

Report Forms  
**SEQUENCE VIB**

**VERSION: 20010716 BETA**

CONDUCTED FOR:

*TSTSPON1*

*TSTSPON2*

<i>LABVALID</i>	V = VALID
	I = INVALID
	N = RESULTS CANNOT BE INTERPRETED (REFER TO COMMENT SECTION)

<i>TSTOIL</i>	NR = Non-reference Oil Test
	RO = Reference Oil Test

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTIME</i>	
Test Number			
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>	Runs on Engine: <i>ENRUN</i>
Oil Code: <i>OILCODE</i>			
Formulation/Stand Code: <i>FORM</i>			
Alternate Codes	<i>ALTCODE1</i>	<i>ALTCODE2</i>	<i>ALTCODE3</i>

In my opinion this test *OPVALID* been conducted in a valid manner in accordance with the VIB Test Procedure (RR:) and the appropriate amendments through the Information Letter System. The remarks included in the report describe the anomalies associated with this test.

SUBMITTED BY: \_\_\_\_\_ *SUBLAB*  
 Testing Laboratory

\_\_\_\_\_ *SUBSIGIM*  
 Signature

\_\_\_\_\_ *SUBNAME*  
 Typed Name

\_\_\_\_\_ *SUBTITLE*  
 Title

Fig. A7.1 Test Report Cover

## Form 2

### Sequence VIB

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## Sequence VIB Form 3

### Summary of Test Method

The Sequence VIB is an engine dynamometer test that measures a lubricant's ability to improve the fuel economy of passenger cars and light-duty trucks. The method compares the performance of a test lubricant to the performance of a baseline lubricant over five different stages of operation.

A 1993 Ford 4.6L spark ignition, V-8 cylinder design, 4-cycle engine is used as the test apparatus. The engine incorporates overhead camshafts, a cross-flow, fast-burn cylinder head design, two valves per cylinder, and an electronic port fuel injection.

The Sequence VIB test incorporates a flush and run type procedure. Each test consists of two 5-stage fuel economy measurements on baseline oil (BC), one at the beginning of the test and one at the end. The test oil is evaluated in between the two baseline runs. The test oil is initially aged during 16 hours of engine operation at 1500 r/min and 125°C oil temperature. After the initial aging, a 5-stage fuel economy measurement is taken. The test oil is then aged an additional 80 hours at an engine speed of 2250 r/min and 135°C oil temperature. Following this final aging, the test oil once again goes through a 5-stage fuel economy measurement. The two fuel economy measurements taken on the baseline oil (BC) and a final value for Fuel Economy Improvement is calculated for the test oil.

Below is a summary of the operation conditions for the aging and 5-stage fuel economy portions of the test.

<b>Fuel Economy Measurement and Aging Condition</b>				
<b>FE Stage</b>	<b>Speed (r/min)</b>	<b>Torque (N-m)</b>	<b>Oil Temp. (°C)</b>	<b>Coolant Temp. (°C)</b>
1	1500	98	125	105
2	800	26	105	95
3	800	26	70	60
4	1500	98	70	60
5	1500	98	45	45

<b>Aging Stage</b>	<b>Speed (r/min)</b>	<b>Torque (N-m)</b>	<b>Oil Temp. (°C)</b>	<b>Coolant Temp. (°C)</b>
1	1500	98	125	105
2	2250	98	135	105

FIG. A7.3 Summary of Test Method

**SEQUENCE VIB  
FORM 4  
TEST RESULT SUMMARY  
NON-REFERENCE & REFERENCE OIL TESTS**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTIME</i>
Test Number		
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>
Oil Code: <i>OILCODE</i>	Engine Serial Number: <i>ENGSN</i>	
Formulation/Stand Code: <i>FORM</i>		

TEST DOCUMENTATION			
	BC Before	Test Oil	BC After
Start Date	<i>BCBSDTE</i>	<i>DTSTRT</i>	<i>BCASTDT</i>
Start Time	<i>BCBSTIM</i>	<i>STRTIME</i>	<i>BCASTTM</i>
End Date	<i>BCBEDTE</i>	<i>TODTE</i>	<i>DTCOMP</i>
End Time	<i>BCBETIM</i>	<i>TOTIM</i>	<i>EOTIME</i>
Oil Test Length, hhh:mm	<i>BCBTLEN</i>	<i>TOLEN</i>	<i>BCATESTL</i>
Calibration Oil Batch	<i>BCOILBT</i>		
Flush Oil Batch	<i>BCFOILBT</i>		
Laboratory Oil Code		<i>LABOCODE</i>	
SAE Viscosity Grade		<i>SAEVISG</i>	
TMC Oil Code (Reference Oil Tests Only)		<i>IND</i>	
New Oil Viscosity @ 40 °C, cSt		<i>V40NEW</i>	
New Oil Viscosity @ 100°C, cSt		<i>V100NEW</i>	
Aged (80 h) Oil Viscosity @ 40 °C, cSt		<i>V40A80H</i>	
Aged (80 h) Oil Viscosity @ 100°C, cSt		<i>V100A80H</i>	
Total Test Length, hhh:mm	<i>TESTLEN</i>		
Total Engine Hours @ EOT	<i>ENHREND</i>		
Most Recent Fuel Batch	<i>FUELBTD</i>		

OVERALL RESULTS				
	BC Oil		Test Oil	
	Before	After	Phase I	Phase II
Fuel Consumed, kg	<i>BC1KG</i>	<i>BC2KG</i>	<i>TO1KG</i>	<i>TO2KG</i>
Shift Delta, %	<i>BCSFTDLT</i>			
Fuel Economy Improvement, %			<i>FEI1</i>	<i>FEI2</i>
FEI Industry Correction Factor, %			<i>FEI1CF</i>	<i>FEI2CF</i>
FEI Severity Adjustment, % (non-reference tests only)			<i>FEI1SA</i>	<i>FEI2SA</i>
FEI Final Result, %			<i>FEI1FNL</i>	<i>FEI2FNL</i>
Total Oil Consumption, mL	<i>TOTOCON</i>			

Last Reference Oil Test on Stand/Engine History (Non-Reference Tests Only)			
Date Completed	<i>RDTCOMP</i>	Fuel Batch	<i>RFUELBID</i>
TMC Oil Code	<i>RIND</i>	SAE Viscosity Grade	<i>RSAEVISG</i>
Oilcode	<i>ROILCODE</i>	Calibration Oil Batch	<i>RCALOIL</i>
Runs on Stand	<i>RSTRUN</i>	Runs on Engine	<i>RENRUN</i>
		Phase I	Phase II
Final FEI Results		<i>RFEI1FNL</i>	<i>RFEI2FNL</i>

Fig. A7.4 Test Result Summary - Non-reference and Reference Oil Tests

**SEQUENCE VIB  
FORM 5  
OPERATIONAL DATA ANALYSIS**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>
Test Number		
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>
Oil Code: <i>OILCODE</i>		
Formulation/Stand Code: <i>FORM</i>		

Computed Averages						
Oil	Stage	BSFC kg/kW-h	BSFC C.V.%	Nominal Power kW	Weight Factor	Weighted Fuel Consumed kg
<b>BC Before Test Oil</b>	<b>1</b>	<i>BFCARB1A</i>	<i>BFCCRB1A</i>	15.39	0.0802	<i>WFC_RB1A</i>
	<b>2</b>	<i>BFCARB2A</i>	<i>BFCCRB2A</i>	2.18	0.0787	<i>WFC_RB2A</i>
	<b>3</b>	<i>BFCARB3A</i>	<i>BFCCRB3A</i>	2.18	0.0848	<i>WFC_RB3A</i>
	<b>4</b>	<i>BFCARB4A</i>	<i>BFCCRB4A</i>	15.39	0.0864	<i>WFC_RB4A</i>
	<b>5</b>	<i>BFCARB5A</i>	<i>BFCCRB5A</i>	15.39	0.0699	<i>WFC_RB5A</i>
Total Fuel Consumed						<i>BC1KG</i>

Computed Averages						
Oil	Stage	BSFC kg/kW-h	BSFC C.V.%	Nominal Power kW	Weight Factor	Weighted Fuel Consumed kg
<b>Test Oil Phase I</b>	<b>1</b>	<i>BFCARC1A</i>	<i>BFCCRC1A</i>	15.39	0.0802	<i>WFC_RC1A</i>
	<b>2</b>	<i>BFCARC2A</i>	<i>BFCCRC2A</i>	2.18	0.0787	<i>WFC_RC2A</i>
	<b>3</b>	<i>BFCARC3A</i>	<i>BFCCRC3A</i>	2.18	0.0848	<i>WFC_RC3A</i>
	<b>4</b>	<i>BFCARC4A</i>	<i>BFCCRC4A</i>	15.39	0.0864	<i>WFC_RC4A</i>
	<b>5</b>	<i>BFCARC5A</i>	<i>BFCCRC5A</i>	15.39	0.0699	<i>WFC_RC5A</i>
Total Fuel Consumed						<i>TO1KG</i>

Fig. A7.5 Operational Data Analysis

**SEQUENCE VIB**  
**FORM 6**  
**OPERATIONAL DATA ANALYSIS**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>
Test Number		
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>
Oil Code: <i>OILCODE</i>		
Formulation/Stand Code: <i>FORM</i>		

Computed Averages						
Oil	Stage	BSFC kg/kW-h	BSFC C.V.%	Nominal Power kW	Weight Factor	Weighted Fuel Consumed kg
<b>Test Oil Phase II</b>	<b>1</b>	<i>BFCARD1A</i>	<i>BFCCRD1A</i>	15.39	0.0802	<i>WFC_RD1A</i>
	<b>2</b>	<i>BFCARD2A</i>	<i>BFCCRD2A</i>	2.18	0.0787	<i>WFC_RD2A</i>
	<b>3</b>	<i>BFCARD3A</i>	<i>BFCCRD3A</i>	2.18	0.0848	<i>WFC_RD3A</i>
	<b>4</b>	<i>BFCARD4A</i>	<i>BFCCRD4A</i>	15.39	0.0864	<i>WFC_RD4A</i>
	<b>5</b>	<i>BFCARD5A</i>	<i>BFCCRD5A</i>	15.39	0.0699	<i>WFC_RD5A</i>
Total Fuel Consumed						<i>TO2KG</i>

Computed Averages						
Oil	Stage	BSFC kg/kW-h	BSFC C.V.%	Nominal Power kW	Weight Factor	Weighted Fuel Consumed kg
<b>BC After Test Oil</b>	<b>1</b>	<i>BFCARA1A</i>	<i>BFCCRA1A</i>	15.39	0.0802	<i>WFC_RA1A</i>
	<b>2</b>	<i>BFCARA2A</i>	<i>BFCCRA2A</i>	2.18	0.0787	<i>WFC_RA2A</i>
	<b>3</b>	<i>BFCARA3A</i>	<i>BFCCRA3A</i>	2.18	0.0848	<i>WFC_RA3A</i>
	<b>4</b>	<i>BFCARA4A</i>	<i>BFCCRA4A</i>	15.39	0.0864	<i>WFC_RA4A</i>
	<b>5</b>	<i>BFCARA5A</i>	<i>BFCCRA5A</i>	15.39	0.0699	<i>WFC_RA5A</i>
Total Fuel Consumed						<i>BC2KG</i>

Fig. A7.6 Operational Data Analysis

**SEQUENCE VIB  
FORM 7**

**GENERAL PARAMETER LISTING**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>	
Test Number			
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>	Runs on Engine: <i>ENRUN</i>
Oil Code: <i>OILCODE</i>			
Formulation/Stand Code: <i>FORM</i>			

**16 Hour Aging**

	SPEC	AVERAGE <sup>A</sup>	MAX <sup>A</sup>	MIN <sup>A</sup>
1. Speed, r/min	1500 ± 5	<i>ARPM16H</i>	<i>XRPM16H</i>	<i>IRPM16H</i>
2. Torque, N-m	98 ± 0.10	<i>ALD16H</i>	<i>XLD16H</i>	<i>ILD16H</i>
3. Oil Gallery Temperature, °C	125 ± 2	<i>AOGT16H</i>	<i>XOGT16H</i>	<i>IOGT16H</i>
4. Coolant Inlet Temperature, °C	105 ± 2	<i>ACINT16H</i>	<i>XCINT16H</i>	<i>ICINT16H</i>
5. Oil Circulation Temperature, °C	Record	<i>ASMPT16H</i>	<i>XSMPT16H</i>	<i>ISMPT16H</i>
6. Coolant Out Temperature, °C	Record	<i>ACOT16H</i>	<i>XCOT16H</i>	<i>ICOT16H</i>
7. Intake Air Temperature, °C	27 ± 2	<i>AINAT16H</i>	<i>XINAT16H</i>	<i>IINAT16H</i>
8. Fuel to Flowmeter Temperature, °C	20 - 32	<i>AFTMM16H</i>	<i>XFTMM16H</i>	<i>IFTMM16H</i>
9. Fuel to Fuel Rail Temperature, °C	20 ± 2	<i>AFTFR16H</i>	<i>XFTFR16H</i>	<i>IFTFR16H</i>
10. Load Cell Temperature, °C	Record	<i>ALCT16H</i>	<i>XLCT16H</i>	<i>ILCT16H</i>
11. Oil Heater Temperature, °C	205 max	<i>AHEAT16H</i>	<i>XHEAT16H</i>	<i>IHEAT16H</i>
12. Intake Air Pressure, kPa	0.05 ± 0.02	<i>AINAP16H</i>	<i>XINAP16H</i>	<i>IINAP16H</i>
13. Fuel to Flowmeter Pressure, kPa	100 min	<i>AFPMM16H</i>	<i>XFPMM16H</i>	<i>IFPMM16H</i>
14. Fuel to Fuel Rail Pressure, kPa	205 - 310	<i>AFPFR16H</i>	<i>XFPFR16H</i>	<i>IFPFR16H</i>
15. Intake Manifold Pressure, kPa abs.	Record	<i>AINTV16H</i>	<i>XINTV16H</i>	<i>IINTV16H</i>
16. Exhaust Back Pressure, kPa abs.	104 ± 0.20	<i>AEXBP16H</i>	<i>XEXBP16H</i>	<i>IEXBP16H</i>
17. Engine Oil Pressure, kPa	Record	<i>AOGP16H</i>	<i>XOGP16H</i>	<i>IOGP16H</i>
18. Coolant Flow, L/min	130 ± 4	<i>AMCF16H</i>	<i>XMCF16H</i>	<i>IMCF16H</i>
19. Fuel Flow, kg/h	Record	<i>AFFLO16H</i>	<i>XFFLO16H</i>	<i>IFFLO16H</i>
20. Intake Air Humidity, grains/kg	11.4 ± 0.8	<i>AINAH16H</i>	<i>XINAH16H</i>	<i>IINAH16H</i>
21. Air/Fuel Ratio	Record	<i>AAFR16H</i>	<i>XAFR16H</i>	<i>IAFR16H</i>
22. Crankcase Pressure, kPa	0.00 ± 0.25	<i>ACCV16H</i>	<i>XCCV16H</i>	<i>ICCV16H</i>

<sup>A</sup> Based on a minimum of one determination per hour

Fig. A7.7 General Parameter Listing

**SEQUENCE VIB  
FORM 8  
GENERAL PARAMETER LISTING**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTIME</i>	
Test Number			
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>	Runs on Engine: <i>ENRUN</i>
Oil Code: <i>OILCODE</i>			
Formulation/Stand Code: <i>FORM</i>			

**80 Hour Aging**

	SPEC	AVERAGE <sup>A</sup>	MAX <sup>A</sup>	MIN <sup>A</sup>
1. Speed, r/min	2250 ± 5	<i>ARPM80H</i>	<i>XRPM80H</i>	<i>IRPM80H</i>
2. Torque, N-m	98 ± 0.10	<i>ALD80H</i>	<i>XLD80H</i>	<i>ILD80H</i>
3. Oil Gallery Temperature, °C	135 ± 2	<i>AOGT80H</i>	<i>XOGT80H</i>	<i>IOGT80H</i>
4. Coolant Inlet Temperature, °C	105 ± 2	<i>ACINT80H</i>	<i>XCINT80H</i>	<i>ICINT80H</i>
5. Oil Circulation Temperature, °C	Record	<i>ASMPT80H</i>	<i>XSMPT80H</i>	<i>ISMPT80H</i>
6. Coolant Out Temperature, °C	Record	<i>ACOT80H</i>	<i>XCOT80H</i>	<i>ICOT80H</i>
7. Intake Air Temperature, °C	27 ± 2	<i>AINAT80H</i>	<i>XINAT80H</i>	<i>IINAT80H</i>
8. Fuel to Flowmeter Temperature, °C	20 - 32	<i>AFTMM80H</i>	<i>XFTMM80H</i>	<i>IFTMM80H</i>
9. Fuel to Fuel Rail Temperature, °C	20 ± 2	<i>AFTFR80H</i>	<i>XFTFR80H</i>	<i>IFTFR80H</i>
10. Load Cell Temperature, °C	Record	<i>ALCT80H</i>	<i>XLCT80H</i>	<i>ILCT80H</i>
11. Oil Heater Temperature, °C	205 max	<i>AHEAT80H</i>	<i>XHEAT80H</i>	<i>IHEAT80H</i>
12. Intake Air Pressure, kPa	0.05 ± 0.02	<i>AINAP80H</i>	<i>XINAP80H</i>	<i>IINAP80H</i>
13. Fuel to Flowmeter Pressure, kPa	100 min	<i>AFPMM80H</i>	<i>XFPMM80H</i>	<i>IFPMM80H</i>
14. Fuel to Fuel Rail Pressure, kPa	205 - 310	<i>AFPFR80H</i>	<i>XFPFR80H</i>	<i>IFPFR80H</i>
15. Intake Manifold Pressure, kPa abs.	Record	<i>AINTV80H</i>	<i>XINTV80H</i>	<i>IINTV80H</i>
16. Exhaust Back Pressure, kPa abs.	104 ± 0.20	<i>AEXBP80H</i>	<i>XEXBP80H</i>	<i>IEXBP80H</i>
17. Engine Oil Pressure, kPa	Record	<i>AOGP80H</i>	<i>XOGP80H</i>	<i>IOGP80H</i>
18. Coolant Flow, L/min	130 ± 4	<i>AMCF80H</i>	<i>XMCF80H</i>	<i>IMCF80H</i>
19. Fuel Flow, kg/h	Record	<i>AFFLO80H</i>	<i>XFFLO80H</i>	<i>IFFLO80H</i>
20. Intake Air Humidity, grains/kg	11.4 ± 0.8	<i>AINAH80H</i>	<i>XINAH80H</i>	<i>IINAH80H</i>
21. Air/Fuel Ratio	Record	<i>AAFR80H</i>	<i>XAFR80H</i>	<i>IAFR80H</i>
22. Crankcase Pressure, kPa	0.00 ± 0.25	<i>ACCV80H</i>	<i>XCCV80H</i>	<i>ICCV80H</i>

<sup>A</sup> Based on a minimum of one determination per hour

Fig. A7.8 General Parameter Listing



**SEQUENCE VIB  
FORM 9  
GENERAL PARAMETER SUMMARY**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>		
Test Number				
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>	Runs on Engine: <i>ENRUN</i>	
Oil Code: <i>OILCODE</i>				
Formulation/Stand Code: <i>FORM</i>				

**BC Before Test Oil**

**General Parameters**

	Spec	Stage				
		1	2	3	4	5
1. Oil Circulation Temperature, °C	Record	<i>OCT_RB01</i>	<i>OCT_RB02</i>	<i>OCT_RB03</i>	<i>OCT_RB04</i>	<i>OCT_RB05</i>
2. Coolant Out Temperature, °C	Record	<i>COT_RB01</i>	<i>COT_RB02</i>	<i>COT_RB03</i>	<i>COT_RB04</i>	<i>COT_RB05</i>
3. Fuel to Flowmeter Temperature, °C	20-32	<i>FFT_RB01</i>	<i>FFT_RB02</i>	<i>FFT_RB03</i>	<i>FFT_RB04</i>	<i>FFT_RB05</i>
4. Delta Fuel to Flowmeter Temp., °C <sup>A</sup>	≤ 4	<i>FFTDRB01</i>	<i>FFTDRB02</i>	<i>FFTDRB03</i>	<i>FFTDRB04</i>	<i>FFTDRB05</i>
5. Test Cell Temperature, °C	Record	<i>TCT_RB01</i>	<i>TCT_RB02</i>	<i>TCT_RB03</i>	<i>TCT_RB04</i>	<i>TCT_RB05</i>
6. Load Cell Temperature, °C	Record	<i>LCT_RB01</i>	<i>LCT_RB02</i>	<i>LCT_RB03</i>	<i>LCT_RB04</i>	<i>LCT_RB05</i>
7. Delta Load Cell Temperature, °C <sup>A</sup>	≤ 12	<i>LCTDRB01</i>	<i>LCTDRB02</i>	<i>LCTDRB03</i>	<i>LCTDRB04</i>	<i>LCTDRB05</i>
8. Oil Heater Temperature, °C	205 max	<i>OHT_RB01</i>	<i>OHT_RB02</i>	<i>OHT_RB03</i>	<i>OHT_RB04</i>	<i>OHT_RB05</i>
9. Intake Air Pressure, kPa	0.05 ± .02	<i>IAP_RB01</i>	<i>IAP_RB02</i>	<i>IAP_RB03</i>	<i>IAP_RB04</i>	<i>IAP_RB05</i>
10. Fuel to Flowmeter Pressure, kPa	100 min	<i>FFP_RB01</i>	<i>FFP_RB02</i>	<i>FFP_RB03</i>	<i>FFP_RB04</i>	<i>FFP_RB05</i>
11. Fuel to Fuel Rail Pressure, kPa	205 - 310	<i>FFRPRB01</i>	<i>FFRPRB02</i>	<i>FFRPRB03</i>	<i>FFRPRB04</i>	<i>FFRPRB05</i>
12. Intake Manifold Pressure, kPa abs.	Record	<i>IMP_RB01</i>	<i>IMP_RB02</i>	<i>IMP_RB03</i>	<i>IMP_RB04</i>	<i>IMP_RB05</i>
13. Engine Oil Pressure, kPa	Record	<i>EOP_RB01</i>	<i>EOP_RB02</i>	<i>EOP_RB03</i>	<i>EOP_RB04</i>	<i>EOP_RB05</i>
14. Coolant Flow, L/min	130 ± 4	<i>CFLORB01</i>	<i>CFLORB02</i>	<i>CFLORB03</i>	<i>CFLORB04</i>	<i>CFLORB05</i>
15. Intake Air Humidity, grains/kg	11.4 ± 0.8	<i>IAH_RB01</i>	<i>IAH_RB02</i>	<i>IAH_RB03</i>	<i>IAH_RB04</i>	<i>IAH_RB05</i>
16. Crankcase Pressure, kPa	0.00 ± 0.25	<i>CCV_RB01</i>	<i>CCV_RB02</i>	<i>CCV_RB03</i>	<i>CCV_RB04</i>	<i>CCV_RB05</i>
17. Blowby, L/min <sup>B</sup>	Record	<i>BLBYB01</i>				
18. Barometric Pressure, kPa	Record	<i>BAP_RB01</i>	<i>BAP_RB02</i>	<i>BAP_RB03</i>	<i>BAP_RB04</i>	<i>BAP_RB05</i>

<sup>A</sup> Difference between the maximum stage average reading of the entire test and the individual stage average readings

<sup>B</sup> Not required by test procedure

Fig. A7.9 General Parameter Summary

**SEQUENCE VIB  
FORM 10  
GENERAL PARAMETER SUMMARY**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>		
Test Number				
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>	Runs on Engine: <i>ENRUN</i>	
Oil Code: <i>OILCODE</i>				
Formulation/Stand Code: <i>FORM</i>				

**Test Oil Phase I**

**General Parameters**

	Spec	Stage				
		1	2	3	4	5
1. Oil Circulation Temperature, °C	Record	<i>OCT_RC01</i>	<i>OCT_RC02</i>	<i>OCT_RC03</i>	<i>OCT_RC04</i>	<i>OCT_RC05</i>
2. Coolant Out Temperature, °C	Record	<i>COT_RC01</i>	<i>COT_RC02</i>	<i>COT_RC03</i>	<i>COT_RC04</i>	<i>COT_RC05</i>
3. Fuel to Flowmeter Temperature, °C	20-32	<i>FFT_RC01</i>	<i>FFT_RC02</i>	<i>FFT_RC03</i>	<i>FFT_RC04</i>	<i>FFT_RC05</i>
4. Delta Fuel to Flowmeter Temp., °C <sup>A</sup>	≤ 4	<i>FFTDRC01</i>	<i>FFTDRC02</i>	<i>FFTDRC03</i>	<i>FFTDRC04</i>	<i>FFTDRC05</i>
5. Test Cell Temperature, °C	Record	<i>TCT_RC01</i>	<i>TCT_RC02</i>	<i>TCT_RC03</i>	<i>TCT_RC04</i>	<i>TCT_RC05</i>
6. Load Cell Temperature, °C	Record	<i>LCT_RC01</i>	<i>LCT_RC02</i>	<i>LCT_RC03</i>	<i>LCT_RC04</i>	<i>LCT_RC05</i>
7. Delta Load Cell Temperature, °C <sup>A</sup>	≤ 12	<i>LCTDRC01</i>	<i>LCTDRC02</i>	<i>LCTDRC03</i>	<i>LCTDRC04</i>	<i>LCTDRC05</i>
8. Oil Heater Temperature, °C	205 max	<i>OHT_RC01</i>	<i>OHT_RC02</i>	<i>OHT_RC03</i>	<i>OHT_RC04</i>	<i>OHT_RC05</i>
9. Intake Air Pressure, kPa	0.05 ± .02	<i>IAP_RC01</i>	<i>IAP_RC02</i>	<i>IAP_RC03</i>	<i>IAP_RC04</i>	<i>IAP_RC05</i>
10. Fuel to Flowmeter Pressure, kPa	100 min	<i>FFP_RC01</i>	<i>FFP_RC02</i>	<i>FFP_RC03</i>	<i>FFP_RC04</i>	<i>FFP_RC05</i>
11. Fuel to Fuel Rail Pressure, kPa	205 - 310	<i>FFRPRC01</i>	<i>FFRPRC02</i>	<i>FFRPRC03</i>	<i>FFRPRC04</i>	<i>FFRPRC05</i>
12. Intake Manifold Pressure, kPa abs.	Record	<i>IMP_RC01</i>	<i>IMP_RC02</i>	<i>IMP_RC03</i>	<i>IMP_RC04</i>	<i>IMP_RC05</i>
13. Engine Oil Pressure, kPa	Record	<i>EOP_RC01</i>	<i>EOP_RC02</i>	<i>EOP_RC03</i>	<i>EOP_RC04</i>	<i>EOP_RC05</i>
14. Coolant Flow, L/min	130 ± 4	<i>CFLORC01</i>	<i>CFLORC02</i>	<i>CFLORC03</i>	<i>CFLORC04</i>	<i>CFLORC05</i>
15. Intake Air Humidity, grains/kg	11.4 ± 0.8	<i>IAH_RC01</i>	<i>IAH_RC02</i>	<i>IAH_RC03</i>	<i>IAH_RC04</i>	<i>IAH_RC05</i>
16. Crankcase Pressure, kPa	0.00 ± 0.25	<i>CCV_RC01</i>	<i>CCV_RC02</i>	<i>CCV_RC03</i>	<i>CCV_RC04</i>	<i>CCV_RC05</i>
17. Barometric Pressure, kPa	Record	<i>BAP_RC01</i>	<i>BAP_RC02</i>	<i>BAP_RC03</i>	<i>BAP_RC04</i>	<i>BAP_RC05</i>

<sup>A</sup> Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.10 General Parameter Summary

**SEQUENCE VIB  
FORM 11  
GENERAL PARAMETER SUMMARY**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>		
Test Number				
Test Stand: <i>STAND</i>	Runs on Test Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>	Runs on Engine: <i>ENRUN</i>	
Oil Code: <i>OILCODE</i>				
Formulation/Stand Code: <i>FORM</i>				

**Test Oil Phase II**

**General Parameters**

	Spec	Stage				
		1	2	3	4	5
1. Oil Circulation Temperature, °C	Record	<i>OCT_RD01</i>	<i>OCT_RD02</i>	<i>OCT_RD03</i>	<i>OCT_RD04</i>	<i>OCT_RD05</i>
2. Coolant Out Temperature, °C	Record	<i>COT_RD01</i>	<i>COT_RD02</i>	<i>COT_RD03</i>	<i>COT_RD04</i>	<i>COT_RD05</i>
3. Fuel to Flowmeter Temperature, °C	20-32	<i>FFT_RD01</i>	<i>FFT_RD02</i>	<i>FFT_RD03</i>	<i>FFT_RD04</i>	<i>FFT_RD05</i>
4. Delta Fuel to Flowmeter Temp., °C <sup>A</sup>	≤ 4	<i>FFTDRD01</i>	<i>FFTDRD02</i>	<i>FFTDRD03</i>	<i>FFTDRD04</i>	<i>FFTDRD05</i>
5. Test Cell Temperature, °C	Record	<i>TCT_RD01</i>	<i>TCT_RD02</i>	<i>TCT_RD03</i>	<i>TCT_RD04</i>	<i>TCT_RD05</i>
6. Load Cell Temperature, °C	Record	<i>LCT_RD01</i>	<i>LCT_RD02</i>	<i>LCT_RD03</i>	<i>LCT_RD04</i>	<i>LCT_RD05</i>
7. Delta Load Cell Temperature, °C <sup>A</sup>	≤ 12	<i>LCTDRD01</i>	<i>LCTDRD02</i>	<i>LCTDRD03</i>	<i>LCTDRD04</i>	<i>LCTDRD05</i>
8. Oil Heater Temperature, °C	205 max	<i>OHT_RD01</i>	<i>OHT_RD02</i>	<i>OHT_RD03</i>	<i>OHT_RD04</i>	<i>OHT_RD05</i>
9. Intake Air Pressure, kPa	0.05 ± .02	<i>IAP_RD01</i>	<i>IAP_RD02</i>	<i>IAP_RD03</i>	<i>IAP_RD04</i>	<i>IAP_RD05</i>
10. Fuel to Flowmeter Pressure, kPa	100 min	<i>FFP_RD01</i>	<i>FFP_RD02</i>	<i>FFP_RD03</i>	<i>FFP_RD04</i>	<i>FFP_RD05</i>
11. Fuel to Fuel Rail Pressure, kPa	205 - 310	<i>FFRPRD01</i>	<i>FFRPRD02</i>	<i>FFRPRD03</i>	<i>FFRPRD04</i>	<i>FFRPRD05</i>
12. Intake Manifold Pressure, kPa abs.	Record	<i>IMP_RD01</i>	<i>IMP_RD02</i>	<i>IMP_RD03</i>	<i>IMP_RD04</i>	<i>IMP_RD05</i>
13. Engine Oil Pressure, kPa	Record	<i>EOP_RD01</i>	<i>EOP_RD02</i>	<i>EOP_RD03</i>	<i>EOP_RD04</i>	<i>EOP_RD05</i>
14. Coolant Flow, L/min	130 ± 4	<i>CFLORD01</i>	<i>CFLORD02</i>	<i>CFLORD03</i>	<i>CFLORD04</i>	<i>CFLORD05</i>
15. Intake Air Humidity, grains/kg	11.4 ± 0.8	<i>IAH_RD01</i>	<i>IAH_RD02</i>	<i>IAH_RD03</i>	<i>IAH_RD04</i>	<i>IAH_RD05</i>
16. Crankcase Pressure, kPa	0.00 ± 0.25	<i>CCV_RD01</i>	<i>CCV_RD02</i>	<i>CCV_RD03</i>	<i>CCV_RD04</i>	<i>CCV_RD05</i>
17. Barometric Pressure, kPa	Record	<i>BAP_RD01</i>	<i>BAP_RD02</i>	<i>BAP_RD03</i>	<i>BAP_RD04</i>	<i>BAP_RD05</i>

<sup>A</sup> Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.11 General Parameter Summary

**SEQUENCE VIB  
FORM 12  
GENERAL PARAMETER SUMMARY**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>		
Test Number				
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>	Runs on Engine: <i>ENRUN</i>	
Oil Code: <i>OILCODE</i>				
Formulation/Stand Code: <i>FORM</i>				

**BC After Test Oil**

**General Parameters**

	Spec	Stage				
		1	2	3	4	5
1. Oil Circulation Temperature, °C	Record	<i>OCT_RA01</i>	<i>OCT_RA02</i>	<i>OCT_RA03</i>	<i>OCT_RA04</i>	<i>OCT_RA05</i>
2. Coolant Out Temperature, °C	Record	<i>COT_RA01</i>	<i>COT_RA02</i>	<i>COT_RA03</i>	<i>COT_RA04</i>	<i>COT_RA05</i>
3. Fuel to Flowmeter Temperature, °C	20-32	<i>FFT_RA01</i>	<i>FFT_RA02</i>	<i>FFT_RA03</i>	<i>FFT_RA04</i>	<i>FFT_RA05</i>
4. Delta Fuel to Flowmeter Temp., °C <sup>A</sup>	≤ 4	<i>FFTDRA01</i>	<i>FFTDRA02</i>	<i>FFTDRA03</i>	<i>FFTDRA04</i>	<i>FFTDRA05</i>
5. Test Cell Temperature, °C	Record	<i>TCT_RA01</i>	<i>TCT_RA02</i>	<i>TCT_RA03</i>	<i>TCT_RA04</i>	<i>TCT_RA05</i>
6. Load Cell Temperature, °C	Record	<i>LCT_RA01</i>	<i>LCT_RA02</i>	<i>LCT_RA03</i>	<i>LCT_RA04</i>	<i>LCT_RA05</i>
7. Delta Load Cell Temperature, °C <sup>A</sup>	≤ 12	<i>LCTDRA01</i>	<i>LCTDRA02</i>	<i>LCTDRA03</i>	<i>LCTDRA04</i>	<i>LCTDRA05</i>
8. Oil Heater Temperature, °C	205 max	<i>OHT_RA01</i>	<i>OHT_RA02</i>	<i>OHT_RA03</i>	<i>OHT_RA04</i>	<i>OHT_RA05</i>
9. Intake Air Pressure, kPa	0.05 ± .02	<i>IAP_RA01</i>	<i>IAP_RA02</i>	<i>IAP_RA03</i>	<i>IAP_RA04</i>	<i>IAP_RA05</i>
10. Fuel to Flowmeter Pressure, kPa	100 min	<i>FFP_RA01</i>	<i>FFP_RA02</i>	<i>FFP_RA03</i>	<i>FFP_RA04</i>	<i>FFP_RA05</i>
11. Fuel to Fuel Rail Pressure, kPa	205 - 310	<i>FFRPRA01</i>	<i>FFRPRA02</i>	<i>FFRPRA03</i>	<i>FFRPRA04</i>	<i>FFRPRA05</i>
12. Intake Manifold Pressure, kPa abs.	Record	<i>IMP_RA01</i>	<i>IMP_RA02</i>	<i>IMP_RA03</i>	<i>IMP_RA04</i>	<i>IMP_RA05</i>
13. Engine Oil Pressure, kPa	Record	<i>EOP_RA01</i>	<i>EOP_RA02</i>	<i>EOP_RA03</i>	<i>EOP_RA04</i>	<i>EOP_RA05</i>
14. Coolant Flow, L/min	130 ± 4	<i>CFLORA01</i>	<i>CFLORA02</i>	<i>CFLORA03</i>	<i>CFLORA04</i>	<i>CFLORA05</i>
15. Intake Air Humidity, grains/kg	11.4 ± 0.8	<i>IAH_RA01</i>	<i>IAH_RA02</i>	<i>IAH_RA03</i>	<i>IAH_RA04</i>	<i>IAH_RA05</i>
16. Crankcase Pressure, kPa	0.00 ± 0.25	<i>CCV_RA01</i>	<i>CCV_RA02</i>	<i>CCV_RA03</i>	<i>CCV_RA04</i>	<i>CCV_RA05</i>
17. Barometric Pressure, kPa	Record	<i>BAP_RA01</i>	<i>BAP_RA02</i>	<i>BAP_RA03</i>	<i>BAP_RA04</i>	<i>BAP_RA05</i>
<sup>A</sup> Difference between the maximum stage average reading of the entire test and the individual stage average readings						

Fig. A7.12 General Parameter Summary

**SEQUENCE VIB**  
**FORM 13**  
**CRITICAL PARAMETER SUMMARY- STAGE 1**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>	
Test Number			
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>	Runs on Engine: <i>ENRUN</i>
Oil Code: <i>OILCODE</i>			
Formulation/Stand Code: <i>FORM</i>			

**BC Before Test Oil**

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 125 ± 1	Coolant In Temp, °C 105 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RB11</i>	<i>RPM_RB11</i>	<i>LOADRB11</i>	<i>OGT_RB11</i>	<i>CINTRB11</i>	<i>IAT_RB11</i>	<i>FRT_RB11</i>	<i>EBP_RB11</i>	<i>FCR_RB11</i>	<i>AFR_RB11</i>	
2	<i>BFC_RB12</i>	<i>RPM_RB12</i>	<i>LOADRB12</i>	<i>OGT_RB12</i>	<i>CINTRB12</i>	<i>IAT_RB12</i>	<i>FRT_RB12</i>	<i>EBP_RB12</i>	<i>FCR_RB12</i>	<i>AFR_RB12</i>	
3	<i>BFC_RB13</i>	<i>RPM_RB13</i>	<i>LOADRB13</i>	<i>OGT_RB13</i>	<i>CINTRB13</i>	<i>IAT_RB13</i>	<i>FRT_RB13</i>	<i>EBP_RB13</i>	<i>FCR_RB13</i>	<i>AFR_RB13</i>	
4	<i>BFC_RB14</i>	<i>RPM_RB14</i>	<i>LOADRB14</i>	<i>OGT_RB14</i>	<i>CINTRB14</i>	<i>IAT_RB14</i>	<i>FRT_RB14</i>	<i>EBP_RB14</i>	<i>FCR_RB14</i>	<i>AFR_RB14</i>	
5	<i>BFC_RB15</i>	<i>RPM_RB15</i>	<i>LOADRB15</i>	<i>OGT_RB15</i>	<i>CINTRB15</i>	<i>IAT_RB15</i>	<i>FRT_RB15</i>	<i>EBP_RB15</i>	<i>FCR_RB15</i>	<i>AFR_RB15</i>	
6	<i>BFC_RB16</i>	<i>RPM_RB16</i>	<i>LOADRB16</i>	<i>OGT_RB16</i>	<i>CINTRB16</i>	<i>IAT_RB16</i>	<i>FRT_RB16</i>	<i>EBP_RB16</i>	<i>FCR_RB16</i>	<i>AFR_RB16</i>	
AVG.	<i>BFCARB1A</i>	<i>RPM_RB1A</i>	<i>LOADRB1A</i>	<i>OGT_RB1A</i>	<i>CINTRB1A</i>	<i>IAT_RB1A</i>	<i>FRT_RB1A</i>	<i>EBP_RB1A</i>	<i>FCR_RB1A</i>	<i>AFR_RB1A</i>	<i>AFRDRB1A</i>
SD	<i>BFCSRB1A</i>										
C.V.	<i>BFCRB1A</i>										

**Test Oil Phase I**

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 125 ± 1	Coolant In Temp, °C 105 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RC11</i>	<i>RPM_RC11</i>	<i>LOADRC11</i>	<i>OGT_RC11</i>	<i>CINTRC11</i>	<i>IAT_RC11</i>	<i>FRT_RC11</i>	<i>EBP_RC11</i>	<i>FCR_RC11</i>	<i>AFR_RC11</i>	
2	<i>BFC_RC12</i>	<i>RPM_RC12</i>	<i>LOADRC12</i>	<i>OGT_RC12</i>	<i>CINTRC12</i>	<i>IAT_RC12</i>	<i>FRT_RC12</i>	<i>EBP_RC12</i>	<i>FCR_RC12</i>	<i>AFR_RC12</i>	
3	<i>BFC_RC13</i>	<i>RPM_RC13</i>	<i>LOADRC13</i>	<i>OGT_RC13</i>	<i>CINTRC13</i>	<i>IAT_RC13</i>	<i>FRT_RC13</i>	<i>EBP_RC13</i>	<i>FCR_RC13</i>	<i>AFR_RC13</i>	
4	<i>BFC_RC14</i>	<i>RPM_RC14</i>	<i>LOADRC14</i>	<i>OGT_RC14</i>	<i>CINTRC14</i>	<i>IAT_RC14</i>	<i>FRT_RC14</i>	<i>EBP_RC14</i>	<i>FCR_RC14</i>	<i>AFR_RC14</i>	
5	<i>BFC_RC15</i>	<i>RPM_RC15</i>	<i>LOADRC15</i>	<i>OGT_RC15</i>	<i>CINTRC15</i>	<i>IAT_RC15</i>	<i>FRT_RC15</i>	<i>EBP_RC15</i>	<i>FCR_RC15</i>	<i>AFR_RC15</i>	
6	<i>BFC_RC16</i>	<i>RPM_RC16</i>	<i>LOADRC16</i>	<i>OGT_RC16</i>	<i>CINTRC16</i>	<i>IAT_RC16</i>	<i>FRT_RC16</i>	<i>EBP_RC16</i>	<i>FCR_RC16</i>	<i>AFR_RC16</i>	
AVG.	<i>BFCARC1A</i>	<i>RPM_RC1A</i>	<i>LOADRC1A</i>	<i>OGT_RC1A</i>	<i>CINTRC1A</i>	<i>IAT_RC1A</i>	<i>FRT_RC1A</i>	<i>EBP_RC1A</i>	<i>FCR_RC1A</i>	<i>AFR_RC1A</i>	<i>AFRDRC1A</i>
SD	<i>BFCSRC1A</i>										
C.V.	<i>BFCRC1A</i>										

<sup>A</sup> Difference between the maximum stage average reading of the entire test and the individual stage average readings.

Fig. A7.13 Critical Parameter Summary - Stage 1

**SEQUENCE VIB**  
**FORM 13A**  
**CRITICAL PARAMETER SUMMARY- STAGE 1**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>
Test Number		
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>
Oil Code: <i>OILCODE</i>		
Formulation/Stand Code: <i>FORM</i>		

**Test Oil Phase II**

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 125 ± 1	Coolant In Temp, °C 105 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR < .50 <sup>A</sup>
1	<i>BFC_RD11</i>	<i>RPM_RD11</i>	<i>LOADRD11</i>	<i>OGT_RD11</i>	<i>CINTRD11</i>	<i>IAT_RD11</i>	<i>FRT_RD11</i>	<i>EBP_RD11</i>	<i>FCR_RD11</i>	<i>AFR_RD11</i>	
2	<i>BFC_RD12</i>	<i>RPM_RD12</i>	<i>LOADRD12</i>	<i>OGT_RD12</i>	<i>CINTRD12</i>	<i>IAT_RD12</i>	<i>FRT_RD12</i>	<i>EBP_RD12</i>	<i>FCR_RD12</i>	<i>AFR_RD12</i>	
3	<i>BFC_RD13</i>	<i>RPM_RD13</i>	<i>LOADRD13</i>	<i>OGT_RD13</i>	<i>CINTRD13</i>	<i>IAT_RD13</i>	<i>FRT_RD13</i>	<i>EBP_RD13</i>	<i>FCR_RD13</i>	<i>AFR_RD13</i>	
4	<i>BFC_RD14</i>	<i>RPM_RD14</i>	<i>LOADRD14</i>	<i>OGT_RD14</i>	<i>CINTRD14</i>	<i>IAT_RD14</i>	<i>FRT_RD14</i>	<i>EBP_RD14</i>	<i>FCR_RD14</i>	<i>AFR_RD14</i>	
5	<i>BFC_RD15</i>	<i>RPM_RD15</i>	<i>LOADRD15</i>	<i>OGT_RD15</i>	<i>CINTRD15</i>	<i>IAT_RD15</i>	<i>FRT_RD15</i>	<i>EBP_RD15</i>	<i>FCR_RD15</i>	<i>AFR_RD15</i>	
6	<i>BFC_RD16</i>	<i>RPM_RD16</i>	<i>LOADRD16</i>	<i>OGT_RD16</i>	<i>CINTRD16</i>	<i>IAT_RD16</i>	<i>FRT_RD16</i>	<i>EBP_RD16</i>	<i>FCR_RD16</i>	<i>AFR_RD16</i>	
AVG.	<i>BFCARD1A</i>	<i>RPM_RD1A</i>	<i>LOADRD1A</i>	<i>OGT_RD1A</i>	<i>CINTRD1A</i>	<i>IAT_RD1A</i>	<i>FRT_RD1A</i>	<i>EBP_RD1A</i>	<i>FCR_RD1A</i>	<i>AFR_RD1A</i>	<i>AFRDRD1A</i>
SD	<i>BFCSD1A</i>										
C.V.	<i>BFCRD1A</i>										

**BC After Test Oil**

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 125 ± 1	Coolant In Temp, °C 105 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RA11</i>	<i>RPM_RA11</i>	<i>LOADRA11</i>	<i>OGT_RA11</i>	<i>CINTRA11</i>	<i>IAT_RA11</i>	<i>FRT_RA11</i>	<i>EBP_RA11</i>	<i>FCR_RA11</i>	<i>AFR_RA11</i>	
2	<i>BFC_RA12</i>	<i>RPM_RA12</i>	<i>LOADRA12</i>	<i>OGT_RA12</i>	<i>CINTRA12</i>	<i>IAT_RA12</i>	<i>FRT_RA12</i>	<i>EBP_RA12</i>	<i>FCR_RA12</i>	<i>AFR_RA12</i>	
3	<i>BFC_RA13</i>	<i>RPM_RA13</i>	<i>LOADRA13</i>	<i>OGT_RA13</i>	<i>CINTRA13</i>	<i>IAT_RA13</i>	<i>FRT_RA13</i>	<i>EBP_RA13</i>	<i>FCR_RA13</i>	<i>AFR_RA13</i>	
4	<i>BFC_RA14</i>	<i>RPM_RA14</i>	<i>LOADRA14</i>	<i>OGT_RA14</i>	<i>CINTRA14</i>	<i>IAT_RA14</i>	<i>FRT_RA14</i>	<i>EBP_RA14</i>	<i>FCR_RA14</i>	<i>AFR_RA14</i>	
5	<i>BFC_RA15</i>	<i>RPM_RA15</i>	<i>LOADRA15</i>	<i>OGT_RA15</i>	<i>CINTRA15</i>	<i>IAT_RA15</i>	<i>FRT_RA15</i>	<i>EBP_RA15</i>	<i>FCR_RA15</i>	<i>AFR_RA15</i>	
6	<i>BFC_RA16</i>	<i>RPM_RA16</i>	<i>LOADRA16</i>	<i>OGT_RA16</i>	<i>CINTRA16</i>	<i>IAT_RA16</i>	<i>FRT_RA16</i>	<i>EBP_RA16</i>	<i>FCR_RA16</i>	<i>AFR_RA16</i>	
AVG.	<i>BFCARA1A</i>	<i>RPM_RA1A</i>	<i>LOADRA1A</i>	<i>OGT_RA1A</i>	<i>CINTRA1A</i>	<i>IAT_RA1A</i>	<i>FRT_RA1A</i>	<i>EBP_RA1A</i>	<i>FCR_RA1A</i>	<i>AFR_RA1A</i>	<i>AFRDRA1A</i>
SD	<i>BFCSDRA1A</i>										
C.V.	<i>BFCRA1A</i>										

<sup>A</sup> Difference between the maximum stage average reading of the entire test and the individual stage average readings.

Fig. A7.13A Critical Parameter Summary - Stage 1

**SEQUENCE VIB**  
**FORM 14**  
**CRITICAL PARAMETER SUMMARY- STAGE 2**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>
Test Number		
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>
Oil Code: <i>OILCODE</i>		
Formulation/Stand Code: <i>FORM</i>		

**BC Before Test Oil**

Step SPEC	BSFC kg/kW-h	Speed r/min 800 ± 2	Torque N-m 26 ± .07	Oil Gallery Temp. °C 105 ± 1	Coolant In Temp, °C 95 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RB21</i>	<i>RPM_RB21</i>	<i>LOADRB21</i>	<i>OGT_RB21</i>	<i>CINTRB21</i>	<i>IAT_RB21</i>	<i>FRT_RB21</i>	<i>EBP_RB21</i>	<i>FCR_RB21</i>	<i>AFR_RB21</i>	
2	<i>BFC_RB22</i>	<i>RPM_RB22</i>	<i>LOADRB22</i>	<i>OGT_RB22</i>	<i>CINTRB22</i>	<i>IAT_RB22</i>	<i>FRT_RB22</i>	<i>EBP_RB22</i>	<i>FCR_RB22</i>	<i>AFR_RB22</i>	
3	<i>BFC_RB23</i>	<i>RPM_RB23</i>	<i>LOADRB23</i>	<i>OGT_RB23</i>	<i>CINTRB23</i>	<i>IAT_RB23</i>	<i>FRT_RB23</i>	<i>EBP_RB23</i>	<i>FCR_RB23</i>	<i>AFR_RB23</i>	
4	<i>BFC_RB24</i>	<i>RPM_RB24</i>	<i>LOADRB24</i>	<i>OGT_RB24</i>	<i>CINTRB24</i>	<i>IAT_RB24</i>	<i>FRT_RB24</i>	<i>EBP_RB24</i>	<i>FCR_RB24</i>	<i>AFR_RB24</i>	
5	<i>BFC_RB25</i>	<i>RPM_RB25</i>	<i>LOADRB25</i>	<i>OGT_RB25</i>	<i>CINTRB25</i>	<i>IAT_RB25</i>	<i>FRT_RB25</i>	<i>EBP_RB25</i>	<i>FCR_RB25</i>	<i>AFR_RB25</i>	
6	<i>BFC_RB26</i>	<i>RPM_RB26</i>	<i>LOADRB26</i>	<i>OGT_RB26</i>	<i>CINTRB26</i>	<i>IAT_RB26</i>	<i>FRT_RB26</i>	<i>EBP_RB26</i>	<i>FCR_RB26</i>	<i>AFR_RB26</i>	
AVG.	<i>BFCARB2A</i>	<i>RPM_RB2A</i>	<i>LOADRB2A</i>	<i>OGT_RB2A</i>	<i>CINTRB2A</i>	<i>IAT_RB2A</i>	<i>FRT_RB2A</i>	<i>EBP_RB2A</i>	<i>FCR_RB2A</i>	<i>AFR_RB2A</i>	<i>AFRDRB2A</i>
SD	<i>BFCSRB2A</i>										
C.V.	<i>BFCRB2A</i>										

**Test Oil Phase I**

Step SPEC	BSFC kg/kW-h	Speed r/min 800 ± 2	Torque N-m 26 ± .07	Oil Gallery Temp. °C 105 ± 1	Coolant In Temp, °C 95 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RC21</i>	<i>RPM_RC21</i>	<i>LOADRC21</i>	<i>OGT_RC21</i>	<i>CINTRC21</i>	<i>IAT_RC21</i>	<i>FRT_RC21</i>	<i>EBP_RC21</i>	<i>FCR_RC21</i>	<i>AFR_RC21</i>	
2	<i>BFC_RC22</i>	<i>RPM_RC22</i>	<i>LOADRC22</i>	<i>OGT_RC22</i>	<i>CINTRC22</i>	<i>IAT_RC22</i>	<i>FRT_RC22</i>	<i>EBP_RC22</i>	<i>FCR_RC22</i>	<i>AFR_RC22</i>	
3	<i>BFC_RC23</i>	<i>RPM_RC23</i>	<i>LOADRC23</i>	<i>OGT_RC23</i>	<i>CINTRC23</i>	<i>IAT_RC23</i>	<i>FRT_RC23</i>	<i>EBP_RC23</i>	<i>FCR_RC23</i>	<i>AFR_RC23</i>	
4	<i>BFC_RC24</i>	<i>RPM_RC24</i>	<i>LOADRC24</i>	<i>OGT_RC24</i>	<i>CINTRC24</i>	<i>IAT_RC24</i>	<i>FRT_RC24</i>	<i>EBP_RC24</i>	<i>FCR_RC24</i>	<i>AFR_RC24</i>	
5	<i>BFC_RC25</i>	<i>RPM_RC25</i>	<i>LOADRC25</i>	<i>OGT_RC25</i>	<i>CINTRC25</i>	<i>IAT_RC25</i>	<i>FRT_RC25</i>	<i>EBP_RC25</i>	<i>FCR_RC25</i>	<i>AFR_RC25</i>	
6	<i>BFC_RC26</i>	<i>RPM_RC26</i>	<i>LOADRC26</i>	<i>OGT_RC26</i>	<i>CINTRC26</i>	<i>IAT_RC26</i>	<i>FRT_RC26</i>	<i>EBP_RC26</i>	<i>FCR_RC26</i>	<i>AFR_RC26</i>	
AVG.	<i>BFCARC2A</i>	<i>RPM_RC2A</i>	<i>LOADRC2A</i>	<i>OGT_RC2A</i>	<i>CINTRC2A</i>	<i>IAT_RC2A</i>	<i>FRT_RC2A</i>	<i>EBP_RC2A</i>	<i>FCR_RC2A</i>	<i>AFR_RC2A</i>	<i>AFRDRC2A</i>
SD	<i>BFCSRC2A</i>										
C.V.	<i>BFCRC2A</i>										

<sup>A</sup> Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.14 Critical Parameter Summary - Stage 2

**SEQUENCE VIB  
FORM 14A  
CRITICAL PARAMETER SUMMARY- STAGE 2**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>
Test Number		
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>
Oil Code: <i>OILCODE</i>		
Formulation/Stand Code: <i>FORM</i>		

**Test Oil Phase II**

Step SPEC	BSFC kg/kW-h	Speed r/min 800 ± 2	Torque N-m 26 ± .07	Oil Gallery Temp. °C 105 ± 1	Coolant In Temp, °C 95 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RD21</i>	<i>RPM_RD21</i>	<i>LOADRD21</i>	<i>OGT_RD21</i>	<i>CINTRD21</i>	<i>IAT_RD21</i>	<i>FRT_RD21</i>	<i>EBP_RD21</i>	<i>FCR_RD21</i>	<i>AFR_RD21</i>	
2	<i>BFC_RD22</i>	<i>RPM_RD22</i>	<i>LOADRD22</i>	<i>OGT_RD22</i>	<i>CINTRD22</i>	<i>IAT_RD22</i>	<i>FRT_RD22</i>	<i>EBP_RD22</i>	<i>FCR_RD22</i>	<i>AFR_RD22</i>	
3	<i>BFC_RD23</i>	<i>RPM_RD23</i>	<i>LOADRD23</i>	<i>OGT_RD23</i>	<i>CINTRD23</i>	<i>IAT_RD23</i>	<i>FRT_RD23</i>	<i>EBP_RD23</i>	<i>FCR_RD23</i>	<i>AFR_RD23</i>	
4	<i>BFC_RD24</i>	<i>RPM_RD24</i>	<i>LOADRD24</i>	<i>OGT_RD24</i>	<i>CINTRD24</i>	<i>IAT_RD24</i>	<i>FRT_RD24</i>	<i>EBP_RD24</i>	<i>FCR_RD24</i>	<i>AFR_RD24</i>	
5	<i>BFC_RD25</i>	<i>RPM_RD25</i>	<i>LOADRD25</i>	<i>OGT_RD25</i>	<i>CINTRD25</i>	<i>IAT_RD25</i>	<i>FRT_RD25</i>	<i>EBP_RD25</i>	<i>FCR_RD25</i>	<i>AFR_RD25</i>	
6	<i>BFC_RD26</i>	<i>RPM_RD26</i>	<i>LOADRD26</i>	<i>OGT_RD26</i>	<i>CINTRD26</i>	<i>IAT_RD26</i>	<i>FRT_RD26</i>	<i>EBP_RD26</i>	<i>FCR_RD26</i>	<i>AFR_RD26</i>	
AVG.	<i>BFCARD2A</i>	<i>RPM_RD2A</i>	<i>LOADRD2A</i>	<i>OGT_RD2A</i>	<i>CINTRD2A</i>	<i>IAT_RD2A</i>	<i>FRT_RD2A</i>	<i>EBP_RD2A</i>	<i>FCR_RD2A</i>	<i>AFR_RD2A</i>	<i>AFRDRD2A</i>
SD	<i>BFCSRD2A</i>										
C.V.	<i>BFCRD2A</i>										

**BC After Test Oil**

Step SPEC	BSFC kg/kW-h	Speed r/min 800 ± 2	Torque N-m 26 ± .07	Oil Gallery Temp. °C 105 ± 1	Coolant In Temp, °C 95 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RA21</i>	<i>RPM_RA21</i>	<i>LOADRA21</i>	<i>OGT_RA21</i>	<i>CINTRA21</i>	<i>IAT_RA21</i>	<i>FRT_RA21</i>	<i>EBP_RA21</i>	<i>FCR_RA21</i>	<i>AFR_RA21</i>	
2	<i>BFC_RA22</i>	<i>RPM_RA22</i>	<i>LOADRA22</i>	<i>OGT_RA22</i>	<i>CINTRA22</i>	<i>IAT_RA22</i>	<i>FRT_RA22</i>	<i>EBP_RA22</i>	<i>FCR_RA22</i>	<i>AFR_RA22</i>	
3	<i>BFC_RA23</i>	<i>RPM_RA23</i>	<i>LOADRA23</i>	<i>OGT_RA23</i>	<i>CINTRA23</i>	<i>IAT_RA23</i>	<i>FRT_RA23</i>	<i>EBP_RA23</i>	<i>FCR_RA23</i>	<i>AFR_RA23</i>	
4	<i>BFC_RA24</i>	<i>RPM_RA24</i>	<i>LOADRA24</i>	<i>OGT_RA24</i>	<i>CINTRA24</i>	<i>IAT_RA24</i>	<i>FRT_RA24</i>	<i>EBP_RA24</i>	<i>FCR_RA24</i>	<i>AFR_RA24</i>	
5	<i>BFC_RA25</i>	<i>RPM_RA25</i>	<i>LOADRA25</i>	<i>OGT_RA25</i>	<i>CINTRA25</i>	<i>IAT_RA25</i>	<i>FRT_RA25</i>	<i>EBP_RA25</i>	<i>FCR_RA25</i>	<i>AFR_RA25</i>	
6	<i>BFC_RA26</i>	<i>RPM_RA26</i>	<i>LOADRA26</i>	<i>OGT_RA26</i>	<i>CINTRA26</i>	<i>IAT_RA26</i>	<i>FRT_RA26</i>	<i>EBP_RA26</i>	<i>FCR_RA26</i>	<i>AFR_RA26</i>	
AVG.	<i>BFCARA2A</i>	<i>RPM_RA2A</i>	<i>LOADRA2A</i>	<i>OGT_RA2A</i>	<i>CINTRA2A</i>	<i>IAT_RA2A</i>	<i>FRT_RA2A</i>	<i>EBP_RA2A</i>	<i>FCR_RA2A</i>	<i>AFR_RA2A</i>	<i>AFRDRA2A</i>
SD	<i>BFCSRA2A</i>										
C.V.	<i>BFCRA2A</i>										

<sup>A</sup> Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.14A Critical Parameter Summary - Stage 2



**SEQUENCE VIB**  
**FORM 15**  
**CRITICAL PARAMETER SUMMARY- STAGE 3**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>	
Test Number			
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>	Runs on Engine: <i>ENRUN</i>
Oil Code: <i>OILCODE</i>			
Formulation/Stand Code: <i>FORM</i>			

**BC Before Test Oil**

Step SPEC	BSFC kg/kW-h	Speed r/min 800 ± 2	Torque N-m 26 ± .07	Oil Gallery Temp. °C 70 ± 1	Coolant In Temp, °C 60 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RB31</i>	<i>RPM_RB31</i>	<i>LOADRB31</i>	<i>OGT_RB31</i>	<i>CINTRB31</i>	<i>IAT_RB31</i>	<i>FRT_RB31</i>	<i>EBP_RB31</i>	<i>FCR_RB31</i>	<i>AFR_RB31</i>	
2	<i>BFC_RB32</i>	<i>RPM_RB32</i>	<i>LOADRB32</i>	<i>OGT_RB32</i>	<i>CINTRB32</i>	<i>IAT_RB32</i>	<i>FRT_RB32</i>	<i>EBP_RB32</i>	<i>FCR_RB32</i>	<i>AFR_RB32</i>	
3	<i>BFC_RB33</i>	<i>RPM_RB33</i>	<i>LOADRB33</i>	<i>OGT_RB33</i>	<i>CINTRB33</i>	<i>IAT_RB33</i>	<i>FRT_RB33</i>	<i>EBP_RB33</i>	<i>FCR_RB33</i>	<i>AFR_RB33</i>	
4	<i>BFC_RB34</i>	<i>RPM_RB34</i>	<i>LOADRB34</i>	<i>OGT_RB34</i>	<i>CINTRB34</i>	<i>IAT_RB34</i>	<i>FRT_RB34</i>	<i>EBP_RB34</i>	<i>FCR_RB34</i>	<i>AFR_RB34</i>	
5	<i>BFC_RB35</i>	<i>RPM_RB35</i>	<i>LOADRB35</i>	<i>OGT_RB35</i>	<i>CINTRB35</i>	<i>IAT_RB35</i>	<i>FRT_RB35</i>	<i>EBP_RB35</i>	<i>FCR_RB35</i>	<i>AFR_RB35</i>	
6	<i>BFC_RB36</i>	<i>RPM_RB36</i>	<i>LOADRB36</i>	<i>OGT_RB36</i>	<i>CINTRB36</i>	<i>IAT_RB36</i>	<i>FRT_RB36</i>	<i>EBP_RB36</i>	<i>FCR_RB36</i>	<i>AFR_RB36</i>	
AVG.	<i>BFCARB3A</i>	<i>RPM_RB3A</i>	<i>LOADRB3A</i>	<i>OGT_RB3A</i>	<i>CINTRB3A</i>	<i>IAT_RB3A</i>	<i>FRT_RB3A</i>	<i>EBP_RB3A</i>	<i>FCR_RB3A</i>	<i>AFR_RB3A</i>	<i>AFRDRB3A</i>
SD	<i>BFCSRB3A</i>										
C.V.	<i>BFCRB3A</i>										

**Test Oil Phase I**

Step SPEC	BSFC kg/kW-h	Speed r/min 800 ± 2	Torque N-m 26 ± .07	Oil Gallery Temp. °C 70 ± 1	Coolant In Temp, °C 60 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RC31</i>	<i>RPM_RC31</i>	<i>LOADRC31</i>	<i>OGT_RC31</i>	<i>CINTRC31</i>	<i>IAT_RC31</i>	<i>FRT_RC31</i>	<i>EBP_RC31</i>	<i>FCR_RC31</i>	<i>AFR_RC31</i>	
2	<i>BFC_RC32</i>	<i>RPM_RC32</i>	<i>LOADRC32</i>	<i>OGT_RC32</i>	<i>CINTRC32</i>	<i>IAT_RC32</i>	<i>FRT_RC32</i>	<i>EBP_RC32</i>	<i>FCR_RC32</i>	<i>AFR_RC32</i>	
3	<i>BFC_RC33</i>	<i>RPM_RC33</i>	<i>LOADRC33</i>	<i>OGT_RC33</i>	<i>CINTRC33</i>	<i>IAT_RC33</i>	<i>FRT_RC33</i>	<i>EBP_RC33</i>	<i>FCR_RC33</i>	<i>AFR_RC33</i>	
4	<i>BFC_RC34</i>	<i>RPM_RC34</i>	<i>LOADRC34</i>	<i>OGT_RC34</i>	<i>CINTRC34</i>	<i>IAT_RC34</i>	<i>FRT_RC34</i>	<i>EBP_RC34</i>	<i>FCR_RC34</i>	<i>AFR_RC34</i>	
5	<i>BFC_RC35</i>	<i>RPM_RC35</i>	<i>LOADRC35</i>	<i>OGT_RC35</i>	<i>CINTRC35</i>	<i>IAT_RC35</i>	<i>FRT_RC35</i>	<i>EBP_RC35</i>	<i>FCR_RC35</i>	<i>AFR_RC35</i>	
6	<i>BFC_RC36</i>	<i>RPM_RC36</i>	<i>LOADRC36</i>	<i>OGT_RC36</i>	<i>CINTRC36</i>	<i>IAT_RC36</i>	<i>FRT_RC36</i>	<i>EBP_RC36</i>	<i>FCR_RC36</i>	<i>AFR_RC36</i>	
AVG.	<i>BFCARC3A</i>	<i>RPM_RC3A</i>	<i>LOADRC3A</i>	<i>OGT_RC3A</i>	<i>CINTRC3A</i>	<i>IAT_RC3A</i>	<i>FRT_RC3A</i>	<i>EBP_RC3A</i>	<i>FCR_RC3A</i>	<i>AFR_RC3A</i>	<i>AFRDRC3A</i>
SD	<i>BFCSRC3A</i>										
C.V.	<i>BFCRC3A</i>										

<sup>A</sup> Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.15 Critical Parameter Summary - Stage 3

**SEQUENCE VIB  
FORM 15A  
CRITICAL PARAMETER SUMMARY- STAGE 3**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>	
Test Number			
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>	Runs on Engine: <i>ENRUN</i>
Oil Code: <i>OILCODE</i>			
Formulation/Stand Code: <i>FORM</i>			

**Test Oil Phase II**

Step SPEC	BSFC kg/kW-h	Speed r/min 800 ± 2	Torque N-m 26 ± .07	Oil Gallery Temp. °C 70 ± 1	Coolant In Temp, °C 60 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RD31</i>	<i>RPM_RD31</i>	<i>LOADRD31</i>	<i>OGT_RD31</i>	<i>CINTRD31</i>	<i>IAT_RD31</i>	<i>FRT_RD31</i>	<i>EBP_RD31</i>	<i>FCR_RD31</i>	<i>AFR_RD31</i>	
2	<i>BFC_RD32</i>	<i>RPM_RD32</i>	<i>LOADRD32</i>	<i>OGT_RD32</i>	<i>CINTRD32</i>	<i>IAT_RD32</i>	<i>FRT_RD32</i>	<i>EBP_RD32</i>	<i>FCR_RD32</i>	<i>AFR_RD32</i>	
3	<i>BFC_RD33</i>	<i>RPM_RD33</i>	<i>LOADRD33</i>	<i>OGT_RD33</i>	<i>CINTRD33</i>	<i>IAT_RD33</i>	<i>FRT_RD33</i>	<i>EBP_RD33</i>	<i>FCR_RD33</i>	<i>AFR_RD33</i>	
4	<i>BFC_RD34</i>	<i>RPM_RD34</i>	<i>LOADRD34</i>	<i>OGT_RD34</i>	<i>CINTRD34</i>	<i>IAT_RD34</i>	<i>FRT_RD34</i>	<i>EBP_RD34</i>	<i>FCR_RD34</i>	<i>AFR_RD34</i>	
5	<i>BFC_RD35</i>	<i>RPM_RD35</i>	<i>LOADRD35</i>	<i>OGT_RD35</i>	<i>CINTRD35</i>	<i>IAT_RD35</i>	<i>FRT_RD35</i>	<i>EBP_RD35</i>	<i>FCR_RD35</i>	<i>AFR_RD35</i>	
6	<i>BFC_RD36</i>	<i>RPM_RD36</i>	<i>LOADRD36</i>	<i>OGT_RD36</i>	<i>CINTRD36</i>	<i>IAT_RD36</i>	<i>FRT_RD36</i>	<i>EBP_RD36</i>	<i>FCR_RD36</i>	<i>AFR_RD36</i>	
AVG.	<i>BFCARD3A</i>	<i>RPM_RD3A</i>	<i>LOADRD3A</i>	<i>OGT_RD3A</i>	<i>CINTRD3A</i>	<i>IAT_RD3A</i>	<i>FRT_RD3A</i>	<i>EBP_RD3A</i>	<i>FCR_RD3A</i>	<i>AFR_RD3A</i>	<i>AFRDRD3A</i>
SD	<i>BFCSRD3A</i>										
C.V.	<i>BFCARD3A</i>										

**BC After Test Oil**

Step SPEC	BSFC kg/kW-h	Speed r/min 800 ± 2	Torque N-m 26 ± .07	Oil Gallery Temp. °C 70 ± 1	Coolant In Temp, °C 60 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RA31</i>	<i>RPM_RA31</i>	<i>LOADRA31</i>	<i>OGT_RA31</i>	<i>CINTRA31</i>	<i>IAT_RA31</i>	<i>FRT_RA31</i>	<i>EBP_RA31</i>	<i>FCR_RA31</i>	<i>AFR_RA31</i>	
2	<i>BFC_RA32</i>	<i>RPM_RA32</i>	<i>LOADRA32</i>	<i>OGT_RA32</i>	<i>CINTRA32</i>	<i>IAT_RA32</i>	<i>FRT_RA32</i>	<i>EBP_RA32</i>	<i>FCR_RA32</i>	<i>AFR_RA32</i>	
3	<i>BFC_RA33</i>	<i>RPM_RA33</i>	<i>LOADRA33</i>	<i>OGT_RA33</i>	<i>CINTRA33</i>	<i>IAT_RA33</i>	<i>FRT_RA33</i>	<i>EBP_RA33</i>	<i>FCR_RA33</i>	<i>AFR_RA33</i>	
4	<i>BFC_RA34</i>	<i>RPM_RA34</i>	<i>LOADRA34</i>	<i>OGT_RA34</i>	<i>CINTRA34</i>	<i>IAT_RA34</i>	<i>FRT_RA34</i>	<i>EBP_RA34</i>	<i>FCR_RA34</i>	<i>AFR_RA34</i>	
5	<i>BFC_RA35</i>	<i>RPM_RA35</i>	<i>LOADRA35</i>	<i>OGT_RA35</i>	<i>CINTRA35</i>	<i>IAT_RA35</i>	<i>FRT_RA35</i>	<i>EBP_RA35</i>	<i>FCR_RA35</i>	<i>AFR_RA35</i>	
6	<i>BFC_RA36</i>	<i>RPM_RA36</i>	<i>LOADRA36</i>	<i>OGT_RA36</i>	<i>CINTRA36</i>	<i>IAT_RA36</i>	<i>FRT_RA36</i>	<i>EBP_RA36</i>	<i>FCR_RA36</i>	<i>AFR_RA36</i>	
AVG.	<i>BFCARA3A</i>	<i>RPM_RA3A</i>	<i>LOADRA3A</i>	<i>OGT_RA3A</i>	<i>CINTRA3A</i>	<i>IAT_RA3A</i>	<i>FRT_RA3A</i>	<i>EBP_RA3A</i>	<i>FCR_RA3A</i>	<i>AFR_RA3A</i>	<i>AFRDRA3A</i>
SD	<i>BFCSRA3A</i>										
C.V.	<i>BFCARA3A</i>										

<sup>A</sup> Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.15A Critical Parameter Summary - Stage 3

**SEQUENCE VIB**  
**FORM 16**  
**CRITICAL PARAMETER SUMMARY- STAGE 4**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>
Test Number		
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>
Oil Code: <i>OILCODE</i>		
Formulation/Stand Code: <i>FORM</i>		

**BC Before Test Oil**

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 70 ± 1	Coolant In Temp, °C 60 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RB41</i>	<i>RPM_RB41</i>	<i>LOADRB41</i>	<i>OGT_RB41</i>	<i>CINTRB41</i>	<i>IAT_RB41</i>	<i>FRT_RB41</i>	<i>EBP_RB41</i>	<i>FCR_RB41</i>	<i>AFR_RB41</i>	
2	<i>BFC_RB42</i>	<i>RPM_RB42</i>	<i>LOADRB42</i>	<i>OGT_RB42</i>	<i>CINTRB42</i>	<i>IAT_RB42</i>	<i>FRT_RB42</i>	<i>EBP_RB42</i>	<i>FCR_RB42</i>	<i>AFR_RB42</i>	
3	<i>BFC_RB43</i>	<i>RPM_RB43</i>	<i>LOADRB43</i>	<i>OGT_RB43</i>	<i>CINTRB43</i>	<i>IAT_RB43</i>	<i>FRT_RB43</i>	<i>EBP_RB43</i>	<i>FCR_RB43</i>	<i>AFR_RB43</i>	
4	<i>BFC_RB44</i>	<i>RPM_RB44</i>	<i>LOADRB44</i>	<i>OGT_RB44</i>	<i>CINTRB44</i>	<i>IAT_RB44</i>	<i>FRT_RB44</i>	<i>EBP_RB44</i>	<i>FCR_RB44</i>	<i>AFR_RB44</i>	
5	<i>BFC_RB45</i>	<i>RPM_RB45</i>	<i>LOADRB45</i>	<i>OGT_RB45</i>	<i>CINTRB45</i>	<i>IAT_RB45</i>	<i>FRT_RB45</i>	<i>EBP_RB45</i>	<i>FCR_RB45</i>	<i>AFR_RB45</i>	
6	<i>BFC_RB46</i>	<i>RPM_RB46</i>	<i>LOADRB46</i>	<i>OGT_RB46</i>	<i>CINTRB46</i>	<i>IAT_RB46</i>	<i>FRT_RB46</i>	<i>EBP_RB46</i>	<i>FCR_RB46</i>	<i>AFR_RB46</i>	
AVG.	<i>BFCARB4A</i>	<i>RPM_RB4A</i>	<i>LOADRB4A</i>	<i>OGT_RB4A</i>	<i>CINTRB4A</i>	<i>IAT_RB4A</i>	<i>FRT_RB4A</i>	<i>EBP_RB4A</i>	<i>FCR_RB4A</i>	<i>AFR_RB4A</i>	<i>AFRDRB4A</i>
SD	<i>BFCSRB4A</i>										
C.V.	<i>BFC CRB4A</i>										

**Test Oil Phase I**

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 70 ± 1	Coolant In Temp, °C 60 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RC41</i>	<i>RPM_RC41</i>	<i>LOADRC41</i>	<i>OGT_RC41</i>	<i>CINTRC41</i>	<i>IAT_RC41</i>	<i>FRT_RC41</i>	<i>EBP_RC41</i>	<i>FCR_RC41</i>	<i>AFR_RC41</i>	
2	<i>BFC_RC42</i>	<i>RPM_RC42</i>	<i>LOADRC42</i>	<i>OGT_RC42</i>	<i>CINTRC42</i>	<i>IAT_RC42</i>	<i>FRT_RC42</i>	<i>EBP_RC42</i>	<i>FCR_RC42</i>	<i>AFR_RC42</i>	
3	<i>BFC_RC43</i>	<i>RPM_RC43</i>	<i>LOADRC43</i>	<i>OGT_RC43</i>	<i>CINTRC43</i>	<i>IAT_RC43</i>	<i>FRT_RC43</i>	<i>EBP_RC43</i>	<i>FCR_RC43</i>	<i>AFR_RC43</i>	
4	<i>BFC_RC44</i>	<i>RPM_RC44</i>	<i>LOADRC44</i>	<i>OGT_RC44</i>	<i>CINTRC44</i>	<i>IAT_RC44</i>	<i>FRT_RC44</i>	<i>EBP_RC44</i>	<i>FCR_RC44</i>	<i>AFR_RC44</i>	
5	<i>BFC_RC45</i>	<i>RPM_RC45</i>	<i>LOADRC45</i>	<i>OGT_RC45</i>	<i>CINTRC45</i>	<i>IAT_RC45</i>	<i>FRT_RC45</i>	<i>EBP_RC45</i>	<i>FCR_RC45</i>	<i>AFR_RC45</i>	
6	<i>BFC_RC46</i>	<i>RPM_RC46</i>	<i>LOADRC46</i>	<i>OGT_RC46</i>	<i>CINTRC46</i>	<i>IAT_RC46</i>	<i>FRT_RC46</i>	<i>EBP_RC46</i>	<i>FCR_RC46</i>	<i>AFR_RC46</i>	
AVG.	<i>BFCARC4A</i>	<i>RPM_RC4A</i>	<i>LOADRC4A</i>	<i>OGT_RC4A</i>	<i>CINTRC4A</i>	<i>IAT_RC4A</i>	<i>FRT_RC4A</i>	<i>EBP_RC4A</i>	<i>FCR_RC4A</i>	<i>AFR_RC4A</i>	<i>AFRDRC4A</i>
SD	<i>BFC SRC4A</i>										
C.V.	<i>BFC CRC4A</i>										

<sup>A</sup> Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.16 Critical Parameter Summary - Stage 4

**SEQUENCE VIB  
FORM 16A  
CRITICAL PARAMETER SUMMARY- STAGE 4**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>
Test Number		
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>
Oil Code: <i>OILCODE</i>		
Formulation/Stand Code: <i>FORM</i>		

**Test Oil Phase II**

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 70 ± 1	Coolant In Temp, °C 60 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RD41</i>	<i>RPM_RD41</i>	<i>LOADRD41</i>	<i>OGT_RD41</i>	<i>CINTRD41</i>	<i>IAT_RD41</i>	<i>FRT_RD41</i>	<i>EBP_RD41</i>	<i>FCR_RD41</i>	<i>AFR_RD41</i>	
2	<i>BFC_RD42</i>	<i>RPM_RD42</i>	<i>LOADRD42</i>	<i>OGT_RD42</i>	<i>CINTRD42</i>	<i>IAT_RD42</i>	<i>FRT_RD42</i>	<i>EBP_RD42</i>	<i>FCR_RD42</i>	<i>AFR_RD42</i>	
3	<i>BFC_RD43</i>	<i>RPM_RD43</i>	<i>LOADRD43</i>	<i>OGT_RD43</i>	<i>CINTRD43</i>	<i>IAT_RD43</i>	<i>FRT_RD43</i>	<i>EBP_RD43</i>	<i>FCR_RD43</i>	<i>AFR_RD43</i>	
4	<i>BFC_RD44</i>	<i>RPM_RD44</i>	<i>LOADRD44</i>	<i>OGT_RD44</i>	<i>CINTRD44</i>	<i>IAT_RD44</i>	<i>FRT_RD44</i>	<i>EBP_RD44</i>	<i>FCR_RD44</i>	<i>AFR_RD44</i>	
5	<i>BFC_RD45</i>	<i>RPM_RD45</i>	<i>LOADRD45</i>	<i>OGT_RD45</i>	<i>CINTRD45</i>	<i>IAT_RD45</i>	<i>FRT_RD45</i>	<i>EBP_RD45</i>	<i>FCR_RD45</i>	<i>AFR_RD45</i>	
6	<i>BFC_RD46</i>	<i>RPM_RD46</i>	<i>LOADRD46</i>	<i>OGT_RD46</i>	<i>CINTRD46</i>	<i>IAT_RD46</i>	<i>FRT_RD46</i>	<i>EBP_RD46</i>	<i>FCR_RD46</i>	<i>AFR_RD46</i>	
AVG.	<i>BFCARD4A</i>	<i>RPM_RD4A</i>	<i>LOADRD4A</i>	<i>OGT_RD4A</i>	<i>CINTRD4A</i>	<i>IAT_RD4A</i>	<i>FRT_RD4A</i>	<i>EBP_RD4A</i>	<i>FCR_RD4A</i>	<i>AFR_RD4A</i>	<i>AFRDRD4A</i>
SD	<i>BFCSRD4A</i>										
C.V.	<i>BFCRD4A</i>										

**BC After Test Oil**

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 70 ± 1	Coolant In Temp, °C 60 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RA41</i>	<i>RPM_RA41</i>	<i>LOADRA41</i>	<i>OGT_RA41</i>	<i>CINTRA41</i>	<i>IAT_RA41</i>	<i>FRT_RA41</i>	<i>EBP_RA41</i>	<i>FCR_RA41</i>	<i>AFR_RA41</i>	
2	<i>BFC_RA42</i>	<i>RPM_RA42</i>	<i>LOADRA42</i>	<i>OGT_RA42</i>	<i>CINTRA42</i>	<i>IAT_RA42</i>	<i>FRT_RA42</i>	<i>EBP_RA42</i>	<i>FCR_RA42</i>	<i>AFR_RA42</i>	
3	<i>BFC_RA43</i>	<i>RPM_RA43</i>	<i>LOADRA43</i>	<i>OGT_RA43</i>	<i>CINTRA43</i>	<i>IAT_RA43</i>	<i>FRT_RA43</i>	<i>EBP_RA43</i>	<i>FCR_RA43</i>	<i>AFR_RA43</i>	
4	<i>BFC_RA44</i>	<i>RPM_RA44</i>	<i>LOADRA44</i>	<i>OGT_RA44</i>	<i>CINTRA44</i>	<i>IAT_RA44</i>	<i>FRT_RA44</i>	<i>EBP_RA44</i>	<i>FCR_RA44</i>	<i>AFR_RA44</i>	
5	<i>BFC_RA45</i>	<i>RPM_RA45</i>	<i>LOADRA45</i>	<i>OGT_RA45</i>	<i>CINTRA45</i>	<i>IAT_RA45</i>	<i>FRT_RA45</i>	<i>EBP_RA45</i>	<i>FCR_RA45</i>	<i>AFR_RA45</i>	
6	<i>BFC_RA46</i>	<i>RPM_RA46</i>	<i>LOADRA46</i>	<i>OGT_RA46</i>	<i>CINTRA46</i>	<i>IAT_RA46</i>	<i>FRT_RA46</i>	<i>EBP_RA46</i>	<i>FCR_RA46</i>	<i>AFR_RA46</i>	
AVG.	<i>BFCARA4A</i>	<i>RPM_RA4A</i>	<i>LOADRA4A</i>	<i>OGT_RA4A</i>	<i>CINTRA4A</i>	<i>IAT_RA4A</i>	<i>FRT_RA4A</i>	<i>EBP_RA4A</i>	<i>FCR_RA4A</i>	<i>AFR_RA4A</i>	<i>AFRDRA4A</i>
SD	<i>BFCSRA4A</i>										
C.V.	<i>BFCRA4A</i>										

<sup>A</sup> Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.16A Critical Parameter Summary - Stage 4

**SEQUENCE VIB**  
**FORM 17**  
**CRITICAL PARAMETER SUMMARY- STAGE 5**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>	
Test Number			
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>	Runs on Engine: <i>ENRUN</i>
Oil Code: <i>OILCODE</i>			
Formulation/Stand Code: <i>FORM</i>			

**BC Before Test Oil**

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 45 ± 1	Coolant In Temp, °C 45 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RB51</i>	<i>RPM_RB51</i>	<i>LOADRB51</i>	<i>OGT_RB51</i>	<i>CINTRB51</i>	<i>IAT_RB51</i>	<i>FRT_RB51</i>	<i>EBP_RB51</i>	<i>FCR_RB51</i>	<i>AFR_RB51</i>	
2	<i>BFC_RB52</i>	<i>RPM_RB52</i>	<i>LOADRB52</i>	<i>OGT_RB52</i>	<i>CINTRB52</i>	<i>IAT_RB52</i>	<i>FRT_RB52</i>	<i>EBP_RB52</i>	<i>FCR_RB52</i>	<i>AFR_RB52</i>	
3	<i>BFC_RB53</i>	<i>RPM_RB53</i>	<i>LOADRB53</i>	<i>OGT_RB53</i>	<i>CINTRB53</i>	<i>IAT_RB53</i>	<i>FRT_RB53</i>	<i>EBP_RB53</i>	<i>FCR_RB53</i>	<i>AFR_RB53</i>	
4	<i>BFC_RB54</i>	<i>RPM_RB54</i>	<i>LOADRB54</i>	<i>OGT_RB54</i>	<i>CINTRB54</i>	<i>IAT_RB54</i>	<i>FRT_RB54</i>	<i>EBP_RB54</i>	<i>FCR_RB54</i>	<i>AFR_RB54</i>	
5	<i>BFC_RB55</i>	<i>RPM_RB55</i>	<i>LOADRB55</i>	<i>OGT_RB55</i>	<i>CINTRB55</i>	<i>IAT_RB55</i>	<i>FRT_RB55</i>	<i>EBP_RB55</i>	<i>FCR_RB55</i>	<i>AFR_RB55</i>	
6	<i>BFC_RB56</i>	<i>RPM_RB56</i>	<i>LOADRB56</i>	<i>OGT_RB56</i>	<i>CINTRB56</i>	<i>IAT_RB56</i>	<i>FRT_RB56</i>	<i>EBP_RB56</i>	<i>FCR_RB56</i>	<i>AFR_RB56</i>	
AVG.	<i>BFCARB5A</i>	<i>RPM_RB5A</i>	<i>LOADRB5A</i>	<i>OGT_RB5A</i>	<i>CINTRB5A</i>	<i>IAT_RB5A</i>	<i>FRT_RB5A</i>	<i>EBP_RB5A</i>	<i>FCR_RB5A</i>	<i>AFR_RB5A</i>	<i>AFRDRB5A</i>
SD	<i>BFCSRB5A</i>										
C.V.	<i>BFC CRB5A</i>										

**Test Oil Phase I**

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 45 ± 1	Coolant In Temp, °C 45 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RC51</i>	<i>RPM_RC51</i>	<i>LOADRC51</i>	<i>OGT_RC51</i>	<i>CINTRC51</i>	<i>IAT_RC51</i>	<i>FRT_RC51</i>	<i>EBP_RC51</i>	<i>FCR_RC51</i>	<i>AFR_RC51</i>	
2	<i>BFC_RC52</i>	<i>RPM_RC52</i>	<i>LOADRC52</i>	<i>OGT_RC52</i>	<i>CINTRC52</i>	<i>IAT_RC52</i>	<i>FRT_RC52</i>	<i>EBP_RC52</i>	<i>FCR_RC52</i>	<i>AFR_RC52</i>	
3	<i>BFC_RC53</i>	<i>RPM_RC53</i>	<i>LOADRC53</i>	<i>OGT_RC53</i>	<i>CINTRC53</i>	<i>IAT_RC53</i>	<i>FRT_RC53</i>	<i>EBP_RC53</i>	<i>FCR_RC53</i>	<i>AFR_RC53</i>	
4	<i>BFC_RC54</i>	<i>RPM_RC54</i>	<i>LOADRC54</i>	<i>OGT_RC54</i>	<i>CINTRC54</i>	<i>IAT_RC54</i>	<i>FRT_RC54</i>	<i>EBP_RC54</i>	<i>FCR_RC54</i>	<i>AFR_RC54</i>	
5	<i>BFC_RC55</i>	<i>RPM_RC55</i>	<i>LOADRC55</i>	<i>OGT_RC55</i>	<i>CINTRC55</i>	<i>IAT_RC55</i>	<i>FRT_RC55</i>	<i>EBP_RC55</i>	<i>FCR_RC55</i>	<i>AFR_RC55</i>	
6	<i>BFC_RC56</i>	<i>RPM_RC56</i>	<i>LOADRC56</i>	<i>OGT_RC56</i>	<i>CINTRC56</i>	<i>IAT_RC56</i>	<i>FRT_RC56</i>	<i>EBP_RC56</i>	<i>FCR_RC56</i>	<i>AFR_RC56</i>	
AVG.	<i>BFCARC5A</i>	<i>RPM_RC5A</i>	<i>LOADRC5A</i>	<i>OGT_RC5A</i>	<i>CINTRC5A</i>	<i>IAT_RC5A</i>	<i>FRT_RC5A</i>	<i>EBP_RC5A</i>	<i>FCR_RC5A</i>	<i>AFR_RC5A</i>	<i>AFRDRC5A</i>
SD	<i>BFC SRC5A</i>										
C.V.	<i>BFC CR5A</i>										

<sup>A</sup> Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.17 Critical Parameter Summary - Stage 5

**SEQUENCE VIB  
FORM 17A  
CRITICAL PARAMETER SUMMARY- STAGE 5**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTTIME</i>
Test Number		
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>
Oil Code: <i>OILCODE</i>		
Formulation/Stand Code: <i>FORM</i>		

**Test Oil Phase II**

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 45 ± 1	Coolant In Temp, °C 45 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RD51</i>	<i>RPM_RD51</i>	<i>LOADRD51</i>	<i>OGT_RD51</i>	<i>CINTRD51</i>	<i>IAT_RD51</i>	<i>FRT_RD51</i>	<i>EBP_RD51</i>	<i>FCR_RD51</i>	<i>AFR_RD51</i>	
2	<i>BFC_RD52</i>	<i>RPM_RD52</i>	<i>LOADRD52</i>	<i>OGT_RD52</i>	<i>CINTRD52</i>	<i>IAT_RD52</i>	<i>FRT_RD52</i>	<i>EBP_RD52</i>	<i>FCR_RD52</i>	<i>AFR_RD52</i>	
3	<i>BFC_RD53</i>	<i>RPM_RD53</i>	<i>LOADRD53</i>	<i>OGT_RD53</i>	<i>CINTRD53</i>	<i>IAT_RD53</i>	<i>FRT_RD53</i>	<i>EBP_RD53</i>	<i>FCR_RD53</i>	<i>AFR_RD53</i>	
4	<i>BFC_RD54</i>	<i>RPM_RD54</i>	<i>LOADRD54</i>	<i>OGT_RD54</i>	<i>CINTRD54</i>	<i>IAT_RD54</i>	<i>FRT_RD54</i>	<i>EBP_RD54</i>	<i>FCR_RD54</i>	<i>AFR_RD54</i>	
5	<i>BFC_RD55</i>	<i>RPM_RD55</i>	<i>LOADRD55</i>	<i>OGT_RD55</i>	<i>CINTRD55</i>	<i>IAT_RD55</i>	<i>FRT_RD55</i>	<i>EBP_RD55</i>	<i>FCR_RD55</i>	<i>AFR_RD55</i>	
6	<i>BFC_RD56</i>	<i>RPM_RD56</i>	<i>LOADRD56</i>	<i>OGT_RD56</i>	<i>CINTRD56</i>	<i>IAT_RD56</i>	<i>FRT_RD56</i>	<i>EBP_RD56</i>	<i>FCR_RD56</i>	<i>AFR_RD56</i>	
AVG.	<i>BFCARD5A</i>	<i>RPM_RD5A</i>	<i>LOADRD5A</i>	<i>OGT_RD5A</i>	<i>CINTRD5A</i>	<i>IAT_RD5A</i>	<i>FRT_RD5A</i>	<i>EBP_RD5A</i>	<i>FCR_RD5A</i>	<i>AFR_RD5A</i>	<i>AFRDRD5A</i>
SD	<i>BFCSRD5A</i>										
C.V.	<i>BFCRD5A</i>										

**BC After Test Oil**

Step SPEC	BSFC kg/kW-h	Speed r/min 1500 ± 2	Torque N-m 98 ± .07	Oil Gallery Temp. °C 45 ± 1	Coolant In Temp, °C 45 ± 1	Intake Air Temp, °C 27 ± 2	Fuel Rail Temp, °C 20 ± 2	EBP kPa 104 ± .17	Fuel Flow kg/h Record	AFR 14.25-15.25	Delta AFR ≤ .50 <sup>A</sup>
1	<i>BFC_RA51</i>	<i>RPM_RA51</i>	<i>LOADRA51</i>	<i>OGT_RA51</i>	<i>CINTRA51</i>	<i>IAT_RA51</i>	<i>FRT_RA51</i>	<i>EBP_RA51</i>	<i>FCR_RA51</i>	<i>AFR_RA51</i>	
2	<i>BFC_RA52</i>	<i>RPM_RA52</i>	<i>LOADRA52</i>	<i>OGT_RA52</i>	<i>CINTRA52</i>	<i>IAT_RA52</i>	<i>FRT_RA52</i>	<i>EBP_RA52</i>	<i>FCR_RA52</i>	<i>AFR_RA52</i>	
3	<i>BFC_RA53</i>	<i>RPM_RA53</i>	<i>LOADRA53</i>	<i>OGT_RA53</i>	<i>CINTRA53</i>	<i>IAT_RA53</i>	<i>FRT_RA53</i>	<i>EBP_RA53</i>	<i>FCR_RA53</i>	<i>AFR_RA53</i>	
4	<i>BFC_RA54</i>	<i>RPM_RA54</i>	<i>LOADRA54</i>	<i>OGT_RA54</i>	<i>CINTRA54</i>	<i>IAT_RA54</i>	<i>FRT_RA54</i>	<i>EBP_RA54</i>	<i>FCR_RA54</i>	<i>AFR_RA54</i>	
5	<i>BFC_RA55</i>	<i>RPM_RA55</i>	<i>LOADRA55</i>	<i>OGT_RA55</i>	<i>CINTRA55</i>	<i>IAT_RA55</i>	<i>FRT_RA55</i>	<i>EBP_RA55</i>	<i>FCR_RA55</i>	<i>AFR_RA55</i>	
6	<i>BFC_RA56</i>	<i>RPM_RA56</i>	<i>LOADRA56</i>	<i>OGT_RA56</i>	<i>CINTRA56</i>	<i>IAT_RA56</i>	<i>FRT_RA56</i>	<i>EBP_RA56</i>	<i>FCR_RA56</i>	<i>AFR_RA56</i>	
AVG.	<i>BFCARA5A</i>	<i>RPM_RA5A</i>	<i>LOADRA5A</i>	<i>OGT_RA5A</i>	<i>CINTRA5A</i>	<i>IAT_RA5A</i>	<i>FRT_RA5A</i>	<i>EBP_RA5A</i>	<i>FCR_RA5A</i>	<i>AFR_RA5A</i>	<i>AFRDRA5A</i>
SD	<i>BFCSRA5A</i>										
C.V.	<i>BFCRA5A</i>										

<sup>A</sup> Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.17A Critical Parameter Summary - Stage 5

**SEQUENCE VIB  
FORM 18  
DOWNTIME AND OTHER COMMENTS**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTIME</i>	
Test Number			
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>	Runs on Engine: <i>ENRUN</i>
Oil Code: <i>OILCODE</i>			
Formulation/Stand Code: <i>FORM</i>			

Downtime Occurrences		<i>DWNOCR</i>	
Test Hours	Date	Downtime	Reasons
<i>DOWNR001</i>	<i>DDATR001</i>	<i>DTIMR001</i>	<i>DREAR001</i>
Total Downtime		<i>TOTLDOWN</i>	

Total Number of Comments & Outlier Lines	<i>TOTCOM</i>
<i>OCOMR001</i>	

Fig. A7.18 Downtime and Other Comments

**SEQUENCE VIB****FORM 19****Used Oil Analysis**

Lab: <i>LAB</i>	Date Completed: <i>DTCOMP</i>	Time Completed: <i>EOTIME</i>	
Test Number			
Test Stand: <i>STAND</i>	Runs On The Stand: <i>STRUN</i>	Engine No.: <i>ENGNO</i>	Runs on Engine: <i>ENRUN</i>
Oil Code: <i>OILCODE</i>			
Formulation/Stand Code: <i>FORM</i>			

USED OIL ANALYSIS	
High Temperature High Shear @ 100°C, cP	<i>HTHS</i>
Cold Crank Simulator Viscosity, cP/°C	<i>CCSVIS</i>
Friction Coefficient by HFRR @ 105°C, mm	<i>FCHFRR</i>
Fuel Dilution, %	<i>FUELD</i>
Infrared for Oxidation, Abs./0.01 mm	<i>IOX</i>
Infrared for Nitration, Abs./0.01 mm	<i>INI</i>

Fig. A7.19 Used Oil Analysis