm proper distribution of signal in accordance with the parameter list attached. Report any discrepancies with the circuiting or checkout on the parameter list.

c) Checks using the operator and DAS terminals may be done in place of MVCU, IPAC and DARMS terminal measurements.

d) Disconnect the CHU and restore the connector.

PUMP TERMINAL DATA

PUMP NO.	CONDITION	RLU INPUT	RLU OUTPUT	ILS TERM	RUN CONTACT	IPAC TERM*	ILS TERM	OPR CRT CHECK	DAS CRT CHECK	TSS FUNCTION PANEL CHECK
P-301	RUN	202 5C-3	202 5D-3	201 4B-10	ZS3413	3-1B 4A,B-5	301 1C-3			
P-302	RUN	202 5C-4	202 5D-4	201 4B-9	ZS3414	3-1B 4A,B-6	301 1C-4			
P-303	RUN	202 5C-5	202 5D-8	201 4B-11	ZS3903	3-1B 4A,B-7	301 1C-5			
P-304	RUN	202 5C-6	202 5D-9	201 4B-13	ZS3904	3-1B 4A,B-8	301 1C-6			
P-305	RUN	202 5C-8	202 5D-13	201 4B-14	ZS3909		301 1C-8			
P-307	STOP			201 3C-10	ZS3112A		201 1D-14			
	RUN			201 3C-8	ZS3112B		201 1D-13			

*PUMP MAIN BREAKER "ON" INDICATION

END TO END PUMP SPEED CIRCUIT CHECKOUT PROCEDURE

1.0 OBJECTIVE:

The purpose of these tests are to perform transmitter and circuit tests to determine the following:

a) Proper span adjustment of transducer.
b) Proper distribution of circuit signal.
c) Scaling of signal.

2.0 ACCEPTANCE CRITERIA

a) The transmitter zero and full scale output is measured and adjusted as required.
b) The transmitter signals are properly distributed.
c) Scaling is proper at the distribution terminals.

3.0 REFERENCES

a) Construction drawing 40E3002132033 (-1,-2,-3,-6)
b) Construction drawings E8 (71 thru 96).
c) Signals conditioning wiring and test procedures manual.

4.0 PREREQUISITES

a) The speed transmitter circuits are completely installed.
b) The speed transmitter circuits are scaled.
c) The ILS, IPAC, MVCU, and DARMS are installed.
d) The ILS, IPAC, MVCU, and DARMS are functioning.
e) Programming of the TSS operator console and the DAS are completed. If not, these checks are to be done from the terminals of the equipment.

5.0 LIMITS AND PRECAUTION

a) The input to the circuit will be made with the CHU.

6.0 TEST EQUIPMENT

a) Multimeter.

b) CHU.

7.0 INITIAL CONDITIONS

a) The ILS, IPAC, MVCU, and DARMS are operating.

b) If available, the DAS and operator console are programmed and operating.

c) The speed transmitters are installed.

8.0 PROCEDURE AND DATA COLLECTION

a) Connect the CHU to the transmitter connector to supply the 0 VDC value for zero and 5 VDC for 100% range.

b) Confirm proper distribution and scaling of signal in accordance with the parameter list attached. Report any discrepancies with the span, circuiting or checkout on the parameter list.

c) Checks using the operator and DAS terminals may be done in place of MVCU, IPAC and DARMS terminal measurements.

d) Disconnect the CHU and restore the connector.

```
RRRRRR      AAA   TTTTTTTTT    CCCC    HH    HH  EEEEEEE  TTTTTTTTT   222
RRR  RR    AAAA   TTTTTTTTT  CC    C   HH    HH  EE       TTTTTTTTT  22
RRR  RR   AAA A      TTT     CC        HH    HH  EEEEEEE     TTT
RRRRRR    AAAAAA     TTT     CC        HHHHHHHH  EEEEEEE     TTT      222
RRR RR   AAA   A     TTT      CC    C  HH    HH  EE          TTT     22
RRR  RR AAA    A     TTT      CCCC    HH    HH  EEEEEEE     TTT     2222
```

TAG	ID	RANGE	CRT	T-BOX TERM	DRIVE UNIT TERM	IPAC TERM	OPR CRT CHECK	SCALE CHECK
ST	3413	0-2500	TSS	SA304-C 13,14	P-301 ITB 0901 0902	3-1A 3A-16		
ST	3414	0-2500	TSS	SA304-C 16,17	P-302 ITB 0901 0902	3-1A 3A-6		
ST	3903	0-2500	TSS	SA309-C 13,14	P-303 ITB 0901 0902	3-1B 1A-12		
ST	3904	0-2500	TSS	SA309-C 16,17	P-304 ITB 0901 0902	3-1B 1A-4		

APPENDIX 10D-14

END TO END PUMP MOTOR POWER CIRCUIT CHECKOUT PROCEDURE

1.0 OBJECTIVE:

The purpose of these tests are to perform transmitter and circuit tests to determine the following:

a) Proper span adjustment of transducer.
b) Proper distribution of circuit signal.
c) Scaling of signal.

2.0 ACCEPTANCE CRITERIA

a) The transmitter zero and full scale output is measured and adjusted as required.
b) The transmitter signals are properly distributed.
c) Scaling is proper at the distribution terminals.

3.0 REFERENCES

a) Construction drawing 40E3002132033 (-1,-2,-3,-6).
b) Construction drawings E8 (71 thru 96).
c) Signal conditioning wiring and test procedures manual.

4.0 PREREQUISITES

a) The power transmitter circuits are completely installed.
b) The power transmitter circuits are scaled.
c) The ILS, IPAC, MVCU, and DARMS are installed.
d) The ILS, IPAC, MVCU, and DARMS are functioning.
e) Programming of the TSS operator console and the DAS are completed. If not, these checks are to be done from the terminals of the equipment.

5.0 LIMITS AND PRECAUTION

a) The input to the circuit will be made with the CHU.

6.0 TEST EQUIPMENT

a) Multimeter.
b) CHU.

7.0 INITIAL CONDITIONS

a) The ILS, IPAC, MVCU, and DARMS are operating.

b) If available, the DAS and operator console are programmed and operating.

c) The power transmitters are installed.

8.0 PROCEDURE AND DATA COLLECTION

a) Connect the CHU to the transmitter connector to supply the 4 ma value for zero and 20 ma for 100% range.

b) Confirm proper distribution and scaling of signal in accordance with the parameter list attached. Report any discrepancies with the span, circuiting or checkout on the parameter list.

c) Checks using the operator and DAS terminals may be done in place of MVCU, IPAC and DARMS terminal measurements.

d) Disconnect the CHU and restore the connector.

```
RRRRRR      AAA   TTTTTTTTT    CCCC   HH    HH  EEEEEEE  TTTTTTTTT   22222
RRR  RR    AAAA   TTTTTTTTT  CC    C  HH    HH  EE       TTTTTTTTT  22   22
RRR  RR   AAA A      TTT     CC       HH    HH  EEEEEEE     TTT          22
RRRRRR   AAAAAA      TTT     CC       HHHHHHHH  EEEEEEE     TTT       22222
RRR RR   AAA   A     TTT      CC    C  HH    HH  EE          TTT      22
RRR  RR AAA    A     TTT       CCCC   HH    HH  EEEEEEE     TTT      2222222
```

TAG ID	RANGE	CRT	T-Box TERM	DRIVE UNIT TERM	IPAC TERM	OPR CRT CHECK	SCALE CHECK
JT 3413	300KW	TSS		P-301 ITB 041	3-1B 2A-2		
JT 3414	300KW	TSS		P-302 ITB 041	3-1A 3A-4		
JT 3903	300KW	TSS		P-303 ITB 041	3-1B 1A-14		
JT 3904	300KW	TSS		P-304 ITB 041	3-1B 1A-6		

APPENDIX 1CE

MECHANICAL PREREQUISITE TESTS

Component Number	Component Description	Generic Test Procedure No.	Test Complete Initial/Date
	TS Fire Protection System	261	
	TSS GN_2 System	266	
	TS Feedwater System	521	
	Instrument Air System	904	
	Plant Drains & Sumps	941	
	Cooling Water System	951	
	RS #2 & #3 HVAC Systems	973	
(SEE APP. 10D-11)	Modulating Valves a. IP regulator adjustment b. Full travel functional c. LVDT adjustments d. Limit switch adjustments	SCE 5.7	
(SEE ATTACHED LIST)	Relief Valves a. Relief setting verification b. Reset setting verification	SCE 5.6	
P-301 P-302 P-303 P-304 P-305	Pumps a. Alignment b. Coolant water system checked c. Drains checked d. Local stop/start controls checked	SCE 5.6	

THERMAL STORAGE SUBSYSTEM EQUIPMENT LIST

CATEGORY: SAFETY-RELIEF VALVES

ROCKETDYNE DESIGNATION	TAG NO.	DESCRIPTION	SPEC. NO.	LINE FLUID	CONNECTIONS	PIPE MATERIAL	MAX. ALLOWABLE WORKING		CAPACITY
							PRESS. PSIA	TEMP. °F	
TFSRV	PSV-3115	FLASH TANK STEAM RELIEF VALVE	SP42-021	STEAM	2-1/2" - 150 LB RF FLANGE, AND 4" - 150 LB RF FLANGE	ASTM A106 GRADE B	180	373	15,600 LB/HR @ SET PRESSURE OF 165 PSIG
THSRV-1	PSV-3221	CONDENSER STEAM RELIEF VALVE	SP42-019	STEAM	2" -1500 LB RF FLANGE,AND 4"-150 LB RF FLANGE	ASTM A106 GRADE B	1565	675	66,000 LB/HR @ SET PRESSURE OF 1550 PSIG
THSRV-2	PSV-3321	CONDENSER STEAM RELIEF VALVE	SP42-019	STEAM	2"-1500 LB RF FLANGE,AND 4"-150 LB RF FLANGE	ASTM A106 GRADE B	1565	675	66,000 LB/HR @ SET PRESSURE OF 1550 PSIG
THFRV-1	PSV-3222	CONDENSER OIL RELIEF VALVE	SP42-017	OIL	3"-150 LB RF FLANGE, AND 4"-150 LB RF FLANGE	ASTM A106 GRADE B	130	600	399 GPM @ SET PRESSURE OF 115 PSIG
THFRV-2	PSV-3322	CONDENSER OIL RELIEF VALVE	SP42-017	OIL	3"-150 LB RF FLANGE, AND 4"-150 LB RF FLANGE	ASTM A106 GRADE B	130	600	399 GPM @ SET PRESSURE OF 115 PSIG
TPFRV-1	PSV-3506	PREHEATER OIL RELIEF VALVE	SP42-017	OIL	3"-150 LB RF FLANGE, AND 4"-150 LB RF FLANGE	ASTM A106 GRADE B	130	600	386 GPM @ SET PRESSURE OF 115 PSIG
TPFRV-2	PSV-3606	PREHEATER OIL RELIEF VALVE	SP42-017	OIL	3" -150LB RF FLANGE, AND 4"-150 LB RF FLANGE	ASTM A106 GRADE B	130	600	386 GPM @ SET PRESSURE OF 116 PSIG

THERMAL STORAGE SUBSYSTEM EQUIPMENT LIST

CATEGORY: SAFETY-RELIEF VALVES (CONTINUED)

ROCKETDYNE DESIGNATION	TAG NO.	DESCRIPTION	SPEC. NO.	LINE FLUID	CONNECTIONS	PIPE MATERIAL	MAX. ALLOWABLE WORKING PRESS. PSIA	MAX. ALLOWABLE WORKING TEMP. F	CAPACITY
TSSRV-1	PSV-3719	BOILER STEAM RELIEF VALVE	SP42-020	STEAM	3" - 600 LB RF FLANGE, AND 6"-150 LB RF FLANGE	ASTM A106 GRADE B	487	600	55,000 LB/HR @ SET PRESSURE OF 472 PSIG
TSSRV-2	PSV-3819	BOILER STEAM RELIEF VALVE	SP42-020	STEAM	3" -600 LB RF FLANGE, AND 6"-150 LB RF FLANGE	ASTM A106 GRADE B	487	600	55,000 LB/HR @ SET PRESSURE OF 472 PSIG
TSFRV-1	PSV-3720	SUPERHEATER OIL RELIEF VALVE	SP42-018	OIL	3" - 150 LB RF FLANGE, 4" - 150 LB RF FLANGE	ASTM A106 GRADE B	130	600	279 GPM @ SET PRESSURE OF 115 PSIG
TSFRV-2	PSV-3820	SUPERHEATER OIL RELIEF VALVE	SP42-018	OIL	3" - 150 LB RF FLANGE, 4" - 150 LB RF FLANGE	ASTM A106 GRADE B	130	600	279 GPM @ SET PRESSURE OF 115 PSIG
UGRV-1	PSV-4018	TU PRIMARY ULLAGE GAS RELIEF VALVE	40-M300 -35	GASEOUS H_2,N_2 & HYDRO - CARBONS	8" - 150 LB RF FLANGE	ASTM A106 GRADE B	17	600	45.3 CFM @ SET PRESSURE OF 18 IN.W.C.
UGRV-2	PSV-4019	TU SECONDARY ULLAGE GAS RELIEF VALVE	40-M300 -35	STEAM OR GASEOUS H_2,N_2 AND HYDRO-CARBONS	12" - 125 LB RF FLANGE	ASTM A106 GRADE B	17	600	4,770 CFM @ SET PRESSURE OF 20 IN. W.C.

APPENDIX 10F

INITIAL STATUS OF BREAKERS FOR TEST PROCEDURE STEP 8.0

BREAKERS				
NUMBER	DESCRIPTION	POSITION	STATUS	INITIAL/DATE
1	Remote Stations #2 and #3 SSR Box Valve Switches	CLOSED		
2	SDPC	CLOSED		
	RLU	CLOSED		
	ILS	CLOSED		
	DARMS	CLOSED		
	PLANT TRIP	CLOSED		
	SHIMMS	CLOSED		
3	DAS	CLOSED		
4	120 VDC Valve Control	CLOSED		
5	120 VAC Valve Control	CLOSED		
6	UPS	CLOSED		
7	Instrument Air	CLOSED		
8	Charging and Extraction Pumps			
	LCC "A" (LT-IT)			
	P-301	CLOSED		
	P-302	CLOSED		
	P-303	CLOSED		
	P-304	CLOSED		
9	MCC "B"			
	All Active Breakers	CLOSED		

APPENDIX 10G

INITIAL STATUS OF SWITCHES FOR TEST PROCEDURE STEP 8.1.1

SWITCH		STATUS	INITIAL/DATE
NUMBER	DESCRIPTION		
	N/A		

APPENDIX 10H

INITIAL STATUS - VALVE LINEUP LIST FOR TEST PROCEDURE STEP 8.1.1

VALVE TAG NO.	INFO ONLY DRAWING NUMBER	INFO ONLY COORD	DESCRIPTION	POSITION	INITIAL	DATE
UN1S-2	40P3005132196	B16	N_2 ISOLATION VALVE IN 1"-N-3-BBD	C		
	(40P8005163147)	(B16)				
TBD	40P8005163163	J7	N_2 ISOLATION VALVE IN 1 1/2"-N-3-BBD	O		

O = Open C - Closed T - Throttled LO - Locked Open LC - Locked Closed

*Number assigned by TBD - No existing Valve Tag Number.

T64

MCDONNELL DOUGLAS ASTRONAUTICS COMPANY
ENERGY PROGRAMS
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A3-202-EP-RGR-444
28 July 1981

DOE FILE COPY

Department of Energy
San Francisco Operations Office
1333 Broadway
Oakland, CA 94612

Attention: Mr. David J. Tenca, Contracting Officer

Subject: CONTRACT DE-AC03-79SF10499
SOLAR FACILITIES DESIGN INTEGRATION
SECOND PARTIAL SUBMITTAL OF SUBSYSTEM STAND ALONE
(PREOPERATIONAL) TEST PROCEDURES (RADL ITEM 2-45)

References: (a) MDAC Letter A3-130-EP-DSB-138, dated 3 March 1981, "Revised Delivery Date for Subsystem Stand Alone Test Procedures" (RADL Item 2-45)

(b) MDAC Letter A3-202-EP-RGR-417, dated 17 July 1981, "Partial Submittal of Subsystem Stand Alone (Preoperational) Test Procedures" (RADL Item 2-45)

Dear Mr. Tenca:

One (1) each of four of the Preoperational Test Procedures that comprise a portion of the subject RADL item is being submitted in accordance with the requirements of the Phase II Reports and Deliverables List of the subject contract, as modified by the contents of the Reference (a) letter. The initial transmittal was accomplished per the Reference (b) letter.

This letter transmits the following Preoperational Test Procedures:

•	205/250	Thermal Storage System	Revision 0
•	340	Operating Control System - Data Acquisition System (Part A)	Revision 0
•	405	Main/Admission Steam	Revision 0
•	940	Plant Drains & Sumps	Revision 0

It should be noted that the 340 Preoperational Test Procedure will be written and submitted in two parts, with this first submittal being called Part A.

A copy of this letter also transmits the master copy of each of the procedures to Southern California Edison (L. H. Chillcott) at the Solar One site for control and implementation. Any revisions to these procedures which are originated by the SFDI will be coordinated informally with SCE and subsequently transmitted by letter in the same manner as the subject documents.

Additional submittals will be made as other preoperational test procedures become available in Revision 0 versions, and you will be notified when all of the preoperational test procedures that comprise RADL item 2-45 have been submitted.

Technical questions regarding these procedures should be directed to R. G. Riedesel at (714) 896-3357. For contractual questions, please call the undersigned at (714) 896-1340.

Very truly yours,

D S Butler

D. S. Butler
Contract Administrator
Solar Facilities Design Integration

Enclosure: (as noted)

Cy: L. H. Chillcott, SCE-Daggett (1)
J. M. Slaminski, DOE/STMPO (1)

(w/o enclosure)
R. N. Schweinberg, DOE/STMPO
J. C. Corcoran, DOE/STMPO
D. W. Christian, DOE/Daggett
F. Kovach, T&B-Daggett
R. M. Weeks, MMC-Daggett
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