

General Electric LM2500 Gas Turbine

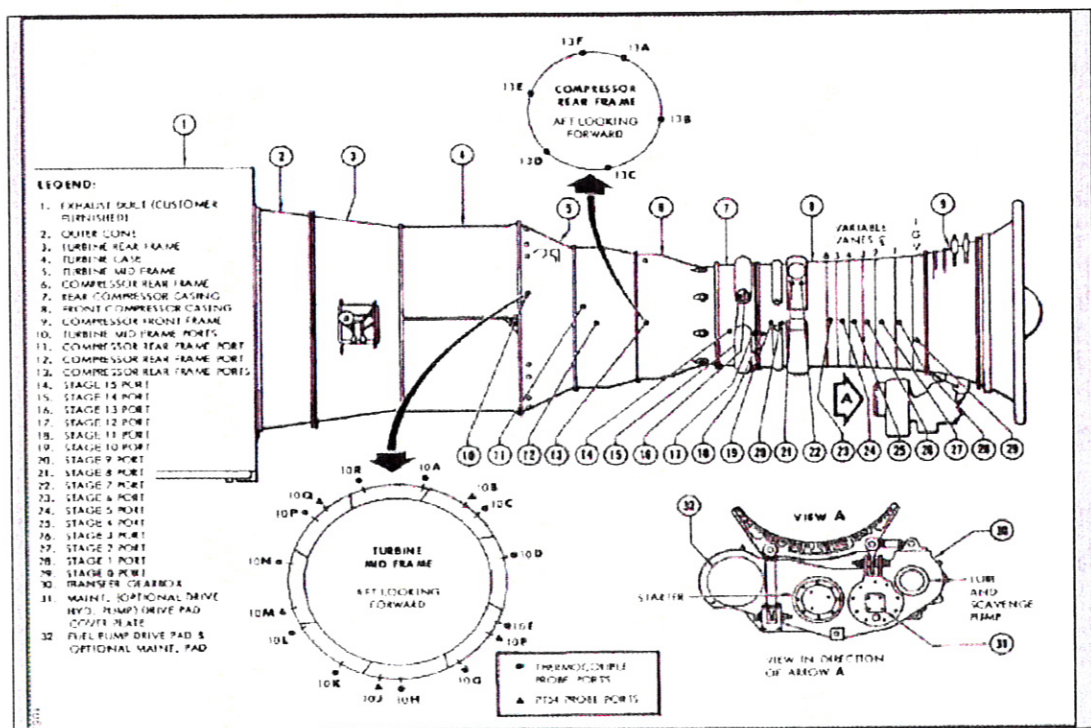
LM2500 SAC Borescope Inspection UNIT TM41

CUST – DOWANS

ENGINE SERIAL NUMBER:
481-694

TCT SALES ORDER NUMBER:
UK9000087

LM2500 SAC BORESCOPE REPORT	
Location:	Dar ES Salaam, Tanzania
Purchase order:	TBC, W/O UK80000157
Date of visit:	13-18 May 2008
Purpose:	Borescope inspection in accordance with GEK 97310, Vol. 1, Table 5-4 to Table 5-11
Purpose:	Lube and Scavenge Pump Inlet Screens Inspection and Cleaning in accordance with GEK 97310, Vol. 1, Table 5-3.18
Written by:	Mark Devine
Engine hours:	1174.45
Starts:	N/K
Fuel type:	Dual
Overview:	Engine visually acceptable for further operation but has reported high heat rate.



Volume 1, Tbl 5-4 – Tbl 5-11	LM2500 SAC Borescope inspection
------------------------------	---------------------------------

COMPRESSOR:

Component	Condition
Stages 1 through 9 Blades	<ul style="list-style-type: none"> Stage 3 blades, no damage found. Stage 4 blades, no damage found. Stage 9 blades, no damage found. Acceptable in accordance with GEK 97310 Vol. 1 table 5-4.

Stages 10 through 16 Blades	<ul style="list-style-type: none"> • Stage 10 blades, no damage found. • Stage 15 blades, no damage found. • Stage 16 blades, no defects found. • Acceptable in accordance with GEK 97310 Vol. 1 table 5-4.
Tip clanging contact stages 3-6	<ul style="list-style-type: none"> • No defects found. • Acceptable.
Stator Vanes (all)	<ul style="list-style-type: none"> • No defects found. • Acceptable.
All VSV Vanes	<ul style="list-style-type: none"> • No defects found. • Acceptable.
HPC Rotor and Stator Airflow Path Surfaces	<ul style="list-style-type: none"> • Normal levels of dirt/corrosion present. • Acceptable.

Reference Photographs - HPC Blades and Vanes



Stg 16 blade condition

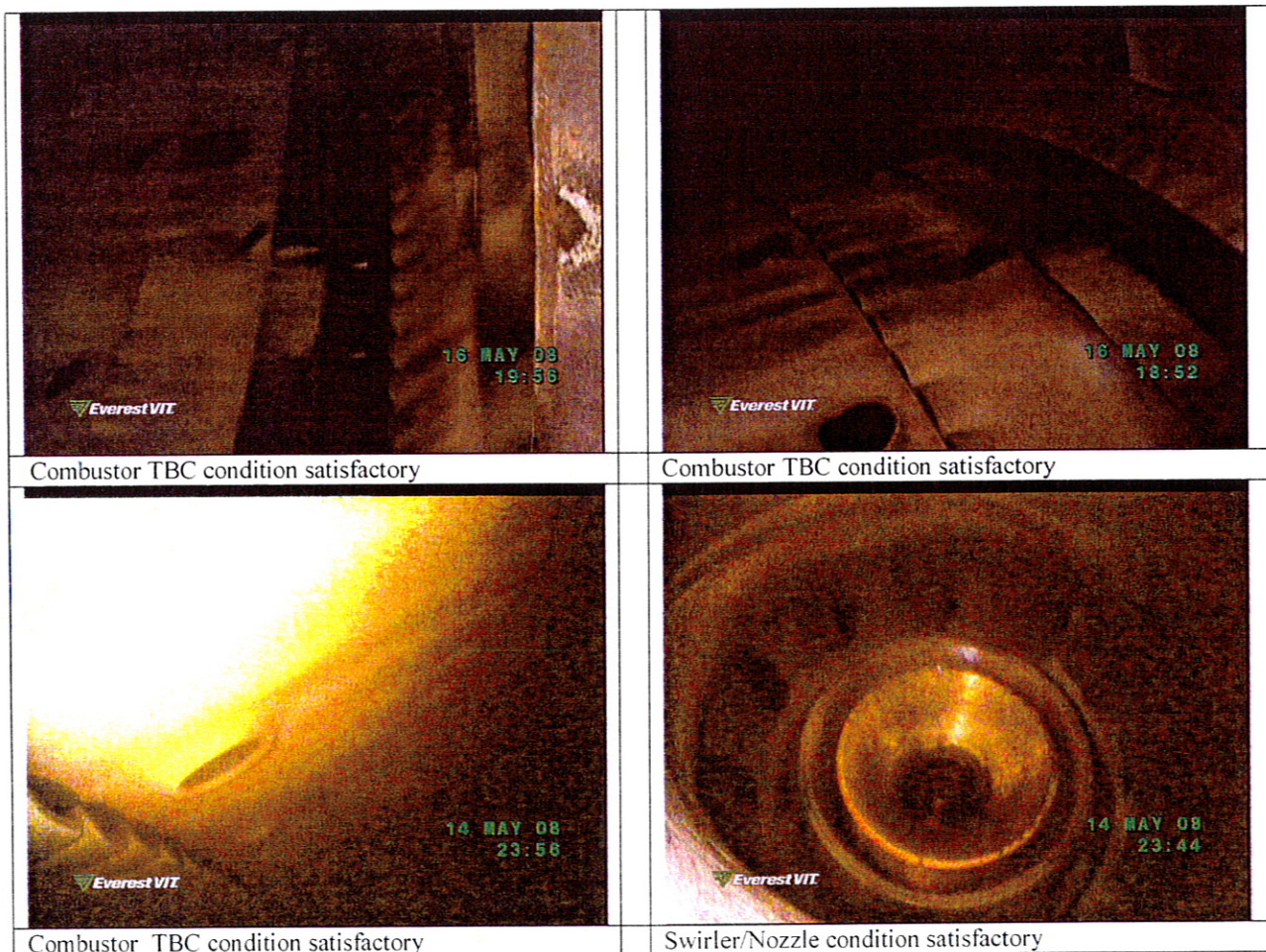
Inspection References: GEK 97310 Vol. 1, Table 5-4 Compressor Blades and Vanes, paragraph 5-3.6 and figures 5-8, 5-9 and 5-10.

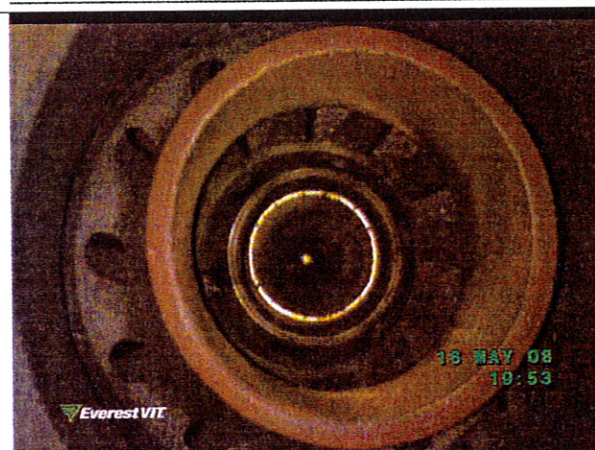
COMBUSTOR and FUEL NOZZLES:

Component	Condition
All Combustor Surfaces	<ul style="list-style-type: none"> • General condition acceptable.
Dome Band/Dome Plate	<ul style="list-style-type: none"> • Minor thermal barrier coating loss/degradation-acceptable
Riveted Joints	<ul style="list-style-type: none"> • No defects found
Trumpet and swirler cups	<ul style="list-style-type: none"> • Minor thermal barrier coating loss/degradation-acceptable.
Dome Assembly	<ul style="list-style-type: none"> • No defects found
Igniter Ferrule	<ul style="list-style-type: none"> • No defects found
Combustor Cowl	<ul style="list-style-type: none"> • No defects found

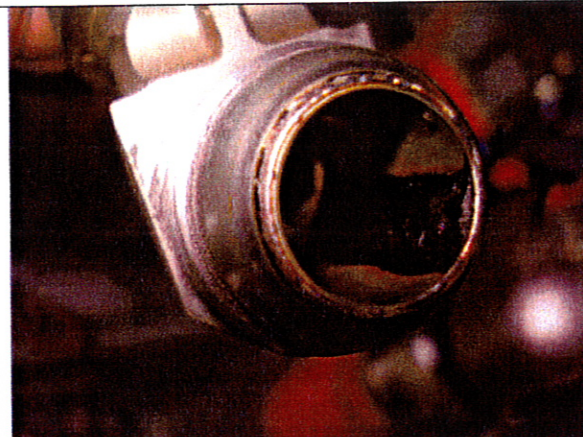
Inner and Outer Liner	<ul style="list-style-type: none"> No defects found
Fuel nozzle	<ul style="list-style-type: none"> 3 fuel nozzles were removed from engine for inspection. #11 pos S/N PHCHN387, #17 pos S/N PHCHN388, #26 pos S/N PHCHN320. One fuel nozzle found with contamination/residue, suspect remnants of liquid fuel running Fuel nozzle #11 position S/N PHCHN387 replaced in accordance with GEK97310 SWP 104 04. Fuel Nozzle installed P/N L31809P10, S/N PHCC2735, customers own stock

Reference Photographs – Combustor, Pre-mixers



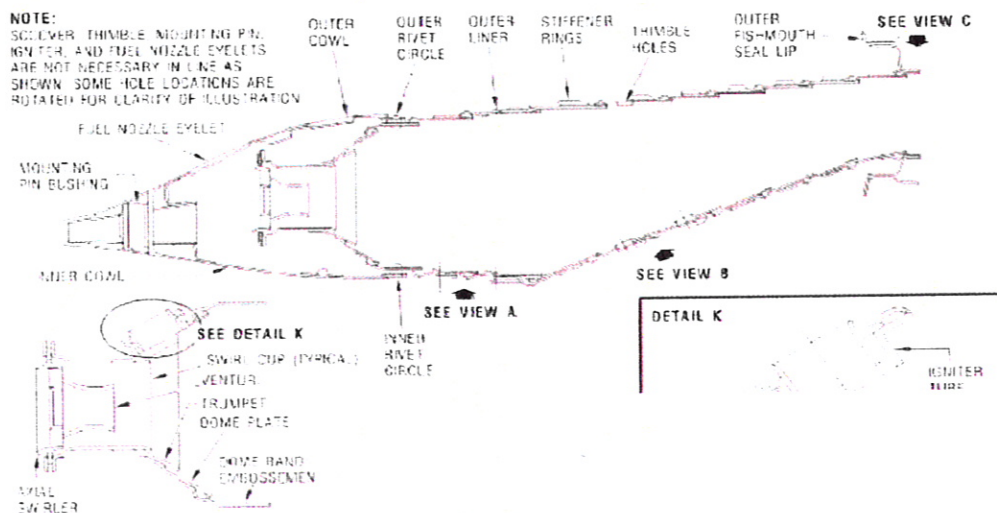
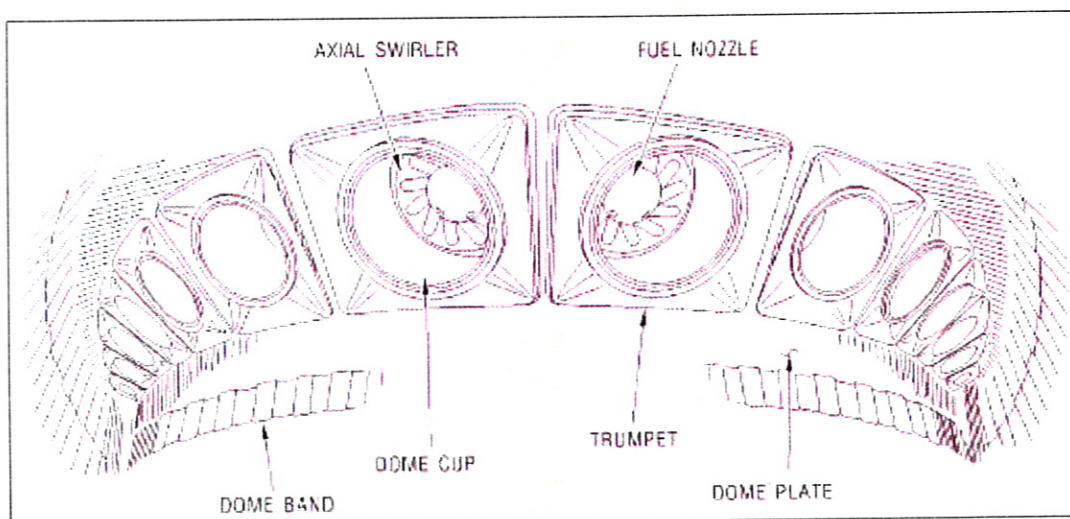


Swirler/nozzle condition satisfactory



Fuel nozzle residue.

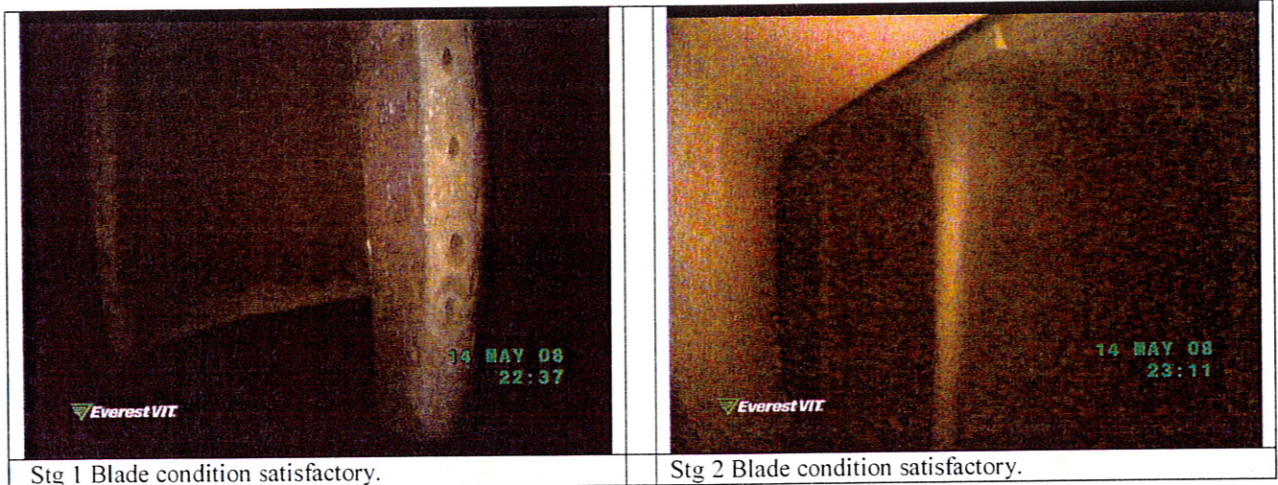
GEK 937310 Inspection References:



HPT ASSEMBLY:

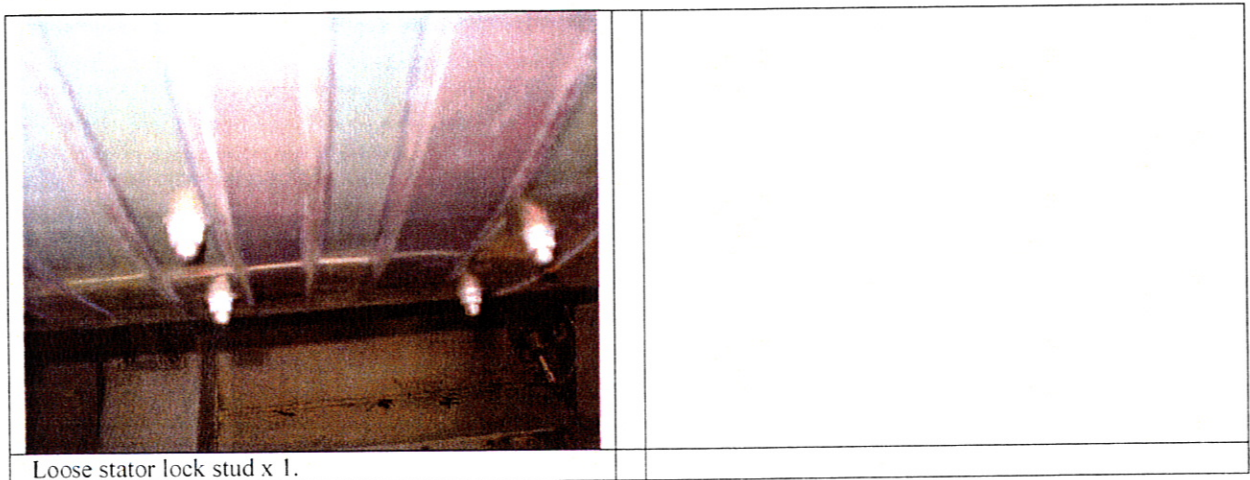
Component	Condition		
HPT Stage 1 Nozzle Assembly	Defect	Location	Findings/GEK limits
	Nozzle airfoil		
	N/A	N/A	No defects found in areas inspected
	Inner and Outer Platform		
	N/A	N/A	No defects found in areas inspected
	General remarks	Condition satisfactory for continued use.	
HPT Rotor Blade-Stage 1	Defect	Location	Findings/GEK limits
	HPT Rotor Blades-Leading Edge Area A		
	N/A	N/A	No defects found
	HPT Rotor Blades-Leading Edge Area B		
	N/A	N/A	No defects found
	HPT Rotor Blade Tips		
	N/A	N/A	No defects found
	HPT Rotor Blade-Trailing Edge Area A		
	N/A	N/A	No defects found
	HPT Rotor Blade-Trailing Edge Area B		
	N/A	N/A	No defects found
	HPT Rotor Blade-Concave Surface Area A		
	N/A	N/A	No defects found
	General remarks	Condition satisfactory for continued use	
HPT Stages 1 and 2 Nozzle Shroud	Defect	Location	Findings/GEK limits
	N/A	N/A	No defects found in areas inspected
	General remarks	Condition satisfactory for continued use	
HPT Stage 2 Nozzle Assembly	Defect	Location	Findings/GEK limits
	N/A	N/A	No defects found in areas inspected
	General remarks	Condition satisfactory for continued use	
HPT Rotor Blade-Stage 2	Defect	Location	Findings/GEK limits
	HPT Rotor Blades-Leading Edge Area A		
	N/A	N/A	No defects found
	HPT Rotor Blades-Leading Edge Area B		
	N/A	N/A	No defects found
	HPT Rotor Blade Tips		
	N/A	N/A	No defects found
	HPT Rotor Blade-Trailing Edge Area A		
	N/A	N/A	No defects found
	HPT Rotor Blade-Trailing Edge Area B		
	N/A	N/A	No defects found
	HPT Rotor Blade-Concave Surface Area A		
	N/A	N/A	No defects found
	General remarks	Condition satisfactory for continued use.	
HPT Stage 2 Nozzle Shroud	Defect	Location	Findings/GEK limits
	N/A	N/A	No defects found in areas inspected
	General remarks	Condition satisfactory for continued use	

Reference Photographs – HPT assembly



PACKAGE INSPECTION RECORD:

Component	Condition
Lube and Scavenge Pump Inlet Screens Inspection.	<ul style="list-style-type: none"> All screens and magnetic plugs found to be clean.
Gas Turbine External Inspection.	<ul style="list-style-type: none"> Stud loose on power turbine stator case. Unable to tighten without risk of damage/shearing stud. Monitor for continued security, acceptable for continued use.



Recommendations	Borescope inspection
------------------------	-----------------------------

- Engine condition satisfactory for continued use
- Lubricate the loose LPTS lock in hopes to tighten in situ, if not find suitable application to retain loose assembly to avoid case damage.
- Customer has reported a higher heat rate compared to the other units. The following steps are recommended
 - Inlet inspection
 - Inspection of filtration system (to include differential pressure reading and ensure instrumentation is calibrated) – this is higher than TM43, refer to package limits.
 - Inspect air inlet for dirty filters- replace as required
 - Inspect for on engine pipe leaks
 - Device inspection and calibration
 - Perform VSV system inspection checks in accordance GEK 97310 Vol. 2 WP118 00 and WP 206 00 – recommend full system (VIGV – HP6)

Questions to be answered by customer

- Last inlet filter change?
 - Are there available filters at site?
- When was the last time the all sensors have been was inspected and calibrated?
 - Fuel manifold pressure low
 - PS3A/B difference
- Has there been a gradual increase to heat rate?
- How is the VSV system angle measured (LVDT/on engine protractor)
- Is there spare VG controllers on site?
 - If yes, what is the part number

Parts used during outage:

Parts used			
Part #	Component Description	Source	Issued
C10-218	SAFETY-CABLE W/FERRULE	NEW	25
4058T39P01	GASKET	NEW	3
M83248/1-121	PREFORMED PACKING	NEW	1
J221P910	PREFORMED PACKING	NEW	2
J221P912	PREFORMED PACKING	NEW	3
J221P905	PREFORMED PACKING	NEW	5
L31809P10	FUEL NOZZLE, S/N PHCC2735	DOWANS	1