Report Forms
SEQUENCE VIBSJ

VERSION: ***20020410***

CONDUCTED FOR:

TSTSPON1

TSTSPON2

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

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

In my opinion this test *OPVALID* been conducted in a valid manner in accordance with the VIB Test Procedure (RR: D02-1469) 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 VIBSJ

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FIG. A7.2 Table of Contents

Sequence VIBSJ
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 VIBSJ test incorporates a flush and run type procedure. Each test consists of 5-stage fuel economy measurements on baseline oil (BC) and test oil. The test oil is aged during 16 hours of engine operation at 1500 r/min and 125˚C oil temperature. After the aging, a 5-stage fuel economy measurement is taken. The fuel economy measurement taken on the baseline oil (BC) and the test oil are used to calculate a final value for Fuel Economy Improvement.

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

Fuel Economy Measurement and Aging Condition				
FE Stage	**Speed (r/min)**	**Torque (N-m)**	**Oil Temp. (˚C)**	**Coolant Temp. (˚C)**
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

Aging Stage	**Speed (r/min)**	**Torque (N-m)**	**Oil Temp. (˚C)**	**Coolant Temp. (˚C)**
1	1500	98	125	105

FIG. A7.3 Summary of Test Method

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

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

TEST DOCUMENTATION		
	BC Before	Test Oil
Start Date	*BCBSDTE*	*DTSTRT*
Start Time	*BCBSTIM*	*STRTIME*
End Date	*BCBEDTE*	*TODTE*
End Time	*BCBETIM*	*TOTIM*
Oil Test Length, hhh:mm	*BCBTLEN*	*TOLEN*
Calibration Oil Batch	*BCOILBT*	
Flush Oil Batch	*BCFOILBT*	
Laboratory Oil Code		*LABOCODE*
SAE Viscosity Grade		*SAEVISC*
TMC Oil Code (Reference Oil Tests Only)		*IND*
New Oil Viscosity @ 40 ˚C, cSt		*V40NEW*
New Oil Viscosity @ 100˚C, cSt		*V100NEW*
Total Test Length, hhh:mm	*TESTLEN*	
Total Engine Hours @ EOT	*ENHREND*	
Most Recent Fuel Batch	*FUELBTID*	

OVERALL RESULTS		
	BC Oil	Test Oil
	Before	Phase I
Fuel Consumed, kg	*BCKG*	*TOKG*
Fuel Economy Improvement, %		*FEI*
FEI Industry Correction Factor, %		*FEI1CF*
FEI Severity Adjustment, % (non-reference tests only)		*FEI1SA*
FEI Final Result, %		*FEI1FNL*

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

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

SEQUENCE VIBSJ
FORM 5
OPERATIONAL DATA ANALYSIS

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

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

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

Fig. A7.5 Operational Data Analysis

SEQUENCE VIBSJ
FORM 6

GENERAL PARAMETER LISTING

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

16 Hour Aging

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

[A] *Based on a minimum of one determination per hour*

Fig. A7.6 General Parameter Listing

SEQUENCE VIBSJ
FORM 7
GENERAL PARAMETER SUMMARY

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

BC Oil

General Parameters

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

[A] Difference between the maximum stage average reading of the entire test and the individual stage average readings.

[B] Measurement not required by procedure.

Fig. A7.7 General Parameter Summary

SEQUENCE VIBSJ
FORM 8
GENERAL PARAMETER SUMMARY

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

Test Oil
General Parameters

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

[A] Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.8 General Parameter Summary

SEQUENCE VIBSJ
FORM 9
CRITICAL PARAMETER SUMMARY- STAGE 1

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

BC 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 [A]
1	*BFC_RB11*	*RPM_RB11*	*LOADRB11*	*OGT_RB11*	*CINTRB11*	*IAT_RB11*	*FRT_RB11*	*EBP_RB11*	*FCR_RB11*	*AFR_RB11*	
2	*BFC_RB12*	*RPM_RB12*	*LOADRB12*	*OGT_RB12*	*CINTRB12*	*IAT_RB12*	*FRT_RB12*	*EBP_RB12*	*FCR_RB12*	*AFR_RB12*	
3	*BFC_RB13*	*RPM_RB13*	*LOADRB13*	*OGT_RB13*	*CINTRB13*	*IAT_RB13*	*FRT_RB13*	*EBP_RB13*	*FCR_RB13*	*AFR_RB13*	
4	*BFC_RB14*	*RPM_RB14*	*LOADRB14*	*OGT_RB14*	*CINTRB14*	*IAT_RB14*	*FRT_RB14*	*EBP_RB14*	*FCR_RB14*	*AFR_RB14*	
5	*BFC_RB15*	*RPM_RB15*	*LOADRB15*	*OGT_RB15*	*CINTRB15*	*IAT_RB15*	*FRT_RB15*	*EBP_RB15*	*FCR_RB15*	*AFR_RB15*	
6	*BFC_RB16*	*RPM_RB16*	*LOADRB16*	*OGT_RB16*	*CINTRB16*	*IAT_RB16*	*FRT_RB16*	*EBP_RB16*	*FCR_RB16*	*AFR_RB16*	
AVG.	*BFCARB1A*	*RPM_RB1A*	*LOADRB1A*	*OGT_RB1A*	*CINTRB1A*	*IAT_RB1A*	*FRT_RB1A*	*EBP_RB1A*	*FCR_RB1A*	*AFR_RB1A*	*AFRDRB1A*
SD	*BFCSRB1A*										
C.V.	*BFCCRB1A*										

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 [A]
1	*BFC_RC11*	*RPM_RC11*	*LOADRC11*	*OGT_RC11*	*CINTRC11*	*IAT_RC11*	*FRT_RC11*	*EBP_RC11*	*FCR_RC11*	*AFR_RC11*	
2	*BFC_RC12*	*RPM_RC12*	*LOADRC12*	*OGT_RC12*	*CINTRC12*	*IAT_RC12*	*FRT_RC12*	*EBP_RC12*	*FCR_RC12*	*AFR_RC12*	
3	*BFC_RC13*	*RPM_RC13*	*LOADRC13*	*OGT_RC13*	*CINTRC13*	*IAT_RC13*	*FRT_RC13*	*EBP_RC13*	*FCR_RC13*	*AFR_RC13*	
4	*BFC_RC14*	*RPM_RC14*	*LOADRC14*	*OGT_RC14*	*CINTRC14*	*IAT_RC14*	*FRT_RC14*	*EBP_RC14*	*FCR_RC14*	*AFR_RC14*	
5	*BFC_RC15*	*RPM_RC15*	*LOADRC15*	*OGT_RC15*	*CINTRC15*	*IAT_RC15*	*FRT_RC15*	*EBP_RC15*	*FCR_RC15*	*AFR_RC15*	
6	*BFC_RC16*	*RPM_RC16*	*LOADRC16*	*OGT_RC16*	*CINTRC16*	*IAT_RC16*	*FRT_RC16*	*EBP_RC16*	*FCR_RC16*	*AFR_RC16*	
AVG.	*BFCARC1A*	*RPM_RC1A*	*LOADRC1A*	*OGT_RC1A*	*CINTRC1A*	*IAT_RC1A*	*FRT_RC1A*	*EBP_RC1A*	*FCR_RC1A*	*AFR_RC1A*	*AFRDRC1A*
SD	*BFCSRC1A*										
C.V.	*BFCCRC1A*										

[A] Difference between the maximum stage average reading of the entire test and the individual stage average readings.

Fig. A7.9 Critical Parameter Summary - Stage 1

SEQUENCE VIBSJ
FORM 10
CRITICAL PARAMETER SUMMARY- STAGE 2

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

BC 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 [A]
1	*BFC_RB21*	*RPM_RB21*	*LOADRB21*	*OGT_RB21*	*CINTRB21*	*IAT_RB21*	*FRT_RB21*	*EBP_RB21*	*FCR_RB21*	*AFR_RB21*	
2	*BFC_RB22*	*RPM_RB22*	*LOADRB22*	*OGT_RB22*	*CINTRB22*	*IAT_RB22*	*FRT_RB22*	*EBP_RB22*	*FCR_RB22*	*AFR_RB22*	
3	*BFC_RB23*	*RPM_RB23*	*LOADRB23*	*OGT_RB23*	*CINTRB23*	*IAT_RB23*	*FRT_RB23*	*EBP_RB23*	*FCR_RB23*	*AFR_RB23*	
4	*BFC_RB24*	*RPM_RB24*	*LOADRB24*	*OGT_RB24*	*CINTRB24*	*IAT_RB24*	*FRT_RB24*	*EBP_RB24*	*FCR_RB24*	*AFR_RB24*	
5	*BFC_RB25*	*RPM_RB25*	*LOADRB25*	*OGT_RB25*	*CINTRB25*	*IAT_RB25*	*FRT_RB25*	*EBP_RB25*	*FCR_RB25*	*AFR_RB25*	
6	*BFC_RB26*	*RPM_RB26*	*LOADRB26*	*OGT_RB26*	*CINTRB26*	*IAT_RB26*	*FRT_RB26*	*EBP_RB26*	*FCR_RB26*	*AFR_RB26*	
AVG.	*BFCARB2A*	*RPM_RB2A*	*LOADRB2A*	*OGT_RB2A*	*CINTRB2A*	*IAT_RB2A*	*FRT_RB2A*	*EBP_RB2A*	*FCR_RB2A*	*AFR_RB2A*	*AFRDRB2A*
SD	*BFCSRB2A*										
C.V.	*BFCCRB2A*										

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 [A]
1	*BFC_RC21*	*RPM_RC21*	*LOADRC21*	*OGT_RC21*	*CINTRC21*	*IAT_RC21*	*FRT_RC21*	*EBP_RC21*	*FCR_RC21*	*AFR_RC21*	
2	*BFC_RC22*	*RPM_RC22*	*LOADRC22*	*OGT_RC22*	*CINTRC22*	*IAT_RC22*	*FRT_RC22*	*EBP_RC22*	*FCR_RC22*	*AFR_RC22*	
3	*BFC_RC23*	*RPM_RC23*	*LOADRC23*	*OGT_RC23*	*CINTRC23*	*IAT_RC23*	*FRT_RC23*	*EBP_RC23*	*FCR_RC23*	*AFR_RC23*	
4	*BFC_RC24*	*RPM_RC24*	*LOADRC24*	*OGT_RC24*	*CINTRC24*	*IAT_RC24*	*FRT_RC24*	*EBP_RC24*	*FCR_RC24*	*AFR_RC24*	
5	*BFC_RC25*	*RPM_RC25*	*LOADRC25*	*OGT_RC25*	*CINTRC25*	*IAT_RC25*	*FRT_RC25*	*EBP_RC25*	*FCR_RC25*	*AFR_RC25*	
6	*BFC_RC26*	*RPM_RC26*	*LOADRC26*	*OGT_RC26*	*CINTRC26*	*IAT_RC26*	*FRT_RC26*	*EBP_RC26*	*FCR_RC26*	*AFR_RC26*	
AVG.	*BFCARC2A*	*RPM_RC2A*	*LOADRC2A*	*OGT_RC2A*	*CINTRC2A*	*IAT_RC2A*	*FRT_RC2A*	*EBP_RC2A*	*FCR_RC2A*	*AFR_RC2A*	*AFRDRC2A*
SD	*BFCSRC2A*										
C.V.	*BFCCRC2A*										

[A] Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.10 Critical Parameter Summary - Stage 2

SEQUENCE VIBSJ
FORM 11
CRITICAL PARAMETER SUMMARY- STAGE 3

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

BC 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 [A]
1	*BFC_RB31*	*RPM_RB31*	*LOADRB31*	*OGT_RB31*	*CINTRB31*	*IAT_RB31*	*FRT_RB31*	*EBP_RB31*	*FCR_RB31*	*AFR_RB31*	
2	*BFC_RB32*	*RPM_RB32*	*LOADRB32*	*OGT_RB32*	*CINTRB32*	*IAT_RB32*	*FRT_RB32*	*EBP_RB32*	*FCR_RB32*	*AFR_RB32*	
3	*BFC_RB33*	*RPM_RB33*	*LOADRB33*	*OGT_RB33*	*CINTRB33*	*IAT_RB33*	*FRT_RB33*	*EBP_RB33*	*FCR_RB33*	*AFR_RB33*	
4	*BFC_RB34*	*RPM_RB34*	*LOADRB34*	*OGT_RB34*	*CINTRB34*	*IAT_RB34*	*FRT_RB34*	*EBP_RB34*	*FCR_RB34*	*AFR_RB34*	
5	*BFC_RB35*	*RPM_RB35*	*LOADRB35*	*OGT_RB35*	*CINTRB35*	*IAT_RB35*	*FRT_RB35*	*EBP_RB35*	*FCR_RB35*	*AFR_RB35*	
6	*BFC_RB36*	*RPM_RB36*	*LOADRB36*	*OGT_RB36*	*CINTRB36*	*IAT_RB36*	*FRT_RB36*	*EBP_RB36*	*FCR_RB36*	*AFR_RB36*	
AVG.	*BFCARB3A*	*RPM_RB3A*	*LOADRB3A*	*OGT_RB3A*	*CINTRB3A*	*IAT_RB3A*	*FRT_RB3A*	*EBP_RB3A*	*FCR_RB3A*	*AFR_RB3A*	*AFRDRB3A*
SD	*BFCSRB3A*										
C.V.	*BFCCRB3A*										

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 [A]
1	*BFC_RC31*	*RPM_RC31*	*LOADRC31*	*OGT_RC31*	*CINTRC31*	*IAT_RC31*	*FRT_RC31*	*EBP_RC31*	*FCR_RC31*	*AFR_RC31*	
2	*BFC_RC32*	*RPM_RC32*	*LOADRC32*	*OGT_RC32*	*CINTRC32*	*IAT_RC32*	*FRT_RC32*	*EBP_RC32*	*FCR_RC32*	*AFR_RC32*	
3	*BFC_RC33*	*RPM_RC33*	*LOADRC33*	*OGT_RC33*	*CINTRC33*	*IAT_RC33*	*FRT_RC33*	*EBP_RC33*	*FCR_RC33*	*AFR_RC33*	
4	*BFC_RC34*	*RPM_RC34*	*LOADRC34*	*OGT_RC34*	*CINTRC34*	*IAT_RC34*	*FRT_RC34*	*EBP_RC34*	*FCR_RC34*	*AFR_RC34*	
5	*BFC_RC35*	*RPM_RC35*	*LOADRC35*	*OGT_RC35*	*CINTRC35*	*IAT_RC35*	*FRT_RC35*	*EBP_RC35*	*FCR_RC35*	*AFR_RC35*	
6	*BFC_RC36*	*RPM_RC36*	*LOADRC36*	*OGT_RC36*	*CINTRC36*	*IAT_RC36*	*FRT_RC36*	*EBP_RC36*	*FCR_RC36*	*AFR_RC36*	
AVG.	*BFCARC3A*	*RPM_RC3A*	*LOADRC3A*	*OGT_RC3A*	*CINTRC3A*	*IAT_RC3A*	*FRT_RC3A*	*EBP_RC3A*	*FCR_RC3A*	*AFR_RC3A*	*AFRDRC3A*
SD	*BFCSRC3A*										
C.V.	*BFCCRC3A*										

[A] Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.11 Critical Parameter Summary - Stage 3

SEQUENCE VIBSJ
FORM 12
CRITICAL PARAMETER SUMMARY- STAGE 4

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

BC 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 [A]
1	*BFC_RB41*	*RPM_RB41*	*LOADRB41*	*OGT_RB41*	*CINTRB41*	*IAT_RB41*	*FRT_RB41*	*EBP_RB41*	*FCR_RB41*	*AFR_RB41*	
2	*BFC_RB42*	*RPM_RB42*	*LOADRB42*	*OGT_RB42*	*CINTRB42*	*IAT_RB42*	*FRT_RB42*	*EBP_RB42*	*FCR_RB42*	*AFR_RB42*	
3	*BFC_RB43*	*RPM_RB43*	*LOADRB43*	*OGT_RB43*	*CINTRB43*	*IAT_RB43*	*FRT_RB43*	*EBP_RB43*	*FCR_RB43*	*AFR_RB43*	
4	*BFC_RB44*	*RPM_RB44*	*LOADRB44*	*OGT_RB44*	*CINTRB44*	*IAT_RB44*	*FRT_RB44*	*EBP_RB44*	*FCR_RB44*	*AFR_RB44*	
5	*BFC_RB45*	*RPM_RB45*	*LOADRB45*	*OGT_RB45*	*CINTRB45*	*IAT_RB45*	*FRT_RB45*	*EBP_RB45*	*FCR_RB45*	*AFR_RB45*	
6	*BFC_RB46*	*RPM_RB46*	*LOADRB46*	*OGT_RB46*	*CINTRB46*	*IAT_RB46*	*FRT_RB46*	*EBP_RB46*	*FCR_RB46*	*AFR_RB46*	
AVG.	*BFCARB4A*	*RPM_RB4A*	*LOADRB4A*	*OGT_RB4A*	*CINTRB4A*	*IAT_RB4A*	*FRT_RB4A*	*EBP_RB4A*	*FCR_RB4A*	*AFR_RB4A*	*AFRDRB4A*
SD	*BFCSRB4A*										
C.V.	*BFCCRB4A*										

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 [A]
1	*BFC_RC41*	*RPM_RC41*	*LOADRC41*	*OGT_RC41*	*CINTRC41*	*IAT_RC41*	*FRT_RC41*	*EBP_RC41*	*FCR_RC41*	*AFR_RC41*	
2	*BFC_RC42*	*RPM_RC42*	*LOADRC42*	*OGT_RC42*	*CINTRC42*	*IAT_RC42*	*FRT_RC42*	*EBP_RC42*	*FCR_RC42*	*AFR_RC42*	
3	*BFC_RC43*	*RPM_RC43*	*LOADRC43*	*OGT_RC43*	*CINTRC43*	*IAT_RC43*	*FRT_RC43*	*EBP_RC43*	*FCR_RC43*	*AFR_RC43*	
4	*BFC_RC44*	*RPM_RC44*	*LOADRC44*	*OGT_RC44*	*CINTRC44*	*IAT_RC44*	*FRT_RC44*	*EBP_RC44*	*FCR_RC44*	*AFR_RC44*	
5	*BFC_RC45*	*RPM_RC45*	*LOADRC45*	*OGT_RC45*	*CINTRC45*	*IAT_RC45*	*FRT_RC45*	*EBP_RC45*	*FCR_RC45*	*AFR_RC45*	
6	*BFC_RC46*	*RPM_RC46*	*LOADRC46*	*OGT_RC46*	*CINTRC46*	*IAT_RC46*	*FRT_RC46*	*EBP_RC46*	*FCR_RC46*	*AFR_RC46*	
AVG.	*BFCARC4A*	*RPM_RC4A*	*LOADRC4A*	*OGT_RC4A*	*CINTRC4A*	*IAT_RC4A*	*FRT_RC4A*	*EBP_RC4A*	*FCR_RC4A*	*AFR_RC4A*	*AFRDRC4A*
SD	*BFCSRC4A*										
C.V.	*BFCCRC4A*										

[A] Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.12 Critical Parameter Summary - Stage 4

SEQUENCE VIBSJ
FORM 13
CRITICAL PARAMETER SUMMARY- STAGE 5

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

BC 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 [A]
1	*BFC_RB51*	*RPM_RB51*	*LOADRB51*	*OGT_RB51*	*CINTRB51*	*IAT_RB51*	*FRT_RB51*	*EBP_RB51*	*FCR_RB51*	*AFR_RB51*	
2	*BFC_RB52*	*RPM_RB52*	*LOADRB52*	*OGT_RB52*	*CINTRB52*	*IAT_RB52*	*FRT_RB52*	*EBP_RB52*	*FCR_RB52*	*AFR_RB52*	
3	*BFC_RB53*	*RPM_RB53*	*LOADRB53*	*OGT_RB53*	*CINTRB53*	*IAT_RB53*	*FRT_RB53*	*EBP_RB53*	*FCR_RB53*	*AFR_RB53*	
4	*BFC_RB54*	*RPM_RB54*	*LOADRB54*	*OGT_RB54*	*CINTRB54*	*IAT_RB54*	*FRT_RB54*	*EBP_RB54*	*FCR_RB54*	*AFR_RB54*	
5	*BFC_RB55*	*RPM_RB55*	*LOADRB55*	*OGT_RB55*	*CINTRB55*	*IAT_RB55*	*FRT_RB55*	*EBP_RB55*	*FCR_RB55*	*AFR_RB55*	
6	*BFC_RB56*	*RPM_RB56*	*LOADRB56*	*OGT_RB56*	*CINTRB56*	*IAT_RB56*	*FRT_RB56*	*EBP_RB56*	*FCR_RB56*	*AFR_RB56*	
AVG.	*BFCARB5A*	*RPM_RB5A*	*LOADRB5A*	*OGT_RB5A*	*CINTRB5A*	*IAT_RB5A*	*FRT_RB5A*	*EBP_RB5A*	*FCR_RB5A*	*AFR_RB5A*	*AFRDRB5A*
SD	*BFCSRB5A*										
C.V.	*BFCCRB5A*										

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 [A]
1	*BFC_RC51*	*RPM_RC51*	*LOADRC51*	*OGT_RC51*	*CINTRC51*	*IAT_RC51*	*FRT_RC51*	*EBP_RC51*	*FCR_RC51*	*AFR_RC51*	
2	*BFC_RC52*	*RPM_RC52*	*LOADRC52*	*OGT_RC52*	*CINTRC52*	*IAT_RC52*	*FRT_RC52*	*EBP_RC52*	*FCR_RC52*	*AFR_RC52*	
3	*BFC_RC53*	*RPM_RC53*	*LOADRC53*	*OGT_RC53*	*CINTRC53*	*IAT_RC53*	*FRT_RC53*	*EBP_RC53*	*FCR_RC53*	*AFR_RC53*	
4	*BFC_RC54*	*RPM_RC54*	*LOADRC54*	*OGT_RC54*	*CINTRC54*	*IAT_RC54*	*FRT_RC54*	*EBP_RC54*	*FCR_RC54*	*AFR_RC54*	
5	*BFC_RC55*	*RPM_RC55*	*LOADRC55*	*OGT_RC55*	*CINTRC55*	*IAT_RC55*	*FRT_RC55*	*EBP_RC55*	*FCR_RC55*	*AFR_RC55*	
6	*BFC_RC56*	*RPM_RC56*	*LOADRC56*	*OGT_RC56*	*CINTRC56*	*IAT_RC56*	*FRT_RC56*	*EBP_RC56*	*FCR_RC56*	*AFR_RC56*	
AVG.	*BFCARC5A*	*RPM_RC5A*	*LOADRC5A*	*OGT_RC5A*	*CINTRC5A*	*IAT_RC5A*	*FRT_RC5A*	*EBP_RC5A*	*FCR_RC5A*	*AFR_RC5A*	*AFRDRC5A*
SD	*BFCSRC5A*										
C.V.	*BFCCRC5A*										

[A] Difference between the maximum stage average reading of the entire test and the individual stage average readings

Fig. A7.13 Critical Parameter Summary - Stage 5

SEQUENCE VIBSJ
FORM 14
DOWNTIME AND OTHER COMMENTS

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

Downtime Occurrences	*DWNOCR*		
Test Hours	**Date**	**Downtime**	**Reasons**
DOWNR001	*DDATR001*	*DTIMR001*	*DREAR001*
Total Downtime		*TOTLDOWN*	

Total Number of Comments & Outlier Lines	*TOTCOM*
OCOMR001	

Fig. A7.14 Downtime and Other Comments