



Solar Gas Turbine/Compressor (Master) Equipment Maintenance Regime			PL-M-20274	
Prepared by:	Hatch	Dale McPhie	Status:	Approved for Use
Reviewed by:	EAM SME's	Alan Fingers	Version:	0
Approved by:	APA Approver	Alan Fingers	Issued:	31/03/2015

1. SOURCE DATA

Doc. Type	Document Name	Doc. No.
Best of Breed	Oakey Compressor Station Solar Saturn S20 4000 hr. Service	PM100 - WI0XX
Best of Breed	Oakey Compressor Station Solar Saturn S20 E & I Calibrations	PM100 - WI0XX
Best of Breed	Oakey Compressor Station Solar Saturn S20 8000 hr. Service	PM100 - WI0XX
Best of Breed	QCS04 Solar Taurus Compressor Unit 2000, 4000 and 8000 hr. Service Returnable	
Best of Breed	Solar Turbines 4000 Hour (Intermediate) Service Procedure & Report	STA/CCS/4000/SS
Supplementary	Davenport Downs Compressor Station Solar Centaur C50 4000 hr. Service	PM100 - WI0XX
Supplementary	Davenport Downs Compressor Station Solar C50 Boroscope Inspection	PM100 - WI0XX
Supplementary	Davenport Downs Compressor Station Solar C50 Waterwash Procedure	PM100 - WI0XX
Supplementary	Davenport Downs Compressor Station Solar C50 E & I Calibrations	PM100 - WI0XX
Supplementary	Davenport Downs Compressor Station Solar Centaur C50 8000 hr. Service	PM100 - WI0XX
Supplementary	Davenport Downs Compressor Station Solar Centaur C50 32000 hr. Service	PM100 - WI0XX
Supplementary	Maintenance Schedules	OPS 509
Supplementary	Maintenance Plan Turee Creek	FM

2. FUNCTIONAL DESCRIPTION

The function of a Solar Gas Turbine/Compressor is to supply gas at the required suction/discharge pressure/temperature/flow rate.



3. OVERARCHING STRATEGY

APA will base Solar Gas Turbine/Compressor servicing on OEM recommendations, utilising in-house labour for minor and medium services and contractor assist (if required) for major services.

Routine checks will be performed weekly and oil sampling monthly. Minor services will be performed at 4000 hours and yearly, medium services at 8000 hours and 5 yearly. Condition assessment by Engineering will commence from 32000 hours every 4000 hours, with a view to unit overhaul at or before 50000 hours by Contractor.

This Regime will apply to all models of Solar Gas Turbine/Compressors in continuous service, with variations for site specific circumstances.

4. RELATED EQUIPMENT

Equipment	Asset Class Type	Function
Start System		Rotates engine to self-sustaining speed
Fuel System		Regulates fuel flow to engine, regulating speed and power
Electrical Control System		Monitors unit, controls shutdowns, protects equipment from hazards
Lube and Servo Oil Systems		Circulates correct quality and quantity of pressurised oil to engine, gear unit, bearings and controls
Enclosure and Ancillary Equipment		Provides suitable operating environment for unit
Air System		Provide correct quality and quantity of air to engine for combustion and operation
Turbine Engine	Gas turbines - Industrial	Maintains rotary motion at a set speed and power
Gas Compressor	Compressors - Centrifugal	Supplies gas at the required discharge pressure and/or flow rate
Seal System		Prevents cross contamination between process gas and lube oil

5. RELATED DOCUMENTS

Document Type	Document Name	Document Number
Manual	Solar Turbines, Centaur 40 Gas Turbine Driven Compressor Set, Operation and Maintenance Instructions	63351
Manual	Solar Turbines, Centaur 50 Gas Turbine Driven Compressor Set, Operation and Maintenance Instructions	3M613



Document Type	Document Name	Document Number
Manual	Solar Turbines, Taurus 60 Gas Turbine Driven Compressor Set, Operation and Maintenance Instructions	3B731
Manual	Solar Turbines, Mars 90 Gas Turbine Driven Compressor Set, Operation and Maintenance Instructions	3P821



6. REVERSE FMEA

Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/ Offline	Labour	Equipment	Parts
Start System	Rotates engine to self-sustaining speed	Reduced life	Lubricator failure	Component damage	Check pneumatic starter lubricator oil level and drip rate (if applicable)	Weekly		Online	1 Tech		
			Strainer deterioration	Component damage	Clean starter motor gas strainer (if applicable)	8000 hrs.		Offline	1 Tech	Hand tools	
			Strainer deterioration	Component damage	Clean auxiliary seal oil pump motor gas strainer (if applicable)	8000 hrs.		Offline	1 Tech	Hand tools	
		Fails to start engine	Valve deterioration	Production loss	Overhaul start system shut off valve (if applicable)	8000 hrs.		Offline	1 Tech	Hand tools	Shut off valve overhaul kit
			Valve deterioration	Production loss	Overhaul auxiliary seal oil pump shut off valve (if applicable)	8000 hrs.		Offline	1 Tech	Hand tools	Shut off valve overhaul kit
Fuel System	Regulates fuel flow to engine, regulating speed and power	Incorrect fuel flow	Incorrect adjustment	Performance loss	Record fuel gas pressure, adjust at off-skid regulator if necessary	Weekly		Online	1 Tech		
		Gas leakage	Seal failure	Safety hazard	Check fuel gas system for leaks	Weekly		Online	1 Tech		
		Loss of control	Linkage failure	Production loss	Inspect condition of fuel system linkages and connections	4000 hrs.		Offline	1 Tech		



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/Offline	Labour	Equipment	Parts
		Unable to ignite	Igniter cable or plug deterioration	Production loss	Remove and inspect igniter cable for damage. Inspect igniter plug for erosion and proper gap. Replace if necessary	4000 hrs.		Offline	1 Tech	Hand tools	Igniter cable & plug
			Igniter torch deterioration	Production loss	Remove and inspect igniter torch housing for cracks or excessive erosion. Inspect discharge tube for chafing wear. Clean or replace as necessary	4000 hrs.		Offline	1 Tech	Hand tools	Igniter torch spares
			Injector deterioration	Component damage	Inspect fuel injectors for damage and clean	4000 hrs.		Offline	1 Tech	Hand tools	Fuel injector spares
		Reduced life	Filter deterioration	Component damage	Replace fuel gas valve solenoids pilot air /gas filter element and seals (if applicable)	4000 hrs.		Offline	1 Tech	Hand tools	Fuel gas pilot air filter element & seals
			Filter deterioration	Component damage	Replace fuel gas filter element and/or strainer and seals	8000 hrs.		Offline	1 Tech	Hand tools	Fuel gas filter element & seals



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/ Offline	Labour	Equipment	Parts
			Filter deterioration	Component damage	Wash & refit fuel control valve orifice filter (if applicable)	8000 hrs.		Offline	1 Tech	Hand tools	
Electrical Control System	Monitors unit, controls shutdowns, protects equipment from hazards	Loss of control	Incorrect indication	Performance loss	Inspect gauges and indicators for proper operation. Check all oil-filled gauges are filled and all indicating lamps are serviceable	Weekly		Online	1 Tech	Data sheet	
			Connection or wiring damage	Performance loss	Check condition of thermocouple harnesses	4000 hrs.		Offline	2 I/E Techs	Hand tools	Thermocouple harness gaskets
		Hazard not controlled	Overspeed monitor failure	Component damage Production loss	Test and calibrate backup overspeed monitor (OSM, if applicable)	4000 hrs.		Online/ Offline	2 I/E Techs	Calibration equipment	
			Device failure	Component damage Production loss	Test E-Stop/backup string devices	4000 hrs.		Offline	2 I/E Techs	Calibration equipment	
		Loss of control	Incorrect control sequencing	Performance loss	Restart turbine and record acceleration time. Monitor control system for proper sequencing	4000 hrs.		Online	2 I/E Techs		



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/Offline	Labour	Equipment	Parts
			Connection or wiring damage	Production loss	Inspect control console electrical connections for cleanliness and security. Check wiring for absence of chafing and insulation damage	8000 hrs.		Offline	2 I/E Techs	Hand tools	
			Incorrect adjustment	Performance loss	Test speed and temperature topping system (relay systems only)	8000 hrs.		Offline	2 I/E Techs	Calibration equipment	
			Incorrect indication	Performance loss	Check and calibrate all temperature and pressure switches	8000 hrs.		Offline	2 I/E Techs	Calibration equipment	
		Hazard not controlled	Incorrect adjustment	Component damage Production loss	Test and calibrate as necessary all safety, warning, and shutdown devices and temperature/pressure monitors	8000 hrs.		Offline	2 I/E Techs	Calibration equipment	
		Hazard not detected	Incorrect indication	Component damage Production loss	Test package vibration monitor	8000 hrs.		Offline	2 I/E Techs	Calibration equipment	
		Loss of control	Incorrect operation	Component damage Production loss	Check and calibrate anti surge valves	8000 hrs.		Offline	2 I/E Techs	Calibration equipment	



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/Offline	Labour	Equipment	Parts
			Incorrect operation	Component damage Production loss	Verify anti surge system	8000 hrs.		Online	2 I/E Techs	Calibration equipment	
		Loss of control	Low battery power	Production loss	Change lithium battery in PLC, or controller	1 yearly		Offline	1 Tech	Hand tools	Lithium battery
Lube and Servo Oil Systems	Circulates correct quality and quantity of pressurised oil to engine, gear unit, bearings and controls	Incorrect oil quantity	Low oil level	Component damage	Check lubes oil tank level, record oil consumption. Top up as necessary	Weekly		Online	1 Tech		Lube oil
			Loss of makeup oil	Component damage	Verify proper operation of oil makeup system (if applicable)	Weekly		Online	1 Tech		
		Loss of containment	Oil leakage	Safety hazard	Check lube oil system for leaks	Weekly		Online	1 Tech		
		Incorrect oil quality	Filter deterioration	Component damage	Check servo oil filter pop-up indicator, change element and seals if popped (if applicable)	Weekly		Online	1 Tech	Hand tools	Servo oil filter elements & seals
		Incorrect oil quality	Filter deterioration	Component damage	Check emergency backup pump lube oil filter pop-up indicator, change element and seals if popped	Weekly		Online	1 Tech	Hand tools	Emergency backup pump oil filter elements & seals



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/ Offline	Labour	Equipment	Parts
		Incorrect oil quality	Filter deterioration	Component damage	Check and record lube oil filter differential pressure. Change element and seals if limit exceeded	Weekly		Online	1 Tech	Hand tools	Lube oil filter elements & seals
		Incorrect oil quantity	Incorrect pressure setting	Component damage	Record lube oil pressure, adjust regulator if necessary.	Weekly		Online	1 Tech	Hand tools	
		Incorrect oil quality	Oil deterioration	Component damage	Take lube oil sample for laboratory analysis. Review results and replace oil as necessary	Monthly		Online	1 Tech		Oil sample kit
		Incorrect oil quantity	Motor failure	Component damage	Electrically test all electric motors including starter motors, oil pumps and fans.	8000 hrs.		Online	2 I/E Techs	Test equipment	
			Motor failure	Component damage	Service all electric motors including starter motors, oil pumps and fans. Lubricate all motors equipped with grease fittings. Check motor mountings security. Electrically test	8000 hrs.		Offline	2 I/E Techs	Test equipment	Grease



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/Offline	Labour	Equipment	Parts
			Cooler fan damage	Component damage Deposits	Lubricate oil cooler fan shaft bearings and check for movement. Check fan blades for damage and hub bolt tension, correct as necessary	4000 hrs.		Offline	1 Tech	Hand tools	Grease
		Incorrect oil temperature	Cooler belt damage	Component damage Deposits	Check oil cooler belt tension and inspect for damage, misalignment or pulley wear (if applicable). Re-tension, replace or align as necessary	4000 hrs.		Offline	1 Tech	Hand tools	Oil cooler belts
			Cooler blockage	Component damage Deposits	Check oil cooler core for contamination, corrosion or damage. Clean or repair as necessary	4000 hrs.		Offline	1 Tech	Cleaning equipment	
		Incorrect oil quality	Filter deterioration	Component damage	Replace lube oil duty filter element and seals. Inspect and clean housing as necessary. Change over duty and standby filter positions.	4000 hrs.		Offline	1 Tech	Hand tools	Lube oil filter element & seals



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/Offline	Labour	Equipment	Parts
		Incorrect oil quality	Filter deterioration	Component damage	Replace servo oil duty filter element and seals. Inspect and clean housing as necessary. Change over duty and standby filter positions.	8000 hrs.		Offline	1 Tech	Hand tools	Servo oil filter element & seals
		Incorrect oil temperature	Vent fan damage	Component damage Deposits	Check lube oil tank vent fan and mist precipitator for proper operation (if applicable)	8000 hrs.		Online	1 Tech		
		Hazard not controlled	Arrestor deterioration	Component damage	Clean all vent flame arrestors as necessary	8000 hrs.		Offline	1 Tech	Hand tools	
Enclosure and Ancillary Equipment	Provides suitable operating environment for unit	Overheating	Fan failure	Component damage	Lubricate enclosure vent fan electric motor bearings. Check motor mounting security and fan blades for damage	4000 hrs.		Offline	1 Tech	Hand tools	Grease
			Filter deterioration	Component damage	Inspect enclosure ventilation filters, clean or replace elements as necessary. Inspect housing and ductwork condition,	4000 hrs.		Offline	1 Tech	Hand tools	Enclosure ventilation filter elements



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/Offline	Labour	Equipment	Parts
					remove contamination as necessary						
		Not sealed	Door deterioration	Component damage	Inspect all enclosure doors for operation and sealing. Test door switches and lubricate hinges	8000 hrs.		Offline	1 Tech	Hand tools	Dry lubricant
Air System	Provide correct quality and quantity of air to engine for combustion and operation	Incorrect air quality/ quantity	Filter deterioration	Component damage Performance loss	Self-cleaning air filter - check supply pressure, manually cycle through cleaning operation, drain air reservoir tank (if applicable)	4000 hrs.		Online	1 Tech		
			Inlet blockage	Component damage Performance loss	Check air inlet system for obstructions and contamination	4000 hrs.		Offline	1 Tech	Hand tools	
		Reduced life	Intake/ exhaust system damage	Performance loss	Inspect air intake and exhaust systems for looseness, damage, leaks or debris	4000 hrs.		Offline	1 Tech	Hand tools	
			Filter deterioration	Component damage Performance loss	Inspect air inlet filter elements and record differential pressure. Replace elements as needed	4000 hrs.		Offline	1 Tech	Hand tools	Air filter elements



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/Offline	Labour	Equipment	Parts
		Incorrect air quantity	Guide vane damage	Performance loss	Inspect engine compressor variable guide vane mechanism for wear or corrosion. Check for bent lever arms, loose fasteners, linkages or bushings and seized guide vanes	8000 hrs.		Offline	1 Tech		
			Guide vane damage	Performance loss	Apply corrosion inhibitor to variable guide vane system linkage (if applicable)	8000 hrs.		Offline	1 Tech		Corrosion inhibitor
		Reduced life	Filter deterioration	Component damage	Replace variable guide vane servo actuator filter elements and seals	8000 hrs.		Offline	1 Tech	Hand tools	Servo actuator filter elements & seals
		Incorrect air quantity	Bleed valve deterioration	Performance loss	Inspect bleed valve, actuator and ducting condition and operation	8000 hrs.		Offline	1 Tech	Hand tools	
			Bleed valve deterioration	Performance loss	Disassemble, clean, inspect and reassemble bleed valve (if applicable)	8000 hrs.		Offline	1 Tech	Hand tools	Bleed valve overhaul kit
		Reduced life	Filter deterioration	Component damage Performance loss	Replace self-cleaning air filter elements (if applicable)	5 yearly		Offline	1 Tech	Hand tools	Air filter elements



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/ Offline	Labour	Equipment	Parts
Turbine Engine	Maintains rotary motion at a set speed and power	Incorrect operation	Unusual behaviour	Component damage Performance loss	Check for any unusual operating condition (vibration, noise, etc.)	Weekly		Online	1 Tech		
			Line/ hose damage	Component damage Performance loss	Inspect all lines and hoses for leaks, wear or chafing. Correct as necessary	Weekly		Online	1 Tech	Hand tools	
			Linkage damage	Component damage Performance loss	Inspect all mechanical linkages for wear or looseness. Correct as necessary	Weekly		Online	1 Tech	Hand tools	
			Leakage	Safety hazard	Inspect entire package for fuel, oil and air leaks	Weekly		Online	1 Tech		
			Incorrect indication	Performance loss	Record nominated unit operating parameter readings from local and remote control panels. Review operational data to determine if engine requires a water wash	Weekly		Online	1 Tech		
			Leakage	Safety hazard	Check for PCD leaks	Weekly		Online	1 Tech		



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/Offline	Labour	Equipment	Parts
			Contaminant build up	Performance loss	Perform engine water wash in harsh operating environment	2000 hrs.		Online	2 Techs	Hand tools Water wash cart	Deionised water Approved detergent
			Contaminant build up	Performance loss	Perform engine water wash	4000 hrs.		Offline	1 Tech	Hand tools Water wash cart	Deionised water ZOK detergent
			Contaminant build up	Performance loss	Conduct borescope inspection of turbine and report findings	4000 hrs.		Offline	1 Borescope Mechanical Tech	Borescope	Inspection port seals
			Contaminant build up	Component damage	Clean entire package	4000 hrs.		Offline	1 Tech	Cleaning equipment	
			Exhaust system damage	Performance loss	Inspect exhaust bellows for leaks, cracks or distortion. Check condition of exhaust stack supports, internals and drain. Correct as necessary	4000 hrs.		Offline	1 Tech	Height access equipment	
			Valve deterioration	Performance loss	Check condition and operation of solenoids, case drains and shut off valves	8000 hrs.		Offline	1 Tech		
			Bearing failure	Component damage	Replace drive shaft bearings (if applicable - Saturns only)	5 yearly		Offline	1 Tech	Hand tools	Drive shaft bearings
			Normal wear & tear	Performance loss	Perform engine condition	32000 hrs.		Online	Engineering	Operating, servicing & inspection	



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/ Offline	Labour	Equipment	Parts
					assessment and determine overhaul hours (not Saturns or Centaur 40's)					records	
			Normal wear & tear	Performance loss	Perform engine condition assessment and determine overhaul hours (not Saturns or Centaur 40's)	36000 hrs.		Online	Engineering	Operating, servicing & inspection records	
			Normal wear & tear	Performance loss	Perform engine condition assessment and determine overhaul hours	40000 hrs.		Online	Engineering	Operating, servicing & inspection records	
			Normal wear & tear	Performance loss	Perform engine condition assessment and determine overhaul hours. Prepare for engine overhaul	44000 hrs.		Online	Engineering	Operating, servicing & inspection records	
			Normal wear & tear	Performance loss	Remove, overhaul, reinstall and align engine (maximum service life 50000 hrs.)	48000 hrs.		Offline	Contractor 2 Techs	Lifting equipment Special tools	Overhaul kit



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/ Offline	Labour	Equipment	Parts
Seal System (Oil)	Prevents cross contamination between process gas and lube oil	Incorrect oil supply	Incorrect oil level/ temperature	Component damage Performance loss	Check seal oil degassing tank level and temperature (if applicable). Top up as necessary	Weekly		Online	1 Tech		Seal oil
			Incorrect oil flows	Component damage Performance loss	Check seal oil sight gauges for proper flow direction of oil and gas (if applicable)	Weekly		Online	1 Tech		
			Oil leakage	Safety hazard	Check seal oil system for leaks (if applicable)	Weekly		Online	1 Tech		
			Filter deterioration	Component damage Performance loss	Check seal oil filter, record differential pressure (if applicable). Change element if limit exceeded or pop-up indicator is popped	Weekly		Online	1 Tech	Hand tools	Seal oil filter elements & seals
		Incorrect oil supply	Coalescer deterioration	Component damage Performance loss	Check seal oil coalescer elements (if applicable). Replace as necessary	8000 hrs.		Offline	1 Tech	Hand tools	Seal oil coalescer elements & seals
			Filter deterioration	Component damage Performance loss	Replace seal oil supply filter elements and seals (if applicable)	8000 hrs.		Offline	1 Tech	Hand tools	Seal oil filter elements & seals



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/Offline	Labour	Equipment	Parts
			Strainer deterioration	Component damage Performance loss	Inspect and clean seal oil trap inlet strainers (if applicable)	8000 hrs.		Offline	1 Tech	Hand tools	
			Valve deterioration	Component damage Performance loss	Check operation of seal oil and seal gas differential pressure regulating valves (if applicable)	8000 hrs.		Offline	1 Tech	Hand tools	Seal oil & seal gas differential pressure regulating valve overhaul kit
Seal System (Dry Gas)	Prevents cross contamination between process gas and lube oil	Incorrect air/gas supply	Incorrect pressure settings	Component damage Performance loss	Check buffer air and dry gas seal pressure settings (if applicable)	Weekly		Online	1 Tech		
			Incorrect leakage rates	Component damage Performance loss	Check and record dry gas seal leakage on each end of compressor (if applicable)	Weekly		Online	1 Tech		
			Gas/air leakage	Safety hazard	Check dry gas seal system for leaks (if applicable)	Weekly		Online	1 Tech		
			Coalescer build up	Component damage Performance loss	Drain buffer air and dry gas seal coalescers (if applicable)	Weekly		Online	1 Tech		



Equipment	Function	Functional Failure	Failure Mode	Failure Effect	Preventive Task/Action	Frequency	Duration (hrs)	Online/ Offline	Labour	Equipment	Parts
			Filter deterioration	Component damage Performance loss	Check and record buffer air and dry gas seal coalescing filter differential pressures (if applicable). Replace elements if differential pressures exceed 138 kPa	Weekly		Online	1 Tech	Hand tools	Buffer air & seal gas filter elements & seals
			Filter deterioration	Component damage Performance loss	Replace buffer air and dry gas seal coalescing duty filter elements and seals (if applicable). Change over duty and standby filter positions.	4000 hrs.		Offline	1 Tech	Hand tools	Buffer air & seal gas filter elements & seals
			Valve deterioration	Component damage Performance loss	Check operation of dry gas seal system differential pressure regulating valves (if applicable)	4000 hrs.		Offline	1 Tech	Hand tools	Differential pressure regulating valve overhaul kit



7. JOB PLANS

Job Plan No. 1	Solar Gas Turbine/Compressor (Master) Weekly Checks	
Frequency	Weekly	
Plant Operations	Online	
Attachments	SWM-R-20117 (SWMS) WI-M-20222 (Work Instruction)	
Resources		
Labour	1 Technician	2 hours
Equipment	Data sheet Hand tools	
Parts		
Job Plan		
1.	Initial Preparation	
2.	Check pneumatic starter lubricator oil level and drip rate (if applicable).	
3.	Record fuel gas pressure, adjust at off-skid regulator if necessary.	
4.	Check fuel gas system for leaks.	
5.	Inspect gauges and indicators for proper operation. Check all oil-filled gauges are filled and all indicating lamps are serviceable.	
6.	Check lube oil tank level, record oil consumption. Top up as necessary.	
7.	Verify proper operation of oil makeup system (if applicable).	
8.	Check lube oil system for leaks.	
9.	Check servo oil filter pop-up indicator, change element and seals if popped (if applicable).	
10.	Check emergency backup pump lube oil filter pop-up indicator, change element and seals if popped.	
11.	Check and record lube oil filter differential pressure. Change element and seals if limit exceeded.	
12.	Record lube oil pressure, adjust regulator if necessary.	
13.	Check for any unusual operating condition (vibration, noise, etc.).	



14.	Inspect all lines and hoses for leaks, wear or chafing. Correct as necessary.
15.	Inspect all mechanical linkages for wear or looseness. Correct as necessary.
16.	Inspect entire package for fuel, oil and air leaks.
17.	Record nominated unit operating parameter readings from local and remote control panels. Review operational data to determine if engine requires a water wash.
18.	Check for PCD leaks.
19.	Check seal oil degassing tank level and temperature (if applicable). Top up as necessary.
20.	Check seal oil sight gauges for proper flow direction of oil and gas (if applicable).
21.	Check seal oil system for leaks (if applicable).
22.	Check seal oil filter, record differential pressure (if applicable). Change element if limit exceeded or pop-up indicator is popped.
23.	Check buffer air and dry gas seal pressure settings (if applicable).
24.	Check and record dry gas seal leakage on each end of compressor (if applicable).
25.	Check dry gas seal system for leaks (if applicable).
26.	Drain buffer air and dry gas seal coalescers (if applicable).
27.	Check and record buffer air and dry gas seal coalescing filter differential pressures (if applicable). Replace elements if differential pressures exceed 138 kPa.
28.	Job Completion

Job Plan No. 2	Solar Gas Turbine/Compressor (Master) Oil Sampling	
Frequency	Monthly	
Plant Operations	Online	
Attachments	SWM-R-20117 (SWMS) WI-M-20224 (Work Instruction)	
Resources		
Labour	1 Technician	1 hour
Equipment	Data sheet Hand tools	



Parts	Oil sample kit
Job Plan	
1.	Initial Preparation
2.	Perform Weekly Checks
3.	Take lube oil sample for laboratory analysis.
4.	Review results and replace oil as necessary.
5.	Job Completion

Job Plan No. 3	Solar Gas Turbine/Compressor (Master) Water Wash	
Frequency	2000 Hours (in harsh operating environment, or as determined necessary by Weekly Checks)	
Plant Operations	Offline	
Attachments	SWM-R-20115 (SWMS) WI-M-20225 (Work Instruction)	
Resources		
Labour	2 Technicians	8 hours
Equipment	Hand tools Water wash cart	
Parts	Deionised water ZOK detergent	
Job Plan		
1.	Initial Preparation	
2.	Unit Isolations	
3.	Perform engine water wash.	
4.	Unit De-Isolations	
5.	Unit Recommissioning	
6.	Job Completion	



Job Plan No. 4	Solar Gas Turbine/Compressor (Master) 4000 hours Service	
Frequency	4000 Hours	
Plant Operations	Offline	
Attachments	SWM-R-20115 (SWMS) WI-M-20227 (Work Instruction)	
Resources		
Labour	2 I/E Technicians 1 Mechanical Technician 1 Mechanical Technician competent in Borescope Inspection	40 hours
Equipment	Data sheet Hand tools Calibration equipment Test equipment Cleaning equipment Water wash cart Borescope Height access equipment	
Parts	Lube oil filter elements & seals Oil sample kit Fuel gas pilot air filter element & seals Thermocouple harness gaskets Deionised water ZOK detergent Buffer air & seal gas filter elements & seals Grease	
Job Plan		
1.	Initial Preparation	
2.	Perform Weekly Checks	
3.	Perform Oil Sampling	
4.	Self-cleaning air filter - check supply pressure, manually cycle through cleaning operation, drain air reservoir tank (if applicable).	
5.	Unit Isolations	
6.	Inspect condition of fuel system linkages and connections.	
7.	Remove and inspect igniter cable for damage. Inspect igniter plug for erosion and proper gap. Replace if necessary.	
8.	Remove and inspect igniter torch housing for cracks or excessive erosion. Inspect discharge tube for chafing wear. Clean or replace as necessary.	
9.	Inspect fuel injectors for damage and clean.	



10.	Replace fuel gas valve solenoids pilot air /gas filter element and seals (if applicable).
11.	Check condition of thermocouple harnesses.
12.	Test and calibrate backup overspeed monitor (OSM, if applicable).
13.	Test E-Stop/backup string devices.
14.	Lubricate oil cooler fan shaft bearings and check for movement or overheating. Check fan blades for damage and hub bolt tension, correct as necessary.
15.	Check oil cooler belt tension and inspect for damage, misalignment or pulley wear (if applicable). Re-tension, replace or align as necessary.
16.	Check oil cooler core for contamination, corrosion or damage. Clean or repair as necessary.
17.	Replace lube oil duty filter element and seals. Inspect and clean housing as necessary. Change over duty and standby filter positions.
18.	Lubricate enclosure vent fan electric motor bearings. Check motor mounting security and fan blades for damage.
19.	Inspect enclosure ventilation filters, clean or replace elements as necessary. Inspect housing and ductwork condition, remove contamination as necessary.
20.	Check air inlet system for obstructions and contamination.
21.	Inspect air intake and exhaust systems for looseness, damage, leaks or debris.
22.	Inspect air inlet filter elements and record differential pressure. Replace elements as needed.
23.	Conduct borescope inspection of turbine and report findings.
24.	Clean entire package.
25.	Inspect exhaust bellows for leaks, cracks or distortion. Check condition of exhaust stack supports, internals and drain. Correct as necessary.
26.	Replace buffer air and dry gas seal coalescing duty filter elements and seals (if applicable). Change over duty and standby filter positions.
27.	Check operation of dry gas seal system differential pressure regulating valves (if applicable).
28.	Perform engine water wash.
29.	Unit De-Isolations
30.	Unit Recommissioning
31.	Restart turbine and record acceleration time. Monitor control system for proper sequencing.
32.	Job Completion



Job Plan No. 5	Solar Gas Turbine/Compressor (Master) 8000 hours Service	
Frequency	8000 Hours	
Plant Operations	Offline	
Attachments	SWM-R-20115 (SWMS) WI-M-20228 (Work Instruction)	
Resources		
Labour	2 I/E Technicians 1 Mechanical Technician 1 Mechanical Technician competent in Borescope Inspection	40 hours
Equipment	Data sheet Hand tools Calibration equipment Test equipment Cleaning equipment Water wash cart Borescope Height access equipment	
Parts	Lube oil filter elements & seals Oil sample kit Fuel gas pilot air filter element & seals Thermocouple harness gaskets Fuel gas filter element & seals Grease Buffer air & seal gas filter elements & seals Servo oil filter elements & seals Seal oil filter elements & seals Shut off valve overhaul kit Deionised water ZOK detergent Dry lubricant Corrosion inhibitor Servo actuator filter elements & seals Bleed valve overhaul kit	
Job Plan		
1.	Initial Preparation	
2.	Perform Weekly Checks	
3.	Perform Oil Sampling	
4.	Electrically test all electric motors including starter motors, oil pumps and fans.	
5.	Check lube oil tank vent fan and mist precipitator for proper operation (if applicable).	
6.	Unit Isolations	



7.	Perform 4000 hours Service
8.	Clean starter motor gas strainer (if applicable).
9.	Clean auxiliary seal oil pump motor gas strainer (if applicable).
10.	Overhaul start system shut off valve (if applicable).
11.	Overhaul auxiliary seal oil pump shut off valve (if applicable).
12.	Replace fuel gas filter element and/or strainer and seals.
13.	Wash & refit fuel control valve orifice filter (if applicable).
14.	Inspect control console electrical connections for cleanliness and security. Check wiring for absence of chafing and insulation damage.
15.	Test speed and temperature topping system (relay systems only).
16.	Check and calibrate all temperature and pressure switches.
17.	Test and calibrate as necessary all safety, warning, and shutdown devices and temperature/ pressure monitors.
18.	Test package vibration monitor.
19.	Check and calibrate anti surge valves.
20.	Service all electric motors including starter motors, oil pumps and fans. Lubricate all motors equipped with grease fittings. Check motor mountings security. Electrically test.
21.	Replace servo oil duty filter element and seals. Inspect and clean housing as necessary.
22.	Clean all vent flame arrestors as necessary.
23.	Inspect all enclosure doors for operation and sealing. Test door switches and lubricate hinges.
24.	Inspect engine compressor variable guide vane mechanism for wear or corrosion. Check for bent lever arms, loose fasteners, linkages or bushings and seized guide vanes.
25.	Apply corrosion inhibitor to variable guide vane system linkage (if applicable).
26.	Replace variable guide vane servo actuator filter elements and seals.
27.	Inspect bleed valve, actuator and ducting condition and operation.
28.	Disassemble, clean, inspect and reassemble bleed valve (if applicable).
29.	Check condition and operation of solenoids, case drains and shut off valves.



30.	Check seal oil coalescer elements (if applicable). Replace as necessary.
31.	Replace seal oil supply filter elements and seals (if applicable).
32.	Inspect and clean seal oil trap inlet strainers (if applicable).
33.	Check operation of seal oil and seal gas differential pressure regulating valves (if applicable).
34.	Perform engine water wash.
35.	Unit De-Isolations
36.	Unit Recommissioning
37.	Verify anti surge system.
38.	Job Completion

Job Plan No. 6	Solar Gas Turbine/Compressor (Master) Battery Change	
Frequency	Yearly	
Plant Operations	Offline	
Attachments	SWM-R-20115 (SWMS) WI-M-20229 (Work Instruction)	
Resources		
Labour	1 Technician	1 hour
Equipment	Hand tools	
Parts	Lithium battery	
Job Plan		
1.	Initial Preparation	
2.	Unit Isolations	
3.	Change lithium battery in PLC, or controller.	
4.	Unit De-Isolations	



5.	Unit Recommissioning
6.	Job Completion

Job Plan No. 7	Solar Gas Turbine/Compressor (Master) 5 Yearly Service	
Frequency	5 Yearly	
Plant Operations	Offline	
Attachments	SWM-R-20115 (SWMS) WI-M-20231 (Work Instruction)	
Resources		
Labour	1 Technician	8 hours
Equipment	Hand tools	
Parts	Lithium battery Air filter elements Drive shaft bearings	
Job Plan		
1.	Initial Preparation	
2.	Unit Isolations	
3.	Perform Battery Change	
4.	Replace self-cleaning air filter elements (if applicable).	
5.	Replace drive shaft bearings (if applicable - Saturns only)	
6.	Unit De-isolations	
7.	Unit Recommissioning	
8.	Job Completion	

Job Plan No. 8	Solar Gas Turbine/Compressor (Master) Engine Condition Assessment
Frequency	Every 4000 Hours, from 32000 to 44000 Hours Every 4000 Hours, from 40000 to 44000 Hours (Saturns & Centaur 40's)



Plant Operations	Online	
Attachments	SWM-R-20117 (SWMS) WI-M-20233 (Work Instruction)	
Resources		
Labour	1 Engineer	8 hours
Equipment	Operating, servicing and inspection records	
Parts		
Job Plan		
1.	Initial Preparation	
2.	Perform engine condition assessment and determine overhaul hours.	
3.	Job Completion	

Job Plan No. 9	Solar Gas Turbine/Compressor (Master) Engine Overhaul	
Frequency	50000 Hours (maximum service life, or as determined necessary by Engine Condition Assessment)	
Plant Operations	Offline	
Attachments	SWM-R-20116 (SWMS) WI-M-20240 (Work Instruction)	
Resources		
Labour	1 Contractor 2 Technicians	40 hours
Equipment	Hand tools Special tools Lifting equipment	
Parts	Overhaul kit	
Job Plan		
1.	Initial Preparation	
2.	Unit Isolations	
3.	Remove, overhaul, reinstall and align engine.	



4.	Unit De-isolations
5.	Unit Recommissioning
6.	Job Completion