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YF 102 IN-DUCT COMBUSTOR NOISE MEASUREMENTS WITH A TURBINE NOZZLE

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16. Abstract

The purpose of the combustor noise measurement program reported herein was to record internally the noise generated by an Avco Lycoming YF-102 engine combustor installed in a test rig. Two configurations were tested – one with and one without the first-stage turbine nozzle installed. Acoustic probes and accessories developed and fabricated at NASA were used. Internal dynamic pressure level measurements were made at ten locations within the combustor. This report describes the combustor rig, the test procedures, and data acquisition and reduction systems. Included are tables and plots of narrow-band and one-third octave band pressure level spectra.

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FOREWORD

This program was conducted for the Lewis Research Center of the National Aeronautics and Space Administration under Contract NAS 3-21974. The scope of this effort follows closely the work conducted under NASA contract NAS 3-20052, as reported in "YF-102 In-Duct Combustor Noise Measurement - Final Report," NASA-CR-135404; the essential difference is the addition of a first-stage turbine nozzle guide vane. The period of performance was September 1979 through March 1981.

Technical direction was provided by the NASA Project Manager, Mr. Meyer Reshotko.

The Avco Lycoming Program Manager was Mr. Craig A. Wilson and Mr. James O'Connell was the principal investigator.

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INTRODUCTION

Recently, attention has been given to the contribution of core noise to overall turbofan engine acoustic emissions. As a result of considerable progress in the reduction of noise generated by the two largest contributors to turbofan engine noise, the fan and jet exhaust, a new acoustic threshold has been reached. This threshold has been attributed to noise generated by poorly understood sources within the engine core (Reference 1). The primary target of this core-noise investigation is the combustion process from which large amounts of thermochemical energy are released.

A program to define the characteristics of combustor noise and its propagation through the engine core to the far field is being conducted at the NASA Lewis Research Center (LeRC). Part of the experimental phase of this program was conducted using an Avco Lycoming YF102 turbofan engine (Reference 1). Results obtained from direct internal and external far-field measurements indicate that below certain engine power levels (60 percent fan speed for a YF-102 engine) low-frequency core noise tends to dominate the far-field noise.

Further research into the relationship between internal engine noise and combustor noise is now aimed at predicting the contribution of combustor-related noise from internal noise measurements. Because of the expense and difficulty of running engines to internally measure combustion noise, it would be advantageous if these data could be gathered from rig tests of the combustor alone. If such a relationship does exist between installed engine combustor noise and test rig combustor noise, then noise data gathered on developmental combustor designs could be used to predict engine noise levels.

Such a test had been previously performed at Avco Lycoming using a YF102 engine combustor installed in a test rig (Reference 3). Acoustic probes, developed by NASA, were used to internally measure the dynamic pressure levels generated within the combustor while operating in the rig. These same measurements have been recorded earlier by NASA using the same acoustic probes on the engine-installed combustor and reported in Reference 2. A comparison of these test conditions showed that single-point measurements (spectra) differed in the two tests, but the results of two-point signal analysis, such as cross-correlation, coherence and phase shift showed good agreement (Reference 4). The invariance of the pairwise measurements in the two types of tests indicates that certain aspects of source generation are preserved in component test facilities and that investigations of combustor noise generation based on two-point measurements can be properly conducted in component test facilities. The variance of the single-point data is thought to be due to differences in combustor end impedances in the two types of tests. The YF102 combustor rig of Reference 3 did not have a first-stage turbine nozzle in place. Consequently, this necessitated further YF102 combustor rig tests with a first-stage turbine nozzle installed.

The objective of the combustor noise measurement program reported herein was to record, as in the previous test, the internal noise of an Avco Lycoming YF-102 engine combustor installed in a test rig. Two configurations were tested - one with and one without the first-stage turbine nozzle installed. The same operating parameters used in the previous test were used again. The same acoustic probes and accessories were also used with four additional probes. Thermocouples were included at the combustor exit plane. The measurements recorded on magnetic tape were reduced to narrow-band and 1/3-octave band pressure level spectra. These data and the tapes were forwarded to LeRC for additional analysis.

EQUIPMENT DESCRIPTION

An Avco Lycoming YF-102 combustion chamber that was similar to the one installed in the YF-102 turbofan engine and tested in conjunction with the NASA YF-102 test program was instrumented, assembled into a test rig, and installed in the combustor test facility at the Stratford, Connecticut plant. The combustor was operated at specific conditions of airflow, pressure and temperature, and fuel flow to simulate engine operating and off-point operating conditions. Two configurations were built - one with and one without the first-stage turbine nozzle installed.

Combustion Chamber

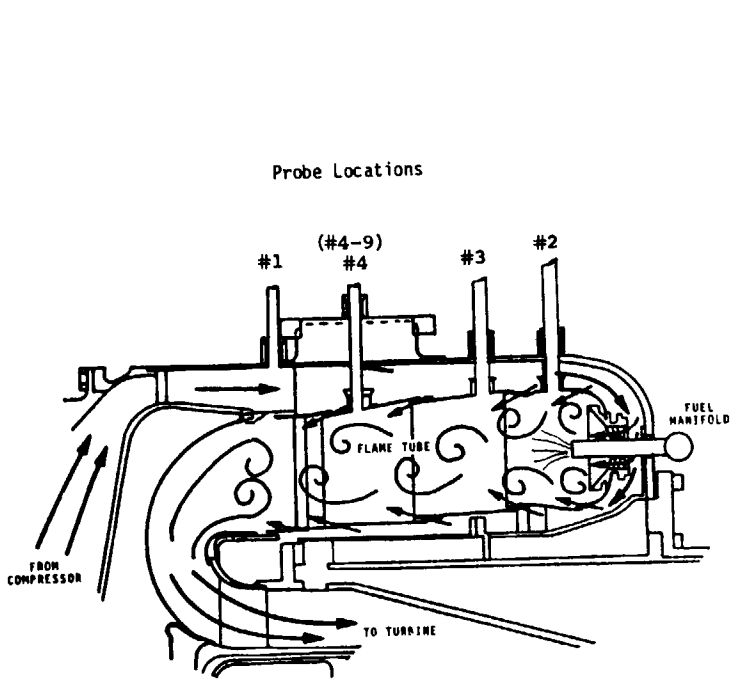
The YF-102 combustion chamber (Figure 1) is of the reverse-flow annular-type design. Air from the compressor enters the combustion chamber section through a set of diffuser vanes, then passes over the outer liner, after which it reverses direction where part of this air enters the flame tube to mix with the fuel, and burn. As the hot gas moves downstream, it is diluted and cooled by the remaining air entering through the holes and slots provided in the liner. The hot gas is then reversed and directed to the turbine inlet nozzles.

Combustor Test Rig

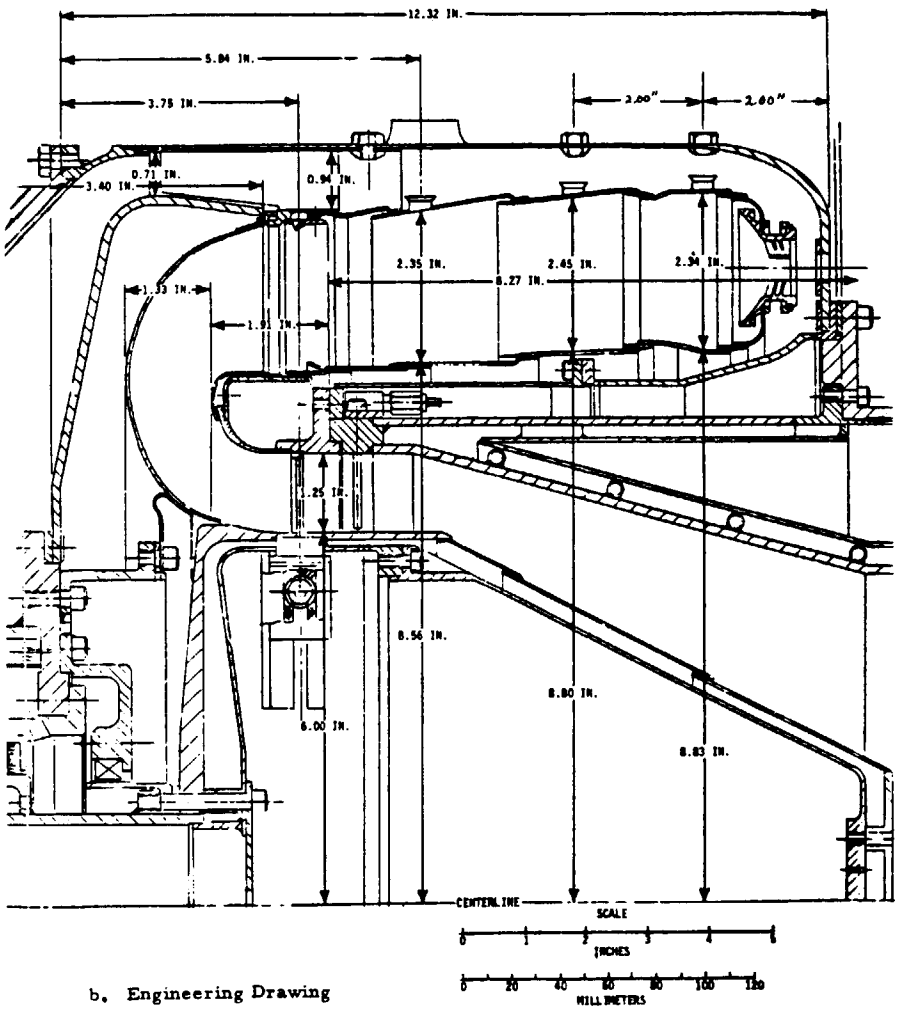
For this test program, the YF-102 combustor chamber was modified to accept nine semi-infinite acoustic probes and then installed in a test rig (Figure 2). A tenth probe was installed in the exit section of the rig. The rig served to substitute for the compressor normally located upstream of the combustor chamber and downstream of the turbine. The test rig also contained the necessary measurement probes and sensors to monitor the test and provide the necessary performance information. Air that is preset by the facility to the appropriate pressure and temperature is admitted to the test rig inlet plenum. This air is then diffused through the compressor discharge diffuser to the combustion chamber at which point the gas exhausts through the exhaust diffuser and finally out of the rig.

Combustor Test Facility

The combustor test rig was installed in the No. 1 testway of the combustor test facility (Figure 3). Butterfly valves, located immediately upstream and downstream of the testway, regulated the flow of air through the test rig. Hot gases passed through a downstream watercooled valve, exhausted to a muffler, and then exited to the atmosphere. The piping and valving installed upstream of the testway were provided to connect the rig with an in-line electric heater and the facility compressor. A T55-L-11 gas turbine compressor, driven by three gas turbine engines through a reduction gearbox, generated the compressed air for most of the tests. Electrically driven compressors were used for the low-pressure points where $P_{t3} \leq 186$ KPa (27 psi). A large Allis-Chalmer electric compressor supplied air to the combustor rig, while exhaustors



a. Schematic Diagram.



b. Engineering Drawing

Figure 1. Combustion Chamber.

FOLDOUT FRAME

FOLDOUT FRAME

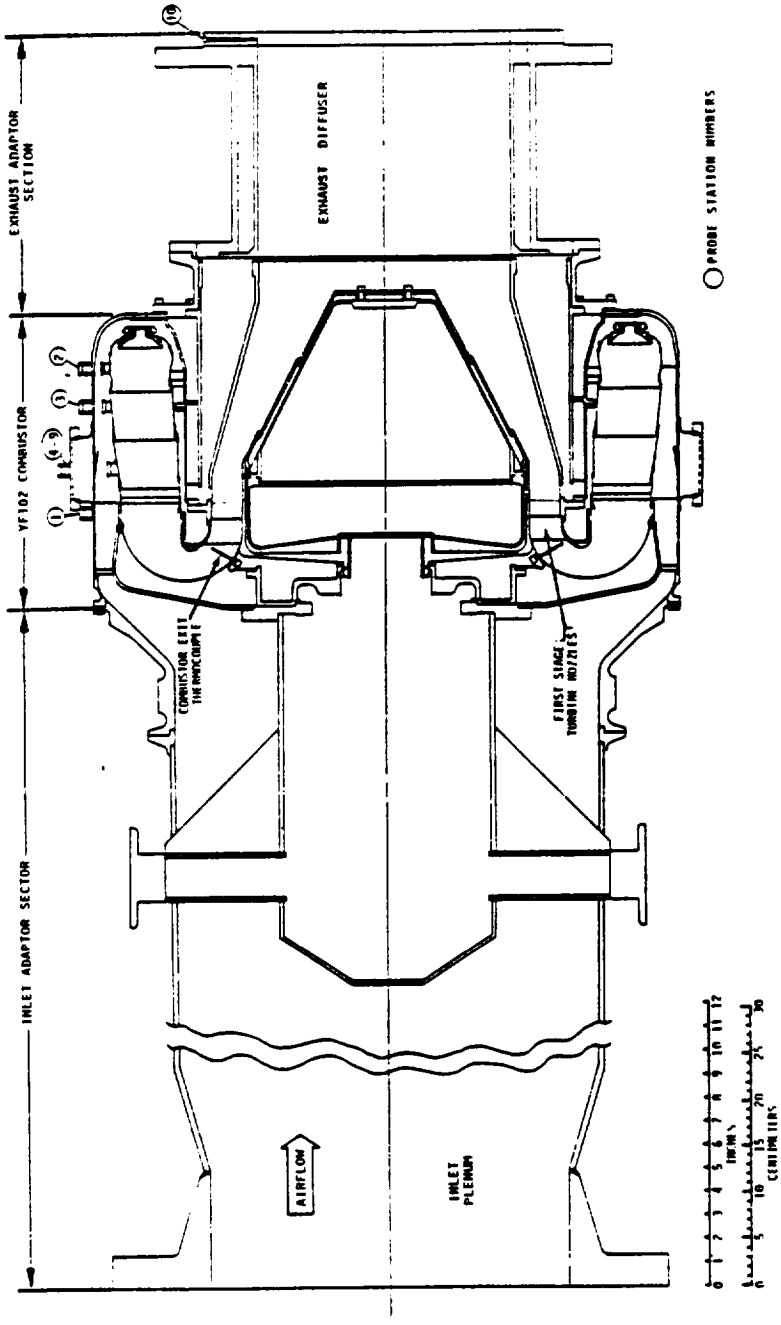


Figure 2. Combustor Test Rig.

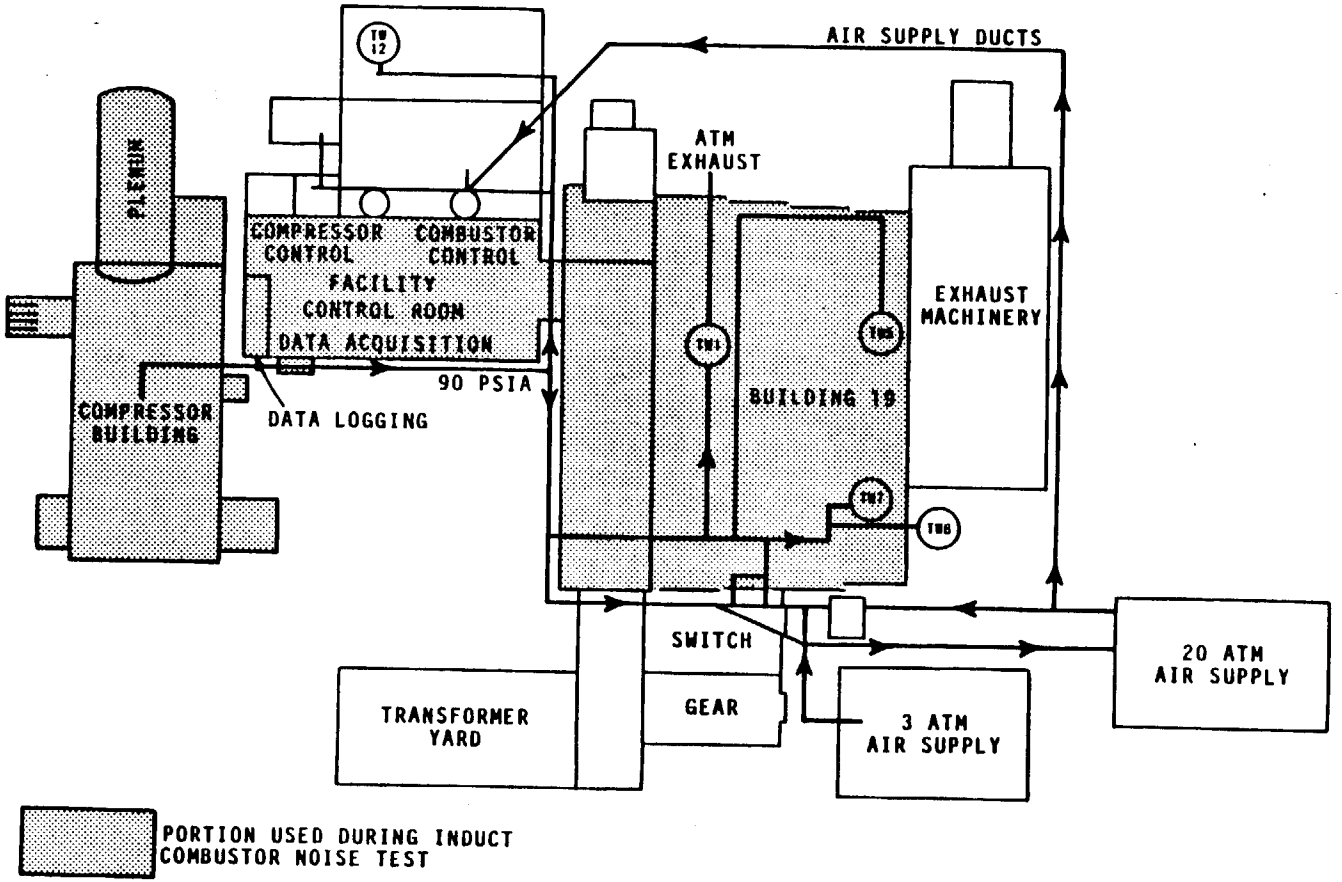


Figure 3. Combustor Test Facility Schematic.

(comprised of a series of roots-type compressors) lowered the rig exhaust pressure by means of air suction. This configuration allowed the required airflow through the combustor at low combustor pressures. Specific conditions of airflow, pressure, and temperature were set for each test from the control room, located adjacent to the testway.

Acoustic Probes

The dynamic pressure fluctuations in the combustion chamber and test rig were sensed by ten Government-furnished "semi-infinite wave guide" probes. These probes, depicted in Figure 4, were the same probes used by NASA during the YF-102 noise measurement program conducted at LeRC and at Lycoming. Each probe has a 6.35 millimeter (1/4-inch) condenser microphone mounted flush on the wave guide that passes through the probe block. The probe system (Figure 5) is fully described in Reference 2. A microphone was connected through a bulkhead fitting to a preamplifier and power supply, which, in turn, was connected to the signal amplifier and tape recorder.

A vent in the probe support block equalizes static pressure across the microphone and provides the back pressure needed to regulate the flow of nitrogen through the wave guide. The flow regulators were adjusted to provide sufficient nitrogen-purge to prevent hot gases from the combustion chamber from entering the wave guide but low enough not to affect the dynamic pressure level measurements made by the microphone.

Probe Locations

Locations of probes 1 through 9 are diagrammed in Figure 6. Once the combustor was installed in the testway (Figure 7), the acoustic probes were then attached to the combustor (Figure 8). A spare probe tube was used to record the pistonphone calibration signal. Gyrolock male connectors (GCM4-316) were used to attach the acoustic probe tubes to the combustor housing. Probe 1 was installed in the combustor inlet duct at the previously used number 2 location. The previously used number 1 location was plugged. Probe 2 was installed 25 mm (1 in.) downstream from the fuel nozzle. Probe 3 was installed 76.4 mm (3 in.) downstream from the fuel nozzles. The previously used number 3 location was plugged. Probes 4 through 9 were installed 133.35 mm (5.25 in.) downstream from the fuel nozzles. Probe 4 was in the same location as the previously used number 4 location. Probes 5 and 6 were installed at locations 30 and 60 degrees respectively, from the Probe 4 location and in the same plane normal to the axis. Probe 7 was in the previously used number 5 location. Probes 2 and 3 were aligned with Probe 4. Probes 8 and 9 were 115 and 270 degrees, respectively, from probe 4 and in the same plane. Probes 2 through 9 were flush with the inner surface of the combustor liner, and probe 1 was installed to be flush with the inner surface of the housing (Figure 9). The probes were then connected to the NASA-furnished control panel (Figure 10) containing nitrogen-flow regulators and power supplies. Probe 10 was installed at the rig's exit.

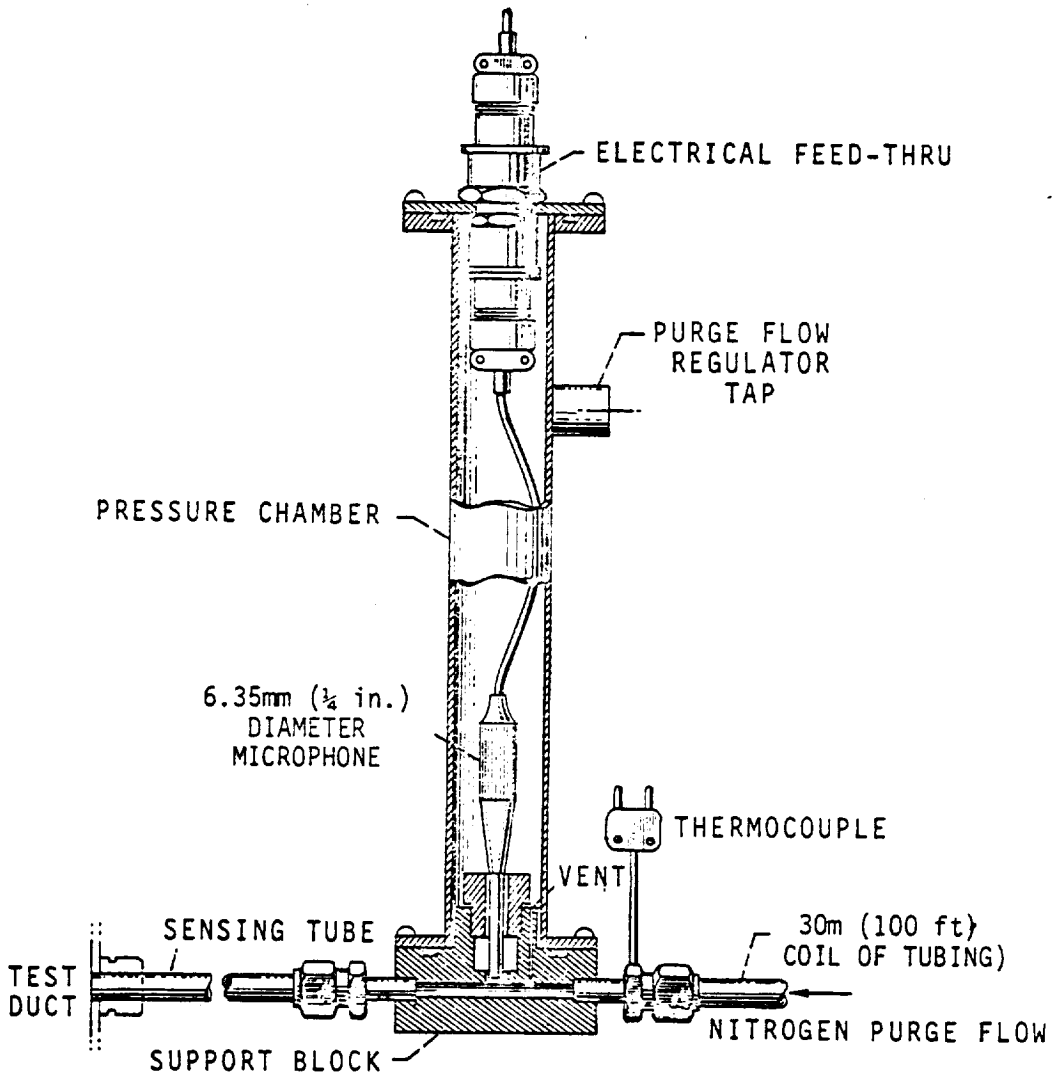


Figure 4. Dynamic Pressure Level Probe.

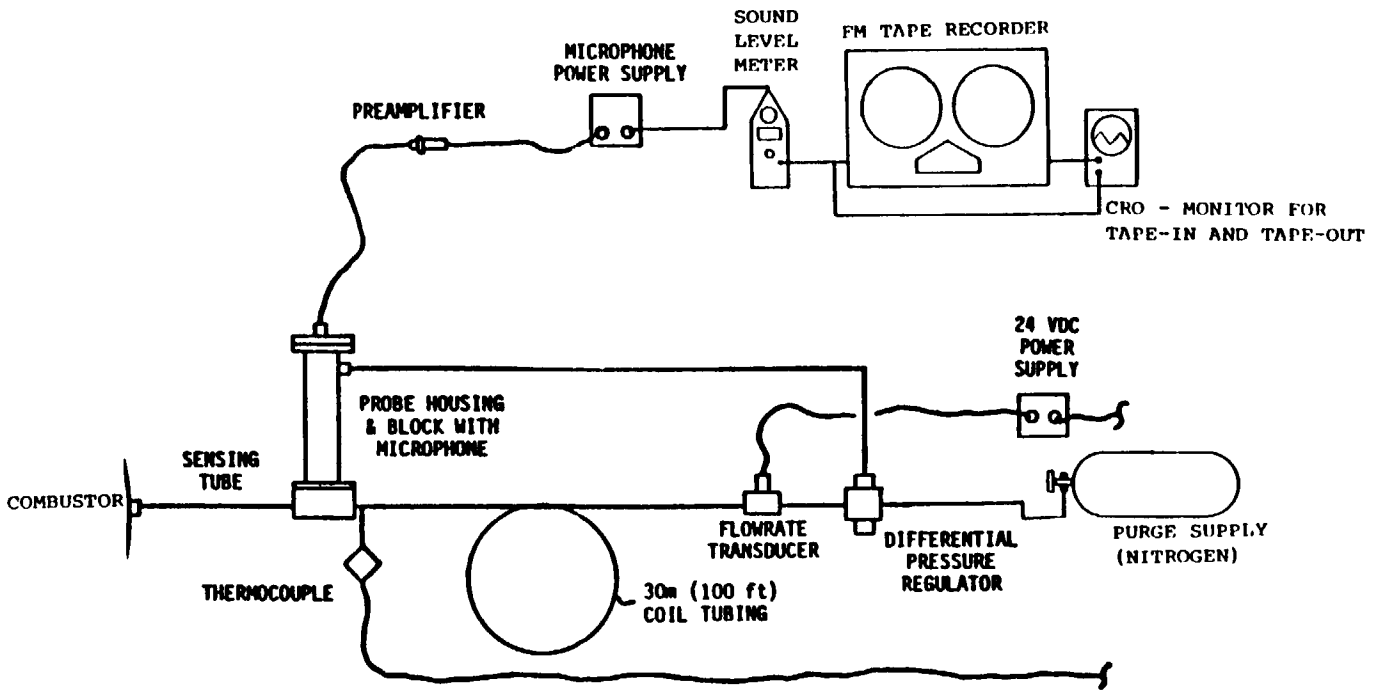


Figure 5. Acoustic Probe System Schematic.

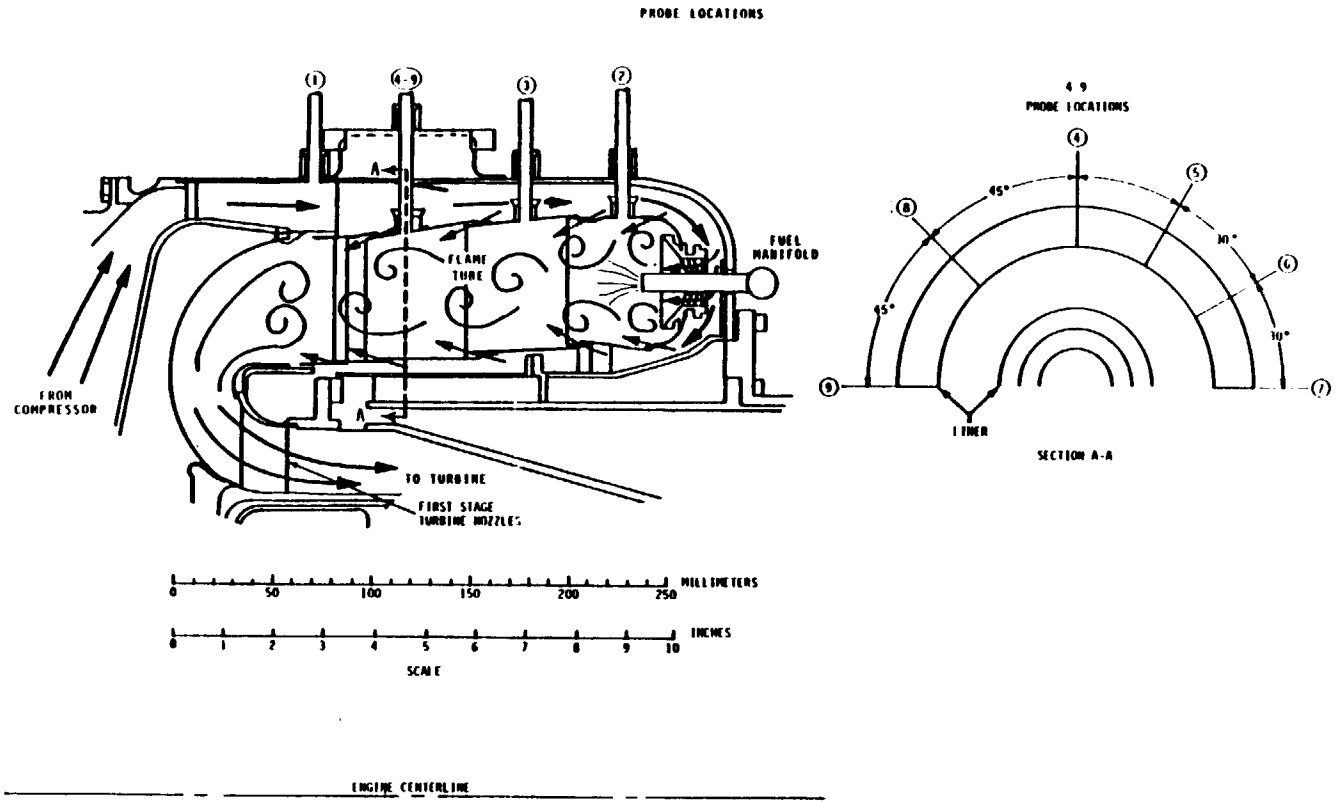


Figure 6. Probe Locations in Combustor.

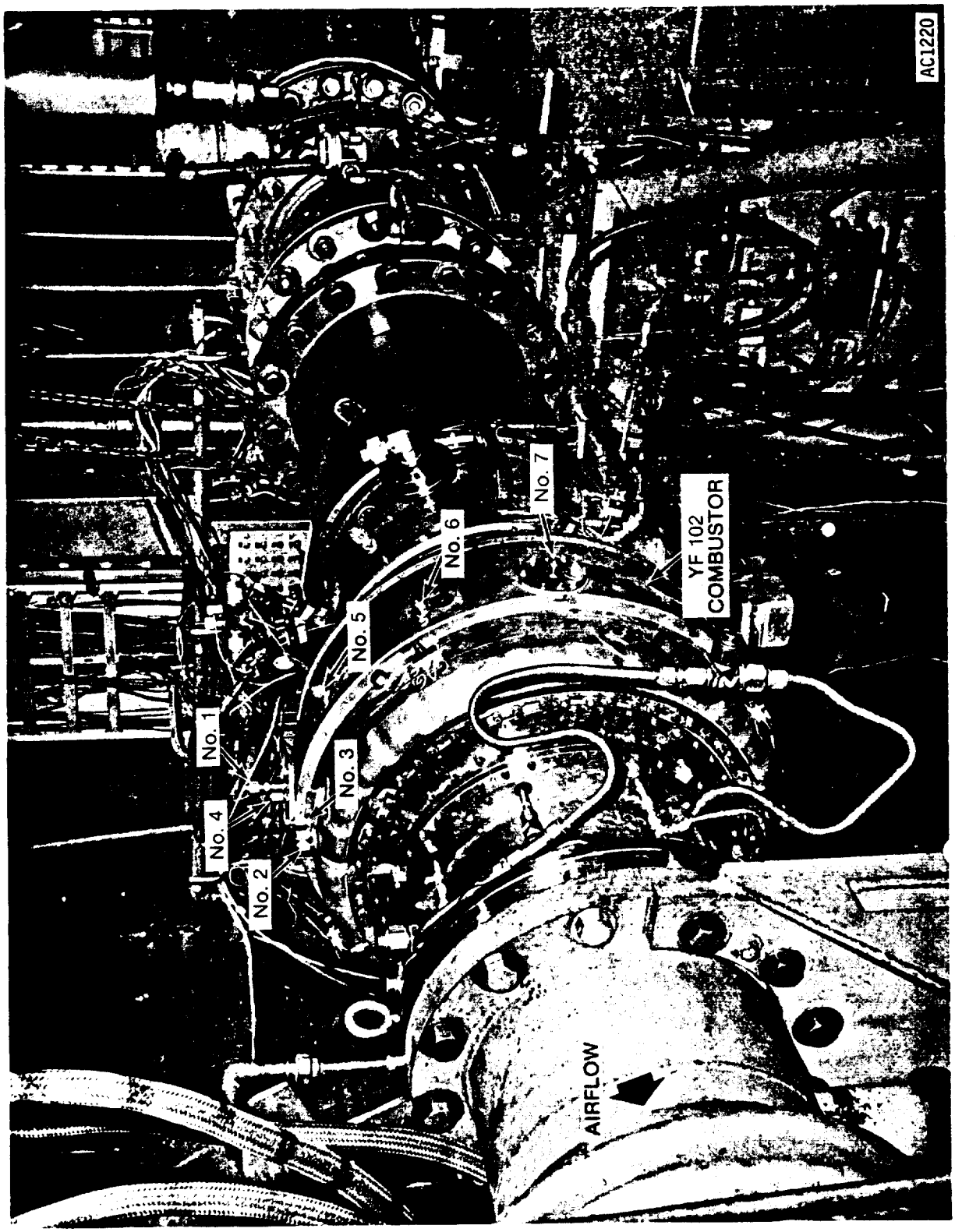


Figure 7. YF102 Combustor Installed in Test Rig.

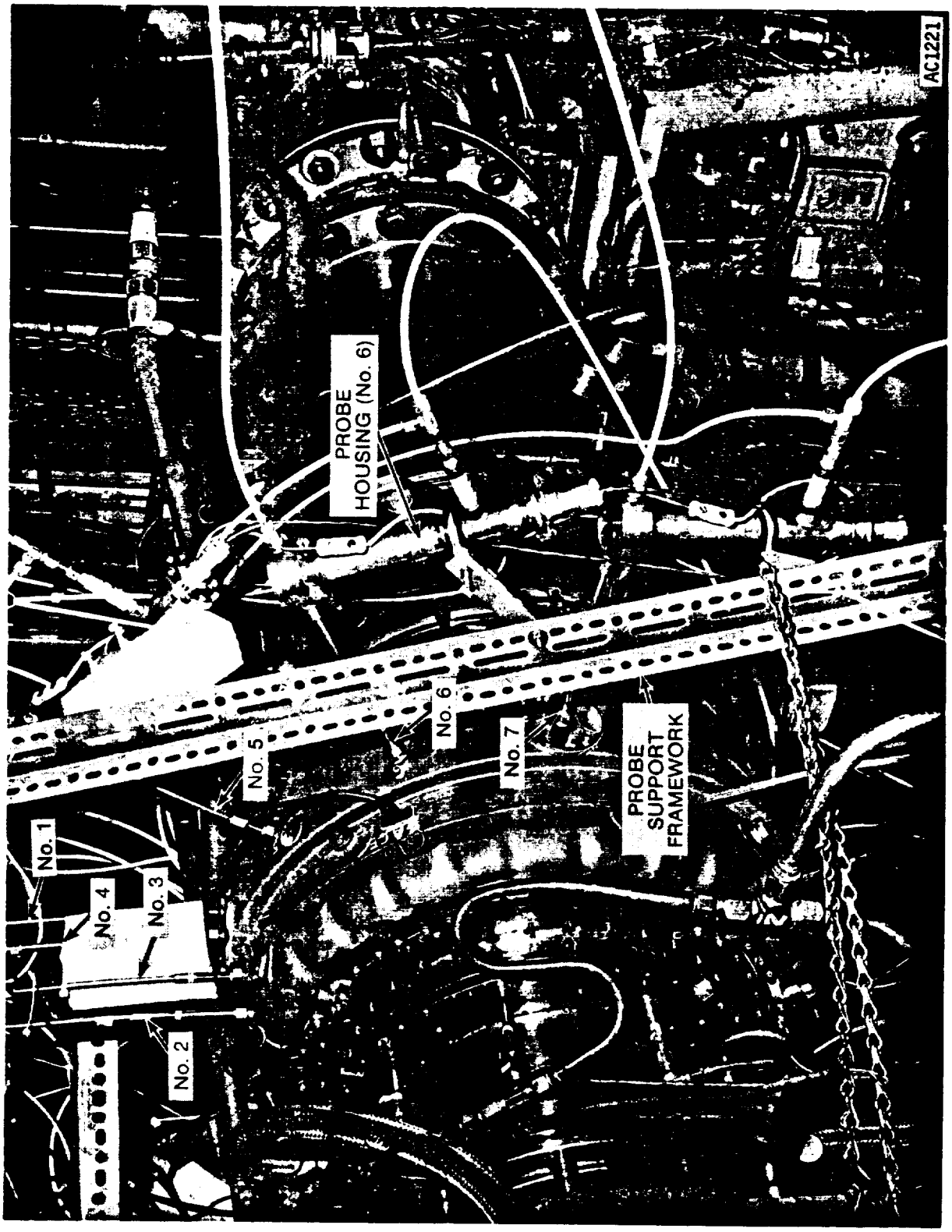


Figure 8. Acoustic Probes Installed in YF102 Combustor.

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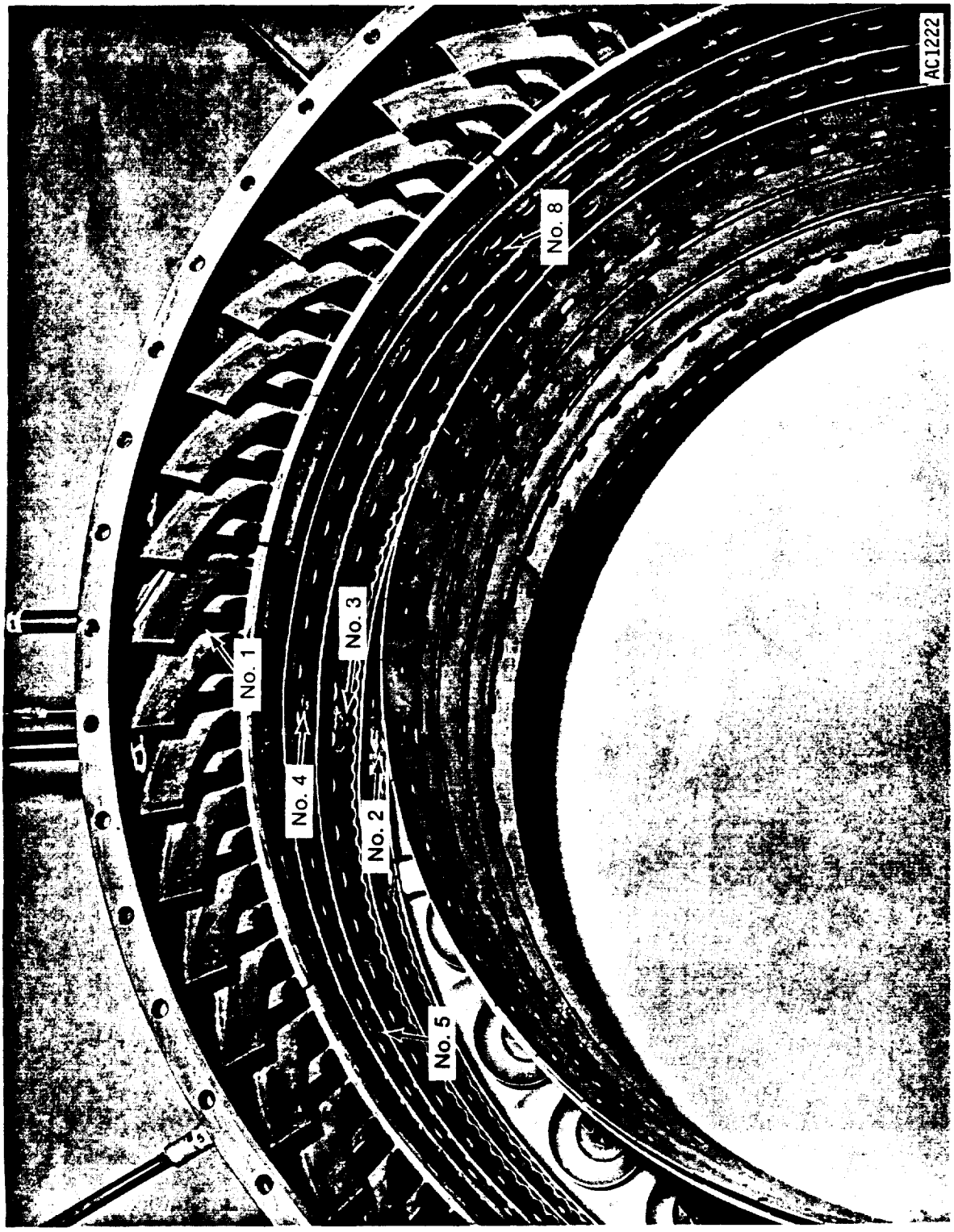

Figure 9. Acoustic Probe Tubes Mounted in YF102 Combustor •

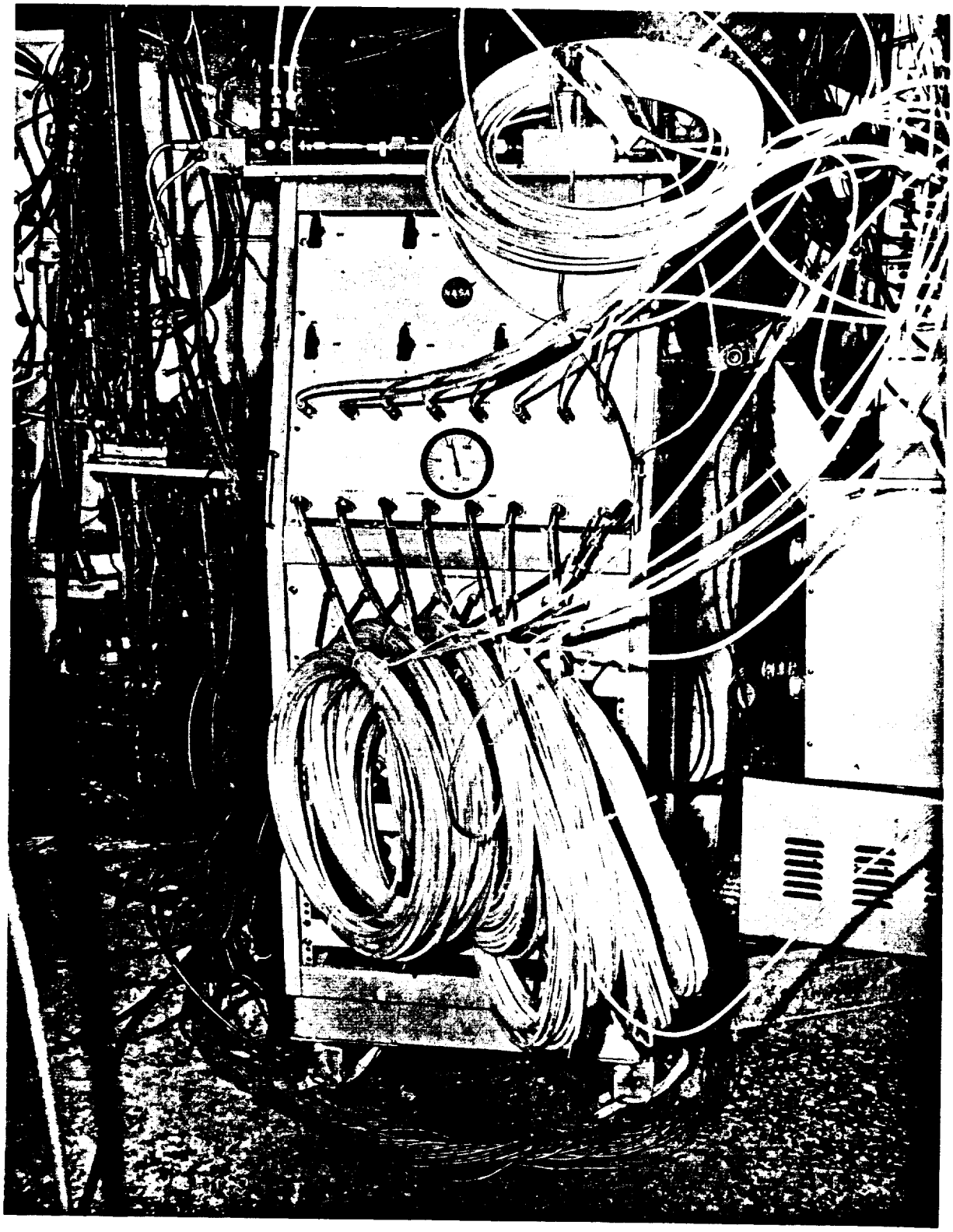

Figure 10. NASA-Furnished Acoustic Probe Instrumentation Panel.

Data Acquisition Equipment

A schematic of the acoustic data acquisition equipment setup is presented in Figure 11. The ten precision, sound-level meters (one for each probe) were used to condition the signals from the microphones so as to provide sufficient voltage to the FM tape-recorder amplifiers. The microphone signals were simultaneously recorded on 25.4 mm (1-in.)-wide magnetic tape using predetermined channels on the tape recorder. The set-up is shown in Figure 12. The probe signals were sampled prior to recording and afterwards by playing back the recorded signal. Narrow-band, pressure-level plots were generated from a selected channel during the recording phase to verify the quality of the recorded signal.

Combustion Rig Instrumentation

The combustor rig was instrumented and connected to the facility data acquisition system. Pressure sensors were connected to a scanning valve arrangement, whereby each of the pressure points could be sampled. The automatic data acquisition system then converts these signals into engineering units for instant readout, producing a preliminary hard copy listing, and then transmitted the data to an IBM 3033 computer for later analysis. An integration period was used to eliminate system electrical noise and input parameter periodic changes. The following parameters from the combustor rig were recorded:

1. Combustor inlet total (P_{t3}) and static (P_{s3}) pressure
2. Combustor exit flange static (P_{sf1}) pressure
3. Combustor inlet temperature (T_{t3})
4. Combustor exit temperature ($T_{t3.8}$)
5. Airflow rate (W_a) through combustor
6. Fuel flow rate (W_f)
7. Fuel-to-air ratio (W_f/W_a).

The combustor rig exit temperature was calculated later by using the curves in Reference 5. The ideal exit temperatures, determined by applying the fuel-air ratio and inlet temperature (T_{t3}) to these curves, were then multiplied by a burner efficiency factor to obtain the combustor exit total temperature.

SUMMARY OF TEST PHASE

The combustor rig was assembled, installed in the combustor test facility testway with the turbine nozzle in place, instrumented, and functionally checked. The acoustic probes were then installed and checked in preparation for running the test rig.

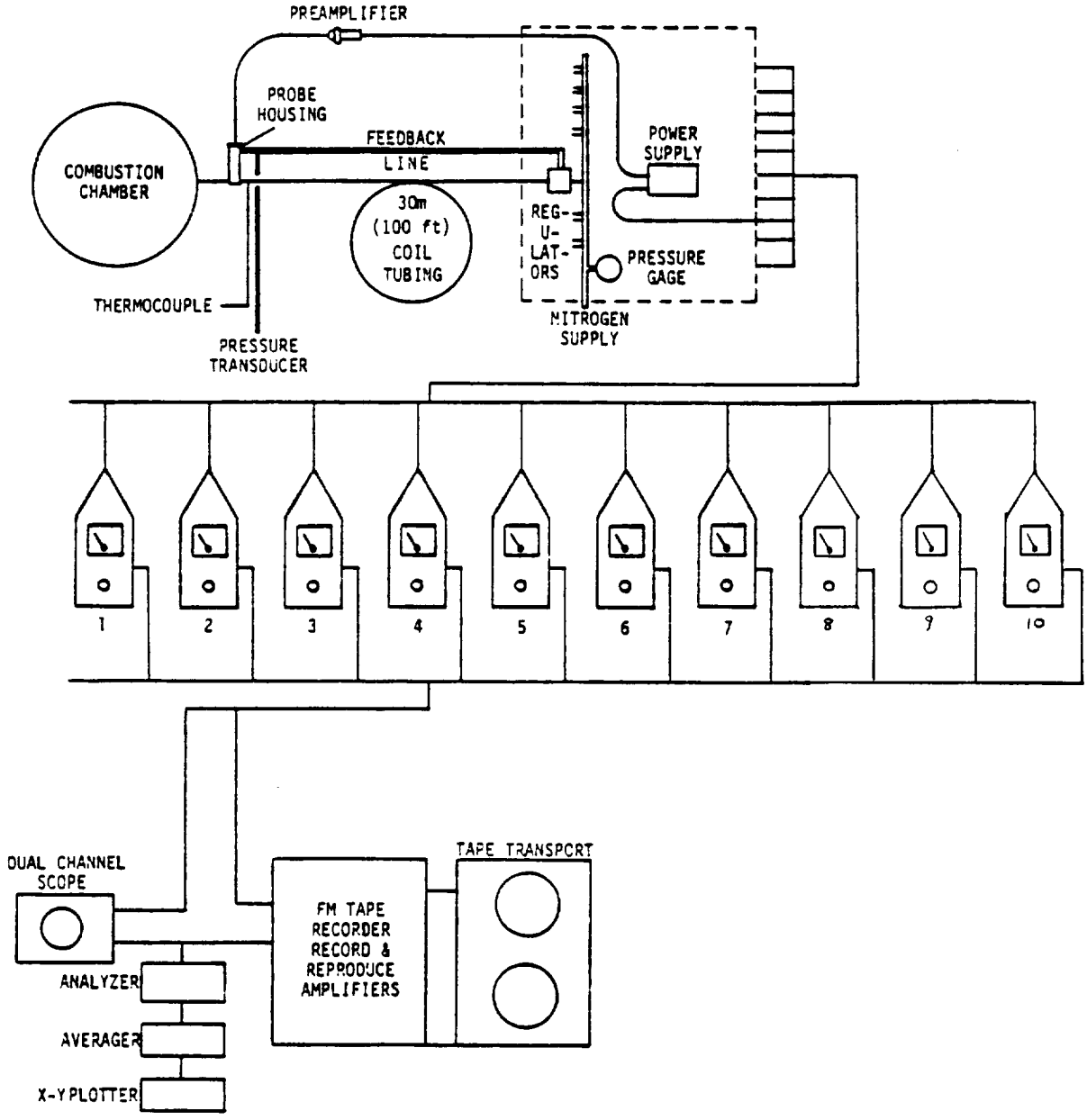

Figure 11. Acoustic Data Acquisition System Schematic.

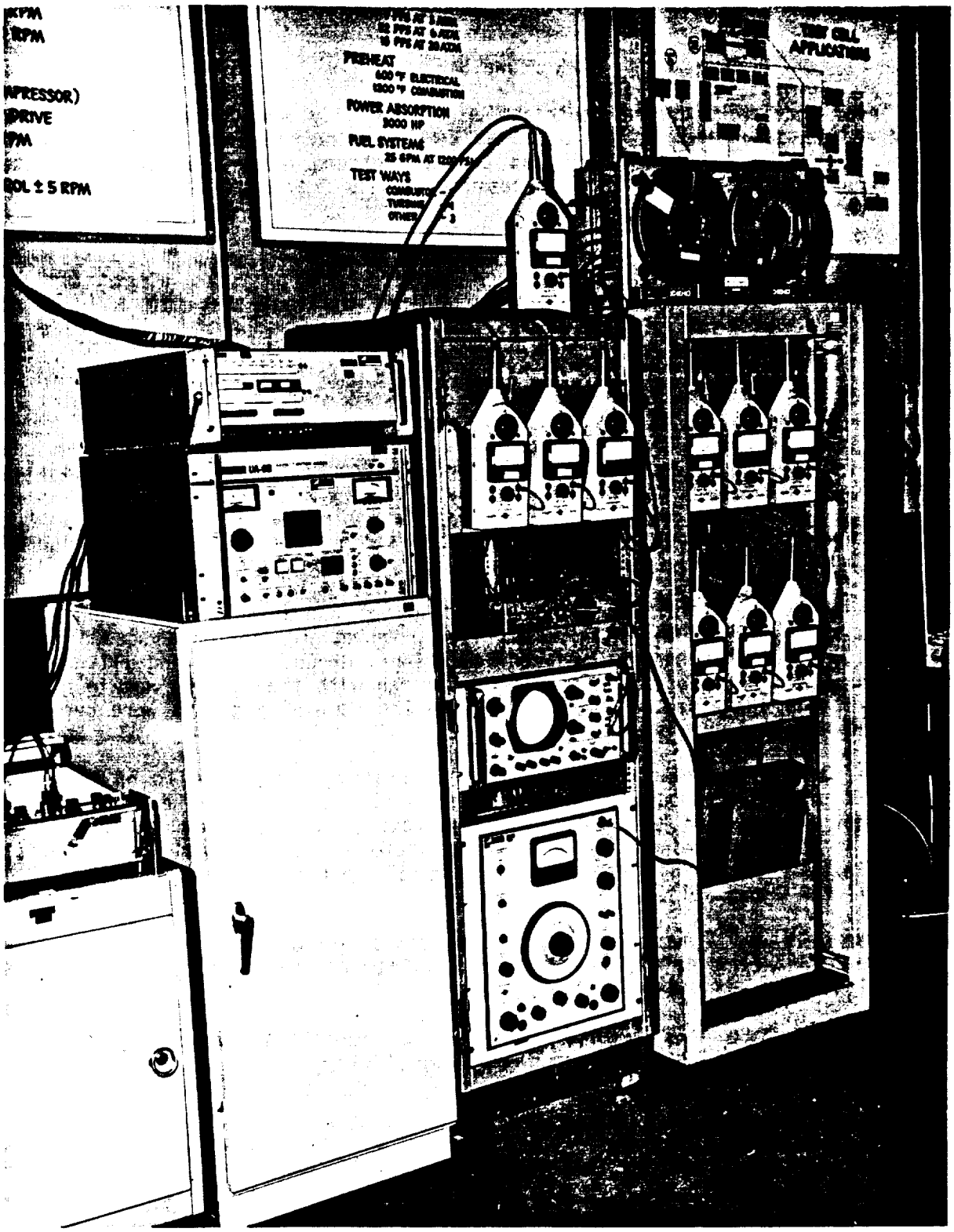

Figure 12. Data Acquisition Equipment Setup .

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Background Noise Levels

Investigation into the contribution of facility machinery and duct work flow noise, conducted in the previous combustor noise test, is described in Reference 3. It was determined that this background noise did not contribute significantly to the acoustic pressure levels recorded during combustor operation.

Combustor Operating Points

Upstream and downstream valves were opened to start the data acquisition phase. A sequence of testing was followed that required the least amount of system changes between test runs. After each test point was established, the system was allowed to stabilize before the acoustic signals were recorded. These dynamic pressure level recordings consisted of a single segment of tape for 200 seconds (500 ft of tape at 30 ips). Before proceeding to the next operating point, a narrow-band pressure level spectrum was generated from one channel of the just-recorded data to check the condition of the recorded signals.

Combustor rig temperature, pressure, and air and fuel flows were monitored to check system stability and recorded for later analysis.

The tests were divided into seven groups of operating points, though not necessarily recorded in that order. The grouping was designed according to various operating parameters and configurations. Groups I, II, and III contain the run points recorded while the combustor ran with the turbine nozzle guide-vane assembly installed. The run points in the remaining groups were recorded with the nozzle removed.

The operating parameters of Group I (operating line) were to be the same as those of the previous YF-102 combustor noise test. Since these parameters could not be repeated as planned with the nozzle in place, new parameters had to be established and used. Heat-release rate variations were performed at high pressure (373 KPa) (54 psi) for Group II, and at low pressure (110 KPa) (16 psi) for Group III).

Groups IV and V are the comparative control group for the operating line and zero fuel-flow point, respectively, using the new operating parameters established for the nozzle configuration.

Tables I through V contain the combustor operating parameters monitored during each run for Groups I through V, respectively.

TABLE I. COMBUSTOR AND TEST RIG OPERATING PARAMETERS
Group I - Operating Line with Turbine Nozzle

RUN NO.	P_{t3} KPa (psia)	P_{s3} KPa (psia)	P_{sf1} KPa (psia)	T_{t3} °C (°F)	$T_{t3.8}$ °C (°F)	Calculated $T_{t3.8}$ °C (°F)	W_a Kg/s (lb/s)	W_f Kg/hr (lb/hr)	W_f/W_a	Valve: % Open
136	110.35 (16.0)	110.24 (15.99)	98.90 (14.34)	59.2 (138.5)	948.6 (1739.4)	1052.5 (1926.5)	0.801 (1.765)	78.06 (172.10)	0.0271	100.0
132	138.55 (20.09)	138.15 (20.04)	110.75 (16.06)	72.2 (161.9)	1031.6 (1888.9)	1075.7 (1968.2)	1.325 (2.922)	133.17 (293.57)	0.0279	100.0
133	186.31 (27.02)	185.57 (26.91)	128.63 (18.66)	100.8 (213.5)	728.7 (1343.7)	745.2 (1373.4)	2.436 (5.371)	150.00 (330.68)	0.0171	100.0
102	256.04 (37.13)	254.70 (36.94)	180.34 (26.16)	125.9 (258.5)	695.1 (1283.2)	675.9 (1248.6)	3.457 (7.621)	179.54 (395.82)	0.0144	100.0
103	310.92 (45.09)	309.19 (44.84)	201.16 (29.18)	145.3 (293.5)	700.8 (1293.4)	688.6 (1271.5)	4.305 (9.490)	220.77 (486.72)	0.0142	83.0
106	374.18 (54.27)	371.80 (53.92)	236.18 (34.25)	169.5 (337.0)	716.1 (1320.9)	722.0 (1331.6)	5.056 (11.146)	262.96 (579.72)	0.0144	70.0
107	442.61 (64.19)	439.62 (63.76)	273.69 (39.69)	198.2 (388.7)	776.6 (1429.9)	824.9 (1516.8)	5.85 (12.896)	384.92 (769.22)	0.0166	64.0
110	554.81 (80.47)	550.75 (79.88)	338.07 (49.03)	230.4 (446.7)	836.4 (1537.5)	827.9 (1522.2)	7.415 (16.348)	427.68 (942.86)	0.0160	75.0

TABLE II. COMBUSTOR AND TEST RIG OPERATING PARAMETERS
Group II - Heat Release Rate Variations at High Pressure with Turbine Nozzle

RUN NO.	P_{t3} KPa (psia)	P_{s3} KPa (psia)	P_{sf1} KPa (psia)	T_{t3} ^{o}C (^{o}F)	$T_{t3.8}$ ^{o}C (^{o}F)	Calculated $T_{t3.8}$ ^{o}C (^{o}F)	W_a Kg/s (lb/s)	W_f Kg/hr (lb/hr)	W_f/W_a	Valve: % Open
105	372.88 (54.08)	370.95 (53.80)	319.59 (46.35)	169.9 (337.8)	123.2 (253.7)	169.9 (337.8)	5.032 (11.104)	0.0	0.0	53.0
112	373.43 (54.16)	370.81 (53.78)	291.65 (42.30)	170.3 (338.5)	324.1 (615.3)	***	5.063 (11.161)	132.61 (292.58)	0.0073	62.0
138	372.89 (54.08)	370.17 (53.69)	271.26 (39.34)	170.1 (338.1)	557.2 (1034.9)	585.5 (1085.9)	5.080 (11.199)	195.20 (430.33)	0.0107	70.0
137	372.81 (54.07)	370.91 (53.79)	228.38 (33.12)	170.0 (338.1)	592.2 (1098.0)	867.1 (1592.7)	5.115 (11.277)	328.25 (723.66)	0.0178	100.0
113	372.28 (53.99)	370.10 (53.68)	226.50 (32.85)	165.0 (329.0)	844.9 (1552.7)	869.8 (1597.7)	5.040 (11.111)	341.79 (753.51)	0.0188	100.0

*** indicates data not within range of efficiency curve

TABLE III. COMBUSTOR AND TEST RIG OPERATING PARAMETERS
Group III - Heat Release Rate Variations at Low Pressure With Turbine Nozzle

RUN NO.	P_{t3} KPa (psia)	P_{s3} KPa (psia)	P_{sf1} KPa (psia)	T_{t3} °C (°F)	$T_{t3.8}$ °C (°F)	Calculated $T_{t3.8}$ °C (°F)	W_a Kg/s (lb/s)	W_f Kg/hr (lb/hr)	W_f/W_a	Valve: % Open
131	110.75 (16.06)	110.84 (16.08)	102.08 (14.81)	56.2 (133.1)	635.4 (1175.8)	792.5 (1458.6)	0.837 (1.846)	57.38 (126.49)	0.0190	100.0
134	110.27 (15.99)	110.12 (15.97)	104.46 (15.15)	61.6 (142.9)	340.7 (645.2)	606.9 (1124.4)	0.799 (1.762)	38.52 (84.93)	0.0134	100.0
135	110.28 (15.99)	110.21 (15.98)	101.70 (14.75)	59.7 (139.5)	681.5 (1258.7)	813.6 (1496.5)	0.806 (1.776)	56.87 (125.38)	0.0196	100.0

TABLE IV. COMBUSTOR AND TEST RIG OPERATING PARAMETERS
Group IV - Operating Line without Turbine Nozzle

RUN NO.	P_{t3} KPa (psia)	P_{s3} KPa (psia)	P_{sf1} KPa (psia)	T_{t3} °C (°F)	$T_{t3.8}$ °C (°F)	Calculated $T_{t3.8}$ °C (°F)	W_a Kg/s (lb/s)	W_f Kg/hr (lb/hr)	W_f/W_a	Valve: % Open
236	109.34 (15.86)	109.26 (15.85)	107.68 (15.62)	53.6 (128.5)	869.3 (1596.8)	***	0.798 (1.759)	78.58 (173.23)	0.0274	68.5
232	138.80 (20.13)	138.24 (20.05)	131.79 (19.11)	82.9 (181.2)	760.3 (1400.5)	***	1.914 (4.220)	134.03 (295.48)	0.0194	46.0
233	186.90 (27.11)	186.22 (27.01)	178.73 (25.92)	95.9 (204.7)	721.8 (1331.3)	743.4 (1370.0)	2.415 (5.323)	149.06 (328.61)	0.0171	39.2
202	256.66 (37.22)	255.42 (37.04)	244.45 (35.45)	131.7 (269.1)	674.1 (1245.3)	751.8 (1385.3)	3.449 (7.604)	201.25 (443.67)	0.0162	43.2
203	310.76 (45.07)	309.13 (44.83)	294.58 (42.72)	147.0 (296.7)	682.4 (1260.4)	698.5 (1289.4)	4.303 (9.487)	223.07 (491.78)	0.0144	40.0
206	373.29 (54.14)	371.37 (53.86)	353.97 (51.34)	169.7 (337.5)	709.4 (1309.0)	723.6 (1334.4)	5.036 (11.103)	262.25 (578.15)	0.0145	41.1
207	446.92 (64.82)	444.00 (64.39)	421.73 (61.17)	199.2 (390.6)	716.2 (1321.1)	725.2 (1337.4)	6.262 (13.806)	310.40 (684.31)	0.0138	80.0
210	556.56 (80.72)	552.77 (80.17)	524.23 (76.03)	229.9 (445.8)	827.7 (1521.9)	829.3 (1524.7)	7.440 (16.403)	429.68 (947.27)	0.0160	61.7

*** indicates data not within range of efficiency curve

TABLE V. COMBUSTOR AND TEST RIG OPERATING PARAMETERS
Group V - Zero Fuel Flow Point Without Turbine Nozzle

RUN NO.	P_{t3} KPa (psia)	P_{s3} KPa (psia)	P_{sf1} KPa (psia)	T_{t3} °C (°F)	$T_{t3.8}$ °C (°F)	Calculated $T_{t3.8}$ °C (°F)	W_a Kg/s (lb/s)	W_f Kg/hr (lb/hr)	W_f/W_a	Valve: % Open
205	372.60 (54.04)	370.61 (53.75)	360.65 (52.31)	170.6 (339.2)	168.2 (334.8)	170.6 (339.2)	5.043 (11.118)	0.0	0.0	37.7

DATA REDUCTION AND ANALYSIS

Description of Data and Reduction Instrument

Reduction to One-Third Octave Band Spectra

The recorded data were reproduced through a Bruel and Kjaer 2131 digital 1/3-octave band spectrum analyzer coupled with a Hewlett-Packard 9825 desktop calculator. The analyzer was programmed to generate 1-second sample averages. These data are then input to the calculator which then computes a logarithmic average of 50 such samples. The spectrum average is then punched out on a Hewlett-Packard 9884A high-speed paper-tape punch. The punched tape is subsequently transmitted to an IBM 3033 computer program that applies correction factors (Table VI) supplied by NASA and produces tabular listings (Appendix A) and graphical plots (Appendix B) of the 1/3 octave band spectra.

Reduction to Narrow Band Spectra

Recorded signals were played back through a Nicolet Scientific UA6B Spectrum Analyzer and Nicolet Scientific 1015 Spectrum Averager and plotted on grid paper by an X-Y recorder. The spectrum analyzer digitizes the input signal and computes the frequency domain transform in 500 discrete lines. The rate of sampling depends upon the duration setting of the band width/sampling. The spectrum averager computes a running average for each of the 500 discrete lines for each sample set; the number of samples is predetermined. After the spectrum averaging has been completed, the output feature of the averager is activated to produce an X-Y plot of the stored spectrum average values. Narrow-band spectra were obtained for each probe and run point. Narrow-band 0-2000 Hz data are contained in Appendix C. These X-Y plots represent the spectrum average of 128 samples of 500 4-Hz-wide bands. Plots of 0-10,000 Hz spectra were also obtained. These plots are the spectrum averages of 128 samples of 500 20-Hz-wide bands. These data were forwarded to NASA.

Allowance for Correlation Analysis

These data were recorded on 25.4 mm (1 inch) magnetic tape. A 1000 Hz signal was simultaneously placed on each channel to allow determination of any head-skew error between the recording and reproducing tape recorders.

TABLE VI. ONE-THIRD OCTAVE BAND PRESSURE LEVEL CORRECTION FACTORS

Combustion Chamber Inlet Pressure	257.9-312.3 kpa (37.4-45.3 psia)	373.6 kpa (54.2 psia)	447.5-555.0-620-5 kpa (64.9 - 80.5-90.0 psia)
Frequency, Hz	Correction Factors, dB re 20 micropascals		
50	3.7	4.2	4.7
63	3.7	4.2	4.7
80	3.7	4.2	4.7
100	3.7	4.2	4.7
125	3.4	3.9	4.4
160	2.8	3.3	3.8
200	1.8	2.3	2.8
250	.9	1.4	1.9
315	.7	1.2	1.7
400	1.4	1.9	2.4
500	1.6	2.1	2.6
630	.5	1.0	1.5
800	2.3	2.8	3.3
1000	2.9	3.4	3.9
1250	2.8	3.3	3.8
1600	3.7	4.2	4.7
2000	4.0	4.5	5.0
2500	3.2	3.7	4.2
3150	2.9	3.4	3.9
4000	3.5	3.9	4.5

REFERENCES

1. Reshotko, M. and Karchmer, A., CORE NOISE MEASUREMENTS FROM A SMALL, GENERAL AVIATION TURBOFAN ENGINE, NASA TM 81610, 1980

2. Reshotko, M., et all, CORE NOISE MEASUREMENTS ON A YF 102 TURBOFAN ENGINE, American Institute of Astronautics and Aeronautics (AIAA) 77-21.

3. Wilson, C.A. "YF-102 IN-DUCT COMBUSTOR NOISE MEASUREMENTS" NASA CR-135404 Nov. 1977.

4. Reshotko, M., and Karchmer, A., COMBUSTOR FLUCTUATING PRESSURE MEASUREMENTS IN-ENGINE AND IN A COMPONENT TEST FACILITY --- A PRELIMINARY COMPARISON, NASA TM-73845, 1977.

5. Huntly, S.C., IDEAL TEMPERATURE RISE DUE TO CONSTANT-PRESSURE COMBUSTION OF A JP-4 Fuel, NASA RME 55G27a (1955).

APPENDIX A

ONE-THIRD OCTAVE BAND PRESSURE LEVELS

	Group	Pt3 (psia)	Run Number	Off-Design Wf/Wa (%)
I.	YF102 Operating Points with nozzle guidevanes	16	136	-
		20	132	-
		27	133	-
		37	102	-
		45	103	-
		54	106	-
		64	107	-
		80	110	-
II.	YF102 High-Pressure Heat Release Rate Variation with nozzle guidevanes	65	105	0
		54	112	50
		54	138	75
		54	137	125
		54	113	150
III.	YF102 Low-Pressure Heat Release Rate Variation with nozzle guidevanes	16	131	50
		16	134	75
		16	135	125
IV.	YF102 Operating Points without nozzle guidevanes	16	236	-
		20	232	-
		27	233	-
		37	202	-
		45	203	-
		54	206	-
		64	207	-
		80	210	-
V.	YF102 Zero Fuel Flow without nozzle guidevanes	54	205	-

APPENDIX A

GROUP I

RUN NO. 136 GROUP NO. I DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS

FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED

INLET PRESS=110.4 KPA(16.0 PSIA), COMB EXIT TEMP=1052.5 DEG C(1926.5 DEG F)

AIR FLOW= 0.80 KG/SEC(1.765#/SEC), FUEL FLOW= 78.1 KG/HR(172.1 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	111.0*	112.8*	114.6*	115.6*	115.3*	115.4*	115.2*	114.3*	113.5*	121.3*
63.0	117.3*	119.2*	121.4*	121.9*	121.7*	121.5*	121.6*	121.3*	120.4*	119.4*
80.0	120.4*	121.1*	123.2*	123.7*	123.5*	123.5*	123.4*	123.1*	122.4*	120.9*
100.0	119.1*	121.7*	123.7*	124.3*	124.1*	124.0*	124.1*	123.4*	123.0*	121.8*
125.0	117.9*	119.9*	121.4*	121.8*	121.4*	121.4*	121.4*	120.7*	120.5*	121.9*
160.0	121.1*	122.6*	123.7*	124.2*	123.7*	123.7*	123.7*	122.9*	123.1*	122.2*
200.0	119.1*	121.6*	122.1*	122.5*	122.0*	122.2*	122.1*	121.2*	121.5*	124.5*
250.0	120.1*	122.4*	122.9*	123.4*	122.6*	122.9*	122.9*	121.9*	122.3*	124.1*
315.0	125.7*	127.2*	127.9*	128.7*	127.7*	127.9*	127.8*	127.3*	127.2*	126.8*
400.0	125.3*	127.3*	128.6*	128.9*	128.1*	128.8*	128.6*	127.8*	127.0*	123.7*
500.0	123.3*	124.4*	125.1*	124.9*	124.1*	123.7*	123.2*	123.0*	121.4*	123.0*
630.0	113.6*	118.5*	119.5*	119.2*	119.1*	119.5*	118.3*	119.3*	117.0*	130.6*
800.0	109.8*	116.4*	116.2*	115.7*	114.8*	115.6*	114.8*	115.1*	114.0*	125.5*
1000.0	109.4*	114.8*	113.2*	111.3*	111.7*	110.7*	109.8*	111.6*	108.0*	126.6*
1250.0	111.2*	112.1*	111.1*	110.2*	111.8*	109.8*	109.3*	110.7*	108.2*	126.5*
1600.0	109.9*	107.9*	108.2*	107.7*	111.4*	107.6*	107.0*	107.5*	106.0*	126.4*
2000.0	108.7*	103.3*	103.7*	103.5*	108.9*	102.9*	102.0*	102.4*	101.8*	124.4*
2500.0	107.6*	102.6*	101.2*	103.8*	107.4*	103.2*	102.3*	103.3*	101.9*	122.8*
3150.0	109.7*	107.3*	101.0*	108.3*	107.9*	107.8*	107.3*	107.3*	105.4*	121.3*
4000.0	107.7*	107.1*	103.2*	107.0*	106.3*	106.6*	106.5*	107.1*	104.7*	119.1*
5000.0	99.5*	104.1*	104.8*	100.5*	102.4*	100.5*	99.8*	102.1*	100.1*	117.3*
6300.0	95.7*	105.6*	103.9*	106.2*	104.6*	105.9*	105.5*	105.3*	101.4*	115.9*
8000.0	97.7*	97.4*	99.8*	99.5*	100.1*	99.5*	99.4*	100.8*	97.6*	110.3*
10000.0	95.3*	98.9*	96.2*	99.3*	97.8*	99.1*	98.6*	99.0*	94.9*	106.8*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 132 GROUP NO. I

DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS

FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED

INLET PRESS=138.5 KPA(20.1 PSIA), COMB EXIT TEMP=1076. DEG C(1968.2 DEG F)

AIR FLOW= 1.32 KG/SEC(2.92#/SEC), FUEL FLOW=133.2 KG/HR(293.7 #/HR)

	PROBE NO.									
FREQ. HZ	1	2	3	4	5	6	7	8	9	10
	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	117.0*	117.5*	119.2*	120.9*	119.8*	119.8*	121.6*	120.0*	117.9*	127.1*
63.0	117.9*	120.2*	122.3*	124.1*	122.7*	122.6*	123.5*	122.9*	121.0*	126.9*
80.0	123.0*	125.0*	126.6*	128.4*	127.0*	127.1*	127.3*	127.6*	125.5*	126.8*
100.0	122.9*	125.7*	127.8*	129.4*	127.7*	128.0*	127.8*	128.5*	126.9*	126.8*
125.0	122.2*	123.9*	125.6*	127.2*	125.9*	126.1*	126.6*	125.9*	124.9*	123.0*
160.0	123.9*	125.4*	126.7*	127.7*	126.7*	126.8*	127.0*	126.6*	125.9*	129.0*
200.0	124.5*	127.3*	127.6*	128.2*	127.6*	127.8*	127.5*	127.2*	127.0*	131.2*
250.0	125.5*	128.4*	128.6*	128.6*	128.5*	128.5*	128.1*	127.1*	127.4*	131.1*
315.0	129.1*	131.1*	132.0*	132.1*	131.9*	131.9*	131.3*	130.7*	130.8*	132.2*
400.0	128.7*	131.1*	132.5*	132.8*	131.8*	132.1*	132.4*	131.5*	131.0*	129.8*
500.0	131.9*	133.9*	134.6*	134.9*	133.8*	134.7*	136.0*	134.3*	132.1*	131.4*
630.0	122.8*	129.3*	130.3*	129.2*	129.1*	130.2*	130.4*	129.4*	127.9*	131.2*
800.0	118.4*	126.3*	126.2*	124.6*	123.8*	124.8*	125.3*	124.0*	123.6*	130.8*
1000.0	117.7*	125.2*	123.7*	121.5*	121.6*	122.1*	122.2*	120.2*	117.9*	134.7*
1250.0	117.5*	122.7*	121.9*	120.5*	119.2*	119.4*	120.6*	118.8*	116.2*	132.9*
1600.0	114.9*	118.4*	118.4*	116.8*	116.8*	116.2*	119.0*	115.8*	114.2*	133.3*
2000.0	113.3*	113.1*	113.4*	112.1*	113.9*	111.7*	117.4*	111.2*	110.6*	132.2*
2500.0	114.3*	111.2*	109.7*	112.9*	113.6*	112.4*	117.7*	111.3*	111.3*	132.2*
3150.0	117.9*	116.1*	108.9*	117.1*	116.0*	116.7*	119.4*	116.0*	114.2*	131.3*
4000.0	116.9*	115.6*	111.5*	115.9*	114.6*	115.6*	118.5*	115.9*	112.9*	128.5*
5000.0	108.3*	113.0*	113.9*	109.6*	110.9*	109.3*	116.9*	110.8*	109.4*	124.9*
6300.0	106.9*	113.6*	113.3*	116.2*	114.9*	116.1*	118.5*	116.6*	111.3*	125.9*
8000.0	107.1*	106.1*	108.9*	109.3*	110.0*	109.5*	116.4*	110.6*	107.5*	124.1*
10000.0	105.5*	107.5*	105.4*	109.0*	108.2*	108.8*	116.1*	109.3*	104.3*	119.6*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 133 GROUP NO. I DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS
FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED
INLET PRESS=186.3 KPA(27.0 PSIA), COMB EXIT TEMP=745.2 DEG C(1373.4 DEG F)
AIR FLOW= 2.44 KG/SEC(5.37#/SEC), FUEL FLOW=150.0 KG/HR(330.7 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	123.9*	123.8*	125.5*	127.6*	126.0*	126.2*	125.7*	126.6*	124.5*	131.5*
63.0	123.0*	125.0*	127.2*	129.2*	127.6*	127.6*	127.7*	128.4*	126.0*	131.9*
80.0	128.5*	129.9*	132.1*	134.0*	132.3*	132.2*	132.4*	133.4*	131.1*	131.7*
100.0	125.2*	127.9*	129.9*	131.7*	130.2*	130.2*	130.3*	131.2*	128.9*	132.4*
125.0	125.9*	127.3*	129.1*	130.5*	129.0*	129.2*	129.2*	129.8*	127.8*	134.2*
160.0	127.6*	129.3*	130.6*	131.8*	130.5*	130.6*	130.5*	130.9*	129.6*	136.3*
200.0	129.1*	131.0*	131.6*	132.4*	131.6*	131.8*	131.5*	131.1*	130.5*	138.0*
250.0	131.1*	133.8*	134.2*	134.4*	134.1*	134.2*	134.0*	132.9*	133.3*	137.6*
315.0	131.8*	133.4*	134.2*	134.2*	134.1*	134.2*	133.8*	132.7*	133.0*	136.6*
400.0	129.8*	132.8*	134.3*	134.4*	133.8*	134.5*	134.4*	133.1*	132.4*	135.5*
500.0	130.3*	134.2*	135.0*	135.5*	135.4*	136.4*	137.4*	133.9*	132.3*	136.6*
630.0	127.2*	134.6*	135.9*	135.0*	135.4*	136.4*	136.1*	133.6*	133.1*	138.5*
800.0	127.0*	134.8*	135.4*	133.7*	133.1*	134.4*	133.9*	132.4*	131.6*	135.4*
1000.0	127.2*	131.4*	130.5*	127.9*	126.8*	127.1*	128.8*	125.8*	123.7*	138.6*
1250.0	126.5*	128.8*	128.3*	127.9*	125.6*	126.1*	126.6*	125.9*	123.6*	137.5*
1600.0	123.6*	125.4*	124.8*	124.4*	124.1*	122.9*	123.4*	122.9*	120.6*	140.3*
2000.0	121.6*	119.5*	119.8*	120.2*	120.9*	118.7*	118.9*	119.2*	117.9*	137.7*
2500.0	122.6*	118.6*	117.4*	121.9*	121.3*	120.3*	120.0*	120.7*	120.0*	137.7*
3150.0	126.5*	121.2*	116.3*	123.8*	122.7*	123.5*	123.1*	123.4*	122.1*	137.3*
4000.0	127.7*	121.1*	118.0*	120.7*	119.3*	120.2*	120.1*	120.8*	119.5*	135.1*
5000.0	121.8*	116.9*	118.0*	115.3*	117.3*	115.2*	115.0*	118.2*	116.7*	131.8*
6300.0	118.4*	118.6*	118.0*	117.7*	117.8*	118.9*	118.7*	118.2*	116.6*	131.2*
8000.0	114.2*	112.2*	115.7*	115.5*	116.7*	115.2*	115.0*	118.8*	115.4*	129.8*
10000.0	114.3*	114.3*	112.3*	113.9*	114.6*	115.4*	114.8*	116.4*	111.2*	128.3*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 102 GROUP NO. I DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS

FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED

INLET PRESS=256.0 KPA(37.1 PSIA), COMB EXIT TEMP=675.9 DEG C(1248.6 DEG F)

AIR FLOW= 3.46 KG/SEC(7.62#/SEC), FUEL FLOW=179.5 KG/HR(395.8 #/HR)

	PROBE NO.									
FREQ. HZ	1	2	3	4	5	6	7	8	9	10
	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	129.4	129.9	130.9	132.9	131.3	131.5	119.3	133.3	118.8	136.8
63.0	127.4	130.1	131.3	133.6	131.9	132.2	122.4	134.2	121.9	137.2
80.0	133.9	136.1	137.3	138.7	137.4	137.6	129.5	139.9	129.2	137.4
100.0	132.2	135.8	136.9	138.2	137.3	137.4	131.3	139.5	130.8	137.6
125.0	134.0	136.2	136.9	137.9	137.0	137.2	132.4	139.1	132.2	139.5
160.0	132.0	134.7	135.0	135.9	135.2	135.2	132.1	136.8	131.9	139.1
200.0	133.9	136.9	136.2	136.9	136.1	136.2	134.7	137.1	134.6	140.0
250.0	134.0	137.3	136.4	136.9	136.4	136.3	136.3	136.3	135.5	139.9
315.0	135.5	138.4	137.9	138.4	137.9	138.0	139.0	137.7	137.7	143.8
400.0	134.0	137.9	138.3	138.9	138.1	138.8	140.6	138.3	137.7	138.2
500.0	133.8	139.3	139.1	139.8	138.6	138.5	142.0	140.5	138.6	138.5
630.0	130.3	138.1	138.4	138.1	137.2	137.7	141.1	138.0	137.3	140.5
800.0	131.3	139.3	139.1	139.0	136.8	138.1	141.9	138.7	138.6	140.9
1000.0	132.4	137.3	134.9	134.2	132.2	132.5	137.4	133.7	132.7	143.0
1250.0	132.0	134.8	133.0	134.3	132.0	132.2	137.4	132.2	131.8	144.4
1600.0	131.2	133.0	131.1	132.5	132.2	130.1	135.7	130.4	130.1	150.3
2000.0	128.9	127.5	127.0	128.9	129.5	126.4	131.5	127.7	128.3	145.4
2500.0	128.6	126.2	124.5	128.6	128.9	126.7	132.0	127.5	129.3	144.0
3150.0	131.9	128.2	123.5	130.4	129.9	129.2	134.4	128.7	130.8	143.4
4000.0	135.4	128.2	124.2	127.7	127.9	127.2	131.9	127.4	128.1	141.8
5000.0	129.3*	121.3*	121.6*	119.3*	121.7*	118.4*	123.6*	120.7*	121.6*	135.3*
6300.0	127.1*	124.1*	121.4*	121.1*	121.2*	122.2*	127.2*	121.3*	120.3*	134.5*
8000.0	121.2*	117.8*	118.8*	119.8*	120.5*	119.5*	124.1*	120.1*	119.7*	133.2*
10000.0	120.9*	117.1*	115.4*	118.9*	118.9*	119.2*	123.8*	119.1*	117.1*	132.1*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 103 GROUP NO. I DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS

FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED

INLET PRESS=310.9 KPA(45.1 PSIA), COMB EXIT TEMP=688.6 DEG C(1271.5 DEG F)

AIR FLOW= 4.30 KG/SEC(9.49#/SEC), FUEL FLOW=220.8 KG/HR(486.7 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	133.7	135.1	135.4	137.0	136.4	136.6	142.7	138.2	127.3	138.8
63.0	129.0	132.7	133.9	135.5	134.7	134.7	141.0	137.0	127.8	138.6
80.0	135.3	138.0	138.9	140.0	139.3	139.4	145.7	141.8	134.2	140.2
100.0	134.1	137.9	138.8	139.9	139.4	139.5	145.7	141.7	135.7	140.3
125.0	137.6	140.4	141.1	141.8	141.2	141.3	147.5	143.5	139.1	143.4
160.0	134.6	137.7	138.1	138.8	138.4	138.4	144.7	140.1	137.4	144.0
200.0	134.5	137.0	136.6	137.4	137.0	137.4	143.6	137.4	136.7	142.0
250.0	137.5	141.6	140.8	141.3	141.0	140.9	147.2	140.4	141.1	141.7
315.0	138.0	141.7	141.2	141.7	141.4	141.5	147.6	140.8	141.8	141.3
400.0	136.9	140.5	141.1	141.7	140.8	141.7	147.5	141.3	141.2	141.8
500.0	135.4	142.0	141.8	142.4	142.8	143.6	150.0	141.5	141.7	144.1
630.0	132.6	141.4	141.5	141.4	141.2	141.4	146.9	140.6	140.1	144.9
800.0	133.7	142.9	142.8	142.4	140.7	142.3	147.9	141.4	141.9	144.1
1000.0	135.1	140.2	137.6	137.1	135.1	135.5	142.3	137.3	135.7	149.6
1250.0	134.8	138.4	136.5	137.5	134.8	135.5	141.8	135.6	135.1	147.0
1600.0	133.7	135.2	133.0	135.1	134.7	133.0	139.2	133.1	132.5	151.0
2000.0	131.2	130.8	129.9	132.4	132.5	130.0	135.7	130.6	131.0	147.2
2500.0	131.0	129.1	127.3	131.3	131.4	129.4	135.6	130.5	132.1	146.8
3150.0	133.9	131.2	126.5	132.9	132.3	131.7	137.8	132.5	134.0	146.6
4000.0	138.1	131.0	127.7	130.3	130.3	129.8	135.8	130.8	131.4	145.5
5000.0	134.2*	124.6*	124.9*	123.0*	125.4*	122.4*	128.7*	124.5*	124.9*	139.1*
6300.0	131.5*	127.6*	125.6*	125.0*	124.8*	124.9*	131.0*	125.1*	123.8*	137.7*
8000.0	125.1*	122.3*	123.1*	124.7*	124.1*	123.3*	129.4*	125.4*	124.6*	136.6*
10000.0	124.8*	120.9*	119.4*	122.6*	122.2*	122.9*	128.6*	124.3*	121.7*	135.1*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 106 GROUP NO. I

DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS
FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED
INLET PRESS=374.2 KPA(54.3 PSIA), COMB EXIT TEMP=722.0 DEG C(1331.6 DEG F)
AIR FLOW= 5.06 KG/SEC(11.15#/SEC), FUEL FLOW=263.0 KG/HR(579.7 #/HR)

FREQ. HZ	PROBE NO. 1	2	3	4	5	6	7	8	9	10
	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	136.3	138.0	138.0	140.5	139.3	139.6	139.5	140.0	137.4	4.2
63.0	130.0	133.8	134.7	137.6	135.8	136.8	136.0	137.5	133.6	4.2
80.0	136.7	139.8	140.4	142.7	141.4	141.7	141.6	143.0	139.4	4.2
100.0	136.0	139.1	139.9	141.8	140.7	141.4	140.7	142.3	138.8	4.2
125.0	139.6	142.1	142.6	144.2	143.1	143.9	143.4	144.8	141.7	3.9
160.0	136.7	139.3	139.7	140.7	140.2	141.1	140.6	141.0	139.0	3.3
200.0	138.1	140.9	140.3	141.1	141.0	141.7	141.7	140.3	139.6	2.3
250.0	145.0	149.3	148.6	148.6	149.0	149.7	149.2	147.0	147.1	1.4
315.0	141.3	144.8	144.4	144.6	144.9	145.3	144.9	142.8	142.9	1.2
400.0	140.3	144.1	144.4	144.9	144.7	145.8	145.4	143.3	141.9	1.9
500.0	138.2	146.1	146.1	146.4	145.9	145.8	145.5	145.2	141.4	2.1
630.0	136.5	146.7	146.3	146.1	145.2	144.1	143.3	146.0	143.1	1.0
800.0	136.7	147.8	147.5	146.1	144.9	147.0	146.3	144.2	141.6	2.8
1000.0	137.6	146.1	142.8	139.9	138.7	140.5	139.8	140.0	136.6	3.4
1250.0	137.8	142.9	140.7	140.1	137.9	140.1	139.3	138.4	135.6	3.3
1600.0	136.4	139.6	136.9	137.8	137.5	137.4	136.7	136.4	133.5	4.2
2000.0	133.6	134.7	133.1	135.4	135.0	134.2	133.1	132.9	130.9	4.5
2500.0	133.5	132.1	129.9	134.3	133.7	133.0	132.5	132.5	132.3	3.7
3150.0	136.2	134.4	129.4	136.4	134.8	134.6	134.6	135.3	135.0	3.4
4000.0	140.3	133.3	130.1	133.0	132.3	132.5	132.4	132.8	131.3	3.9
5000.0	137.2*	126.6*	127.0*	125.3*	126.9*	124.9*	124.8*	125.8*	124.3*	0.0*
6300.0	134.5*	128.9*	126.5*	127.1*	126.4*	124.1*	126.6*	126.4*	126.0*	0.0*
8000.0	127.4*	124.7*	124.8*	126.3*	126.3*	125.7*	125.3*	126.2*	125.4*	0.0*
10000.0	127.4*	121.9*	120.9*	124.4*	124.1*	122.8*	124.9*	124.7*	123.6*	0.0*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 107 GROUP NO. I

DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS
FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED
INLET PRESS=442.6 KPA(64.2 PSIA), COMB EXIT TEMP=824.9 DEG C(1516.8 DEG F)
AIR FLOW= 5.85 KG/SEC(12.90#/SEC), FUEL FLOW=348.9 KG/HR(769.2 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	138.8	139.8	139.0	142.1	141.7	142.2	141.9	142.5	139.5	
63.0	131.4	134.5	134.8	138.0	137.1	138.0	137.3	138.4	134.6	
80.0	137.9	140.3	140.9	143.2	142.4	142.9	142.5	143.6	140.4	
100.0	138.0	140.2	141.0	142.9	142.2	142.9	142.2	143.4	140.3	
125.0	140.5	143.5	144.0	145.4	144.9	145.6	145.1	145.9	143.3	
160.0	139.5	141.0	141.0	142.1	141.9	142.7	142.4	142.6	140.9	
200.0	139.9	141.2	140.5	141.6	141.5	142.4	142.1	140.7	140.2	
250.0	143.8	146.7	145.7	146.3	146.9	147.4	147.0	144.7	144.7	
315.0	143.9	147.3	146.6	147.1	147.6	148.1	147.6	145.4	145.3	
400.0	142.3	145.7	145.9	146.6	146.4	147.7	147.0	145.3	143.2	
500.0	139.1	145.3	145.4	145.9	145.8	146.3	146.1	145.2	141.9	
630.0	139.5	149.0	148.6	148.4	147.5	146.5	145.7	149.0	146.0	
800.0	139.4	150.5	150.3	148.7	147.5	150.3	149.6	147.7	144.2	
1000.0	139.9	149.3	145.9	142.8	142.0	144.1	143.1	143.2	139.6	
1250.0	140.2	145.5	143.2	142.1	140.1	142.8	142.0	141.2	138.4	
1600.0	139.0	142.4	139.5	139.7	139.9	140.3	139.4	138.5	134.9	
2000.0	136.2	138.2	136.1	137.5	137.5	137.5	136.6	135.8	133.5	
2500.0	135.6	134.5	132.4	136.2	136.1	135.8	134.8	135.1	134.2	
3150.0	133.3	136.8	131.8	138.7	137.3	137.4	137.4	137.9	137.4	
4000.0	142.3	136.3	132.8	135.9	135.3	135.9	135.9	135.6	134.2	
5000.0	137.6*	129.3*	129.7*	127.4*	128.8*	127.1*	126.6*	127.7*	126.1*	
6300.0	138.3*	131.3*	129.7*	130.7*	129.1*	127.1*	129.1*	130.1*	129.1*	
8000.0	129.6*	127.6*	127.8*	128.8*	128.0*	127.4*	127.3*	128.3*	127.4*	
10000.0	129.6*	123.9*	124.3*	127.2*	125.7*	124.4*	126.5*	127.4*	126.1*	

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 110 GROUP NO. I

DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS

FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED

INLET PRESS=554.8 KPA(80.5 PSIA), COMB EXIT TEMP=827.9 DEG C(1522.2 DEG F)

AIR FLOW= 7.42 KG/SEC(16.35#/SEC), FUEL FLOW=427.7 KG/HR(942.9 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	139.6	141.5	140.2	142.7	142.4	142.9	142.8	143.9	140.5	
63.0	132.9	137.1	136.3	138.9	138.3	139.5	138.7	139.9	136.4	
80.0	138.8	142.6	142.5	144.1	143.9	144.7	144.3	145.5	141.7	
100.0	140.4	143.2	143.2	144.5	144.2	145.1	144.6	145.7	142.3	
125.0	141.9	145.9	145.7	146.9	146.5	147.3	146.8	147.8	145.0	
160.0	140.8	143.7	143.1	144.2	144.0	144.9	144.3	144.7	142.8	
200.0	140.5	143.6	142.1	143.3	143.1	144.1	143.6	142.7	141.9	
250.0	143.6	147.5	146.0	146.8	146.8	147.3	146.8	144.9	145.0	
315.0	146.4	151.2	149.6	150.3	150.2	150.6	149.9	148.2	147.7	
400.0	144.3	148.1	147.9	148.8	148.2	149.9	148.8	147.4	145.3	
500.0	140.7	147.4	146.9	147.5	147.3	148.0	147.3	146.7	143.9	
630.0	140.6	150.3	149.7	149.6	148.6	147.9	146.8	150.2	147.9	
800.0	140.9	153.2	152.2	150.7	148.8	151.1	150.4	149.6	146.2	
1000.0	142.0	152.1	148.2	145.3	144.2	147.0	145.6	146.0	142.3	
1250.0	143.0	149.2	146.3	144.7	142.6	146.0	144.0	143.7	140.7	
1600.0	141.8	145.8	142.6	142.4	142.6	143.8	141.8	141.2	137.4	
2000.0	139.0	140.9	138.8	140.2	140.7	141.2	139.2	138.6	136.4	
2500.0	138.0	137.1	135.3	138.6	138.6	139.2	137.5	137.4	136.6	
3150.0	141.1	139.6	134.1	141.0	139.7	140.2	140.0	140.2	139.5	
4000.0	144.3	139.2	134.5	139.2	138.1	138.9	138.3	138.3	137.1	
5000.0	141.0*	131.3*	130.8*	129.8*	131.3*	130.1*	129.5*	130.4*	128.7*	
6300.0	148.2*	133.3*	131.8*	132.6*	131.8*	129.6*	132.2*	132.7*	131.6*	
8000.0	133.9*	130.8*	130.2*	130.3*	130.9*	130.3*	130.8*	131.1*	129.1*	
10000.0	133.1*	125.4*	126.7*	129.8*	129.2*	127.2*	130.1*	130.4*	128.8*	

*NO CORRECTIONS FACTORS APPLIED

APPENDIX A

GROUP II

RUN NO. 105 GROUP NO. II DATE: FEB. 22, 1981

YF-102 OFF-DESIGN FUEL-TO-AIR RATIO VARIATIONS

FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED

INLET PRESS=372.9 KPA(54.1 PSIA), COMB EXIT TEMP=169.9 DEG C(337.8 DEG F)

AIR FLOW= 5.03 KG/SEC(11.10#/SEC), FUEL FLOW= 0.0 KG/HR(0.0 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	131.7	132.7	133.1	135.6	134.5	134.8	134.7	137.0	122.1	123.8
63.0	129.1	132.4	133.5	135.6	134.5	135.0	135.0	137.6	124.4	123.6
80.0	135.4	137.9	139.0	140.4	139.4	139.7	140.0	142.5	131.5	123.9
100.0	134.3	136.8	137.6	139.1	138.2	138.5	138.4	141.1	131.7	127.3
125.0	141.0	143.6	144.2	144.8	144.1	144.0	143.8	146.7	139.7	136.0
160.0	136.9	139.8	140.1	140.8	140.3	140.5	140.4	142.0	136.4	127.3
200.0	132.5	133.9	133.5	134.5	133.3	134.6	134.0	134.8	131.8	122.9
250.0	134.6	136.3	135.7	136.5	135.4	136.1	135.7	136.1	135.0	125.5
315.0	137.2	139.6	138.9	139.8	138.6	139.6	139.1	138.7	139.0	124.4
400.0	131.6	130.6	130.7	134.3	130.8	134.6	132.1	132.3	130.1	125.3
500.0	131.6	130.7	130.0	134.2	130.3	133.2	131.3	131.9	129.3	127.1
630.0	131.6	129.6	128.6	133.4	128.6	130.6	129.4	130.3	127.4	130.1
800.0	134.3	130.1	128.4	134.7	129.0	131.1	130.2	131.0	128.8	130.4
1000.0	136.8	129.2	125.8	132.9	129.9	130.0	130.2	130.7	129.7	130.3
1250.0	136.5	129.9	125.9	133.8	131.9	131.3	132.1	131.5	131.8	127.8
1600.0	135.4	126.7	124.6	131.7	132.5	129.7	130.1	130.6	132.4	127.2
2000.0	133.0	123.2	123.4	129.2	130.3	127.2	127.0	128.9	132.1	124.1
2500.0	132.7	122.8	122.9	127.3	128.3	125.1	125.0	127.5	132.5	121.4
3150.0	136.0	125.6	126.1	128.6	128.5	127.1	126.5	128.3	133.1	121.1
4000.0	140.1	126.9	127.1	129.3	128.6	128.9	128.4	129.4	131.9	121.3
5000.0	136.7*	121.6*	124.3*	122.9*	124.8*	123.7*	123.0*	123.3*	124.6*	116.2*
6300.0	133.9*	120.0*	121.2*	122.9*	122.5*	123.2*	122.6*	122.8*	121.6*	112.1*
8000.0	126.9*	117.2*	120.6*	121.1*	121.6*	121.3*	120.6*	121.7*	120.9*	109.4*
10000.0	126.4*	120.7*	119.6*	121.2*	120.4*	121.6*	120.4*	121.4*	119.3*	106.0*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 112 GROUP NO. II DATE: FEB. 22, 1981

YF-102 OFF-DESIGN FUEL-TO-AIR RATIO VARIATIONS

FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED

INLET PRESS=373.4 KPA(54.2 PSIA), COMB EXIT TEMP=324.1 DEG C(615.3 DEG F)

AIR FLOW= 5.06 KG/SEC(11.16#/SEC), FUEL FLOW=132.6 KG/HR(292.6 #/HR)

	PROBE NO.									
FREQ. HZ	1	2	3	4	5	6	7	8	9	10
	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	134.8	135.9	135.6	137.8	137.1	137.2	137.5	139.4	125.1	126.8
63.0	128.8	131.6	132.5	135.3	133.7	134.0	134.3	136.5	124.1	126.4
80.0	134.3	136.6	137.5	139.2	138.3	138.4	138.6	141.0	130.4	126.9
100.0	133.6	136.1	136.9	138.4	137.7	137.9	138.1	140.5	131.7	127.4
125.0	136.7	139.1	139.8	140.8	140.2	140.3	140.5	142.6	135.7	128.1
160.0	136.5	139.1	139.0	139.9	139.7	139.8	139.9	141.3	136.7	128.9
200.0	144.8	149.1	148.3	148.8	148.5	148.6	148.9	149.3	147.7	136.3
250.0	137.5	141.0	140.2	140.5	140.2	140.3	140.4	140.3	139.2	128.1
315.0	138.8	141.4	140.9	141.5	141.0	141.2	141.0	140.7	141.1	127.2
400.0	139.1	141.2	141.5	142.6	141.6	142.3	141.6	141.9	141.5	130.6
500.0	134.5	139.1	139.2	140.3	138.9	139.5	139.5	139.8	138.2	128.1
630.0	133.7	138.4	138.1	138.8	137.2	138.0	137.9	137.9	137.4	130.7
800.0	135.1	138.4	138.1	140.0	136.6	138.8	138.7	138.4	138.3	134.2
1000.0	137.3	138.8	136.0	137.3	134.6	135.4	135.6	135.8	134.8	134.7
1250.0	137.0	136.1	134.0	137.4	134.5	134.7	135.4	135.0	134.2	136.6
1600.0	136.0	133.6	131.5	135.1	135.1	132.4	133.2	133.5	133.1	134.7
2000.0	133.5	130.2	129.5	132.7	133.2	130.1	130.4	131.5	132.2	131.5
2500.0	133.2	128.6	128.0	131.5	131.8	129.3	129.5	130.9	133.1	128.6
3150.0	136.3	130.3	127.4	132.1	132.0	130.5	130.3	131.5	134.1	127.6
4000.0	140.4	129.7	127.4	130.2	130.1	129.1	129.1	130.4	132.0	127.2
5000.0	137.2*	122.5*	123.0*	122.7*	125.0*	121.5*	122.2*	124.1*	124.6*	122.3*
6300.0	134.5*	126.2*	122.4*	123.8*	123.2*	123.0*	123.1*	123.7*	121.9*	121.8*
8000.0	127.4*	122.7*	120.4*	122.1*	122.6*	121.7*	121.4*	122.7*	121.3*	120.0*
10000.0	126.9*	120.0*	119.5*	122.5*	121.6*	122.4*	121.7*	122.5*	119.7*	115.2*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 138 GROUP NO. II DATE: FEB. 22, 1981

YF-102 OFF-DESIGN FUEL-TO-AIR RATIO VARIATIONS
FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED
INLET PRESS=372.9 KPA(54.1 PSIA), COMB EXIT TEMP=585.5 DEG C(1085.9 DEG F)
AIR FLOW= 5.08 KG/SEC(11.20#/SEC), FUEL FLOW=195.2 KG/HR(430.3 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	135.4	4.2	136.1	138.6	137.6	137.7	137.9	139.8	126.0	128.5
63.0	129.8	4.2	133.5	136.0	134.9	135.3	135.3	137.7	125.6	128.0
80.0	135.6	4.2	139.2	140.6	139.9	139.9	140.1	142.6	132.4	128.2
100.0	134.8	4.2	138.6	139.8	139.2	139.3	139.5	142.0	133.4	127.7
125.0	137.9	3.9	140.8	141.9	141.2	141.4	141.6	143.7	137.1	129.2
160.0	135.9	3.3	138.5	139.5	139.0	139.1	139.4	140.9	136.4	128.8
200.0	138.8	2.3	140.8	141.6	141.4	141.7	141.9	141.9	140.0	130.1
250.0	141.5	1.4	145.1	145.6	145.7	146.9	146.8	145.3	145.2	133.8
315.0	139.4	1.2	141.8	142.5	142.2	142.3	142.4	141.6	142.2	128.2
400.0	138.6	1.9	141.8	142.9	141.9	142.8	142.7	142.4	142.3	129.8
500.0	135.6	2.1	141.0	142.0	141.0	141.3	141.5	141.7	140.9	132.4
630.0	134.3	1.0	140.2	140.8	139.9	140.5	140.3	140.9	140.1	129.9
800.0	135.3	2.8	140.8	141.4	138.8	140.8	140.5	140.8	140.8	132.6
1000.0	137.4	3.4	137.8	138.6	136.0	136.7	137.2	137.5	136.0	135.9
1250.0	137.3	3.3	136.6	138.8	135.9	136.4	136.7	136.7	135.9	135.6
1600.0	136.2	4.2	133.3	136.5	136.1	133.7	134.2	134.4	133.7	137.1
2000.0	133.7	4.5	130.6	134.1	134.1	131.0	131.2	132.3	132.6	134.9
2500.0	133.5	3.7	128.9	132.7	133.0	130.4	130.4	131.9	133.5	131.3
3150.0	136.3	3.4	128.4	134.9	134.2	132.6	132.7	133.4	135.3	130.0
4000.0	140.5	3.9	128.0	131.6	131.7	130.4	130.4	131.6	132.7	129.8
5000.0	137.5*	0.0*	124.3*	123.7*	126.2*	122.6*	123.2*	125.1*	125.7*	124.4*
6300.0	134.9*	0.0*	124.0*	124.5*	124.5*	124.0*	124.1*	124.7*	123.1*	123.6*
8000.0	127.7*	0.0*	121.9*	123.5*	124.5*	123.1*	123.2*	124.4*	123.2*	122.3*
10000.0	127.3*	0.0*	119.5*	123.2*	123.0*	123.2*	122.8*	123.7*	121.2*	119.3*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 137 GROUP NO. II DATE: FEB. 22, 1981

YF-102 OFF-DESIGN FUEL-TO-AIR RATIO VARIATIONS

FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED

INLET PRESS=372.8 KPA(54.1 PSIA), COMB EXIT TEMP=867.1 DEG C(1592.7 DEG F)

AIR FLOW= 5.12 KG/SEC(11.28#/SEC), FUEL FLOW=328.3 KG/HR(723.7 #/HR)

	PROBE NO.									
FREQ. HZ	1	2	3	4	5	6	7	8	9	10
	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	136.1	137.6	137.3	139.6	138.8	138.9	145.2	140.8	128.4	144.5
63.0	130.1	133.7	134.6	136.4	135.6	136.0	142.2	138.1	127.6	144.7
80.0	136.4	139.4	140.0	141.4	140.7	140.9	147.2	143.4	134.5	144.6
100.0	135.5	138.8	139.5	140.5	140.1	140.3	146.6	142.8	135.5	144.8
125.0	139.5	142.2	142.7	143.5	143.0	143.3	149.6	145.5	140.1	144.8
160.0	137.5	140.4	140.6	141.3	141.0	141.3	147.6	142.9	139.4	146.4
200.0	137.5	140.2	139.7	140.4	140.0	140.5	146.6	140.8	139.4	145.0
250.0	139.3	142.9	141.9	142.4	142.1	142.2	148.4	142.0	142.2	145.6
315.0	141.9	146.0	145.5	146.0	145.6	145.6	151.4	145.4	145.9	147.4
400.0	142.8	146.8	147.1	147.7	146.7	147.5	153.0	147.1	146.6	148.4
500.0	137.4	143.9	143.7	144.2	143.5	143.9	150.6	144.4	144.2	145.4
630.0	136.0	145.2	145.0	144.8	144.1	144.1	150.4	145.3	143.4	148.9
800.0	136.6	146.6	145.8	144.8	142.9	145.1	150.7	145.5	145.1	147.1
1000.0	137.6	145.4	142.2	140.7	139.1	140.5	146.6	141.0	140.3	147.9
1250.0	137.8	142.9	140.7	140.7	137.8	139.1	145.4	139.4	139.0	151.9
1600.0	136.6	139.8	137.0	138.2	137.6	136.4	142.7	136.6	135.5	149.8
2000.0	133.9	134.9	133.4	135.8	135.5	133.4	139.4	134.2	134.0	151.5
2500.0	133.5	132.4	130.7	134.4	134.3	132.7	138.9	133.9	134.9	149.6
3150.0	136.2	135.1	130.0	136.7	135.8	135.5	141.5	136.1	136.9	149.3
4000.0	140.3	134.9	131.1	134.6	134.2	133.9	139.7	134.5	134.8	148.2
5000.0	138.2*	128.4*	128.7*	126.3*	127.8*	125.1*	131.6*	127.7*	127.5*	141.3*
6300.0	135.2*	130.5*	129.5*	130.6*	128.7*	129.0*	135.0*	130.3*	128.9*	138.9*
8000.0	127.8*	125.8*	126.3*	127.1*	126.7*	126.3*	132.9*	128.5*	128.5*	138.4*
10000.0	127.8*	123.8*	123.2*	125.9*	124.2*	125.4*	131.9*	127.5*	125.6*	135.9*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 113 GROUP NO. II DATE: FEB. 22, 1981

YF-102 OFF-DESIGN FUEL-TO-AIR RATIO VARIATIONS

FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED

INLET PRESS=372.3 KPA(54.0 PSIA), COMB EXIT TEMP=869.8 DEG C(1597.7 DEG F)

AIR FLOW= 5.04 KG/SEC(11.11#/SEC), FUEL FLOW=341.8 KG/HR(753.5 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	136.0	137.3	137.2	139.0	138.4	138.7	144.9	140.5	128.9	144.1
63.0	130.1	133.3	134.1	136.1	135.1	135.4	141.7	137.8	127.8	143.7
80.0	136.6	139.2	140.0	141.3	140.6	140.7	147.1	143.3	135.1	144.1
100.0	135.3	138.5	139.4	140.4	139.8	139.9	146.3	142.5	135.9	144.1
125.0	139.3	142.2	142.6	143.3	142.8	143.1	149.4	145.2	140.4	144.1
160.0	137.4	140.5	140.7	141.4	141.0	141.2	147.6	142.9	139.9	145.9
200.0	137.3	139.8	139.4	140.2	139.8	140.2	146.4	140.6	139.5	144.6
250.0	138.8	142.4	141.5	141.9	141.7	141.8	148.1	141.5	142.1	144.9
315.0	141.5	145.6	145.1	145.8	145.2	145.2	151.2	145.0	145.9	147.1
400.0	143.3	147.5	147.8	148.5	147.4	148.0	153.6	147.8	147.4	149.5
500.0	137.2	143.8	143.7	144.0	143.3	143.8	150.5	144.5	144.3	145.5
630.0	136.2	145.8	145.6	145.6	144.7	144.5	150.3	145.5	143.9	149.4
800.0	136.8	146.8	145.9	144.9	142.9	144.9	150.4	145.3	144.8	147.5
1000.0	138.0	146.2	142.9	141.1	139.7	141.0	147.0	141.6	140.9	147.9
1250.0	137.8	142.8	140.5	140.6	137.9	139.1	145.4	139.3	139.4	151.8
1600.0	136.4	139.9	137.2	138.3	137.8	136.5	142.7	136.8	135.5	150.2
2000.0	133.9	135.2	133.6	135.9	135.6	133.5	139.5	134.3	134.0	152.1
2500.0	133.5	132.6	130.7	134.6	134.4	132.8	139.0	134.0	134.9	149.7
3150.0	136.3	135.2	130.0	136.8	135.9	136.0	141.9	136.2	136.9	149.6
4000.0	140.2	135.3	131.7	135.2	134.5	134.5	140.2	134.8	135.0	148.5
5000.0	138.1*	129.1*	129.4*	126.7*	127.9*	125.2*	131.9*	128.2*	127.6*	141.6*
6300.0	134.8*	130.9*	130.1*	131.2*	129.0*	129.9*	135.7*	130.9*	129.2*	139.2*
8000.0	127.6*	126.2*	126.9*	127.7*	127.0*	126.6*	133.3*	129.1*	128.9*	138.4*
10000.0	127.9*	124.4*	123.6*	126.2*	124.5*	125.9*	132.4*	128.1*	125.9*	136.1*

*NO CORRECTIONS FACTORS APPLIED

APPENDIX A

GROUP III

RUN NO. 131 GROUP NO. III DATE: FEB. 22, 1981

YF-102 LOW PRESSURE HEAT RELEASE VARIATIONS

FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED

INLET PRESS=110.8 KPA(16.1 PSIA), COMB EXIT TEMP=792.5 DEG C(1458.6 DEG F)

AIR FLOW= 0.84 KG/SEC(1.85 #/SEC), FUEL FLOW= 57.4 KG/HR(126.5 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	110.8*	112.9*	114.6*	115.5*	115.8*	115.1*	115.1*	114.7*	113.8*	117.3*
63.0	115.2*	117.7*	119.4*	120.2*	120.4*	119.9*	119.9*	119.5*	118.9*	117.3*
80.0	120.4*	121.4*	123.2*	123.7*	123.5*	123.4*	123.4*	123.0*	122.4*	117.9*
100.0	118.2*	120.9*	122.5*	123.1*	123.1*	123.0*	123.2*	122.4*	122.1*	119.0*
125.0	119.7*	120.7*	121.9*	122.5*	122.6*	122.2*	122.5*	121.4*	121.6*	118.1*
160.0	118.4*	120.2*	121.0*	121.5*	121.3*	121.3*	121.3*	120.5*	120.6*	120.7*
200.0	117.1*	119.6*	119.8*	120.2*	119.8*	120.2*	120.2*	118.9*	119.2*	120.9*
250.0	121.7*	123.9*	124.0*	124.5*	124.2*	124.3*	124.4*	123.3*	123.9*	123.5*
315.0	122.9*	123.9*	124.3*	125.2*	124.4*	124.5*	124.0*	123.7*	123.6*	121.5*
400.0	118.5*	121.0*	121.9*	122.2*	121.7*	122.5*	122.5*	121.7*	121.0*	121.9*
500.0	115.5*	117.1*	117.4*	117.4*	116.5*	115.9*	115.6*	117.7*	115.8*	125.1*
630.0	109.9*	112.7*	113.3*	113.3*	112.6*	113.1*	112.7*	112.9*	111.8*	124.9*
800.0	108.6*	114.0*	113.8*	113.5*	112.1*	112.6*	112.6*	112.9*	111.6*	123.2*
1000.0	108.8*	111.4*	109.7*	108.2*	108.9*	108.1*	107.6*	109.0*	106.5*	124.2*
1250.0	110.0*	107.9*	106.6*	107.0*	109.1*	106.9*	107.2*	108.0*	106.1*	123.4*
1600.0	109.4*	103.6*	103.5*	104.3*	108.4*	104.4*	104.1*	104.2*	103.4*	122.3*
2000.0	108.3*	100.0*	100.3*	101.6*	105.7*	100.6*	100.1*	100.4*	99.8*	119.7*
2500.0	107.1*	100.3*	98.8*	102.5*	104.5*	101.7*	101.6*	101.7*	100.8*	118.1*
3150.0	109.5*	103.6*	98.7*	104.9*	104.5*	104.6*	104.2*	103.9*	102.8*	117.1*
4000.0	107.0*	103.4*	100.6*	102.6*	102.2*	102.9*	103.2*	103.1*	101.2*	115.7*
5000.0	98.6*	99.7*	100.5*	98.6*	100.3*	99.2*	98.7*	101.1*	99.7*	113.3*
6300.0	94.8*	102.2*	100.1*	100.4*	99.8*	102.1*	101.8*	100.3*	97.9*	108.6*
8000.0	95.3*	94.9*	97.3*	97.9*	98.1*	98.7*	98.2*	98.8*	96.4*	103.2*
10000.0	93.5*	99.2*	95.3*	97.4*	96.7*	98.8*	97.9*	97.7*	94.6*	100.7*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 134 GROUP NO. III DATE: FEB. 22, 1981

YF-102 LOW PRESSURE HEAT RELEASE VARIATIONS

FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED

INLET PRESS=110.3 KPA(16.0 PSIA), COMB EXIT TEMP=606.9 DEG C(1124.4 DEG F)

AIR FLOW= 0.80 KG/SEC(1.76 #/SEC), FUEL FLOW= 38.5 KG/HR(84.9 #/HR)

	PROBE NO.									
FREQ. HZ	1	2	3	4	5	6	7	8	9	10
	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	112.6*	114.9*	116.6*	117.6*	117.4*	117.2*	117.1*	116.6*	115.4*	115.4*
63.0	116.7*	118.9*	121.2*	121.9*	121.5*	121.2*	121.4*	120.9*	120.1*	115.8*
80.0	117.5*	118.4*	120.6*	121.2*	120.8*	120.6*	120.6*	120.2*	119.7*	115.9*
100.0	116.8*	119.1*	121.1*	121.5*	121.3*	121.3*	121.4*	120.6*	120.2*	116.4*
125.0	115.5*	116.6*	118.3*	118.7*	118.2*	118.2*	118.3*	117.6*	117.5*	114.7*
160.0	118.4*	119.7*	120.7*	121.0*	120.8*	120.8*	120.8*	119.7*	120.0*	118.4*
200.0	115.9*	118.3*	118.7*	119.2*	118.8*	118.9*	118.6*	117.6*	117.7*	118.4*
250.0	114.4*	116.3*	116.4*	116.9*	116.4*	116.6*	116.2*	115.4*	116.3*	118.0*
315.0	120.4*	120.9*	121.7*	122.1*	121.8*	122.2*	121.9*	120.5*	121.4*	123.9*
400.0	112.1*	112.4*	113.7*	114.4*	113.8*	114.2*	113.8*	113.3*	112.4*	119.1*
500.0	111.7*	111.0*	111.3*	111.8*	111.5*	110.9*	110.8*	110.8*	109.1*	119.4*
630.0	110.4*	110.6*	111.6*	111.7*	111.1*	111.1*	110.9*	110.3*	109.9*	121.9*
800.0	108.0*	108.7*	108.8*	109.2*	108.6*	108.4*	108.0*	108.3*	107.5*	119.8*
1000.0	108.6*	108.5*	107.0*	106.6*	107.9*	106.3*	105.6*	106.3*	105.2*	119.4*
1250.0	109.6*	105.4*	105.0*	105.4*	108.0*	104.7*	104.3*	105.0*	104.5*	116.9*
1600.0	109.6*	100.8*	101.7*	102.9*	107.2*	101.9*	101.1*	102.1*	101.8*	116.0*
2000.0	108.4*	97.6*	98.6*	100.6*	104.2*	99.0*	98.1*	98.8*	98.2*	114.0*
2500.0	107.4*	97.5*	97.3*	100.7*	102.4*	99.3*	98.5*	99.6*	97.4*	112.7*
3150.0	109.7*	99.4*	97.6*	102.1*	102.2*	101.8*	100.8*	99.4*	98.1*	111.3*
4000.0	107.3*	99.3*	100.2*	101.1*	100.3*	100.5*	99.8*	101.8*	96.9*	107.9*
5000.0	98.7*	97.1*	97.7*	97.4*	99.5*	98.1*	97.3*	98.5*	96.3*	103.8*
6300.0	95.1*	96.9*	98.3*	100.2*	99.5*	101.2*	100.0*	100.6*	95.5*	99.0*
8000.0	96.1*	92.4*	96.4*	98.1*	100.0*	99.8*	97.7*	99.3*	94.3*	95.7*
10000.0	96.0*	97.3*	96.7*	99.5*	100.9*	102.2*	98.8*	99.5*	93.3*	94.0*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 135 GROUP NO. III DATE: FEB. 22, 1981

YF-102 LOW PRESSURE HEAT RELEASE VARIATIONS

FIRST STAGE TURBINE NOZZLE GUIDE VANES INSTALLED

INLET PRESS=110.3 KPA(16.0 PSIA), COMB EXIT TEMP=813.6 DEG C(1496.5 DEG F)

AIR FLOW= 0.81 KG/SEC(1.78 #/SEC), FUEL FLOW= 56.9 KG/HR(125.4 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	111.1*	112.7*	114.7*	115.5*	115.7*	115.2*	115.4*	114.6*	113.6*	117.9*
63.0	116.5*	118.8*	120.7*	121.4*	121.2*	121.0*	120.9*	120.7*	119.9*	117.8*
80.0	119.9*	121.1*	122.9*	123.6*	123.4*	123.1*	123.1*	122.9*	122.3*	118.6*
100.0	117.8*	120.2*	122.2*	122.7*	122.6*	122.5*	122.5*	121.8*	121.4*	119.5*
125.0	119.8*	121.0*	122.4*	123.0*	122.6*	122.6*	122.5*	121.8*	121.7*	118.9*
160.0	118.9*	120.4*	121.5*	121.9*	121.5*	121.6*	121.7*	120.7*	120.8*	121.4*
200.0	117.1*	119.5*	119.8*	120.4*	119.8*	120.1*	120.0*	118.9*	119.3*	121.5*
250.0	121.6*	123.6*	124.0*	124.6*	123.7*	123.9*	123.9*	123.1*	123.7*	124.1*
315.0	123.2*	123.7*	124.4*	125.4*	124.3*	124.4*	123.8*	123.7*	123.4*	122.0*
400.0	118.6*	120.8*	121.9*	122.4*	121.8*	122.6*	122.6*	121.4*	120.9*	121.9*
500.0	116.2*	117.3*	117.9*	118.0*	116.9*	116.3*	115.9*	118.2*	116.7*	126.7*
630.0	110.1*	112.5*	113.3*	113.5*	112.9*	113.4*	112.9*	112.9*	111.7*	125.6*
800.0	108.7*	113.9*	113.9*	113.6*	112.2*	112.7*	112.6*	112.9*	111.6*	123.7*
1000.0	108.8*	110.9*	109.5*	108.3*	109.2*	108.2*	107.5*	109.0*	106.3*	124.7*
1250.0	110.0*	107.8*	106.8*	107.1*	109.5*	107.1*	107.0*	108.0*	106.0*	123.9*
1600.0	109.5*	103.7*	103.9*	104.5*	108.9*	104.5*	103.9*	104.4*	103.3*	122.9*
2000.0	108.3*	99.9*	100.7*	101.9*	106.5*	100.5*	99.7*	100.4*	99.6*	120.4*
2500.0	107.3*	99.9*	99.2*	102.6*	105.1*	101.6*	101.0*	101.9*	100.5*	118.8*
3150.0	109.5*	103.8*	99.1*	105.3*	105.0*	104.6*	104.0*	104.1*	102.5*	117.9*
4000.0	107.4*	103.2*	100.9*	102.9*	102.7*	103.0*	103.1*	103.5*	101.0*	116.3*
5000.0	98.4*	99.7*	100.8*	98.8*	100.7*	99.3*	98.3*	101.5*	98.6*	113.9*
6300.0	94.9*	102.4*	100.4*	100.9*	100.3*	102.4*	101.7*	101.3*	97.6*	109.5*
8000.0	95.1*	94.4*	97.6*	98.2*	98.3*	98.8*	97.8*	99.5*	96.2*	104.2*
10000.0	93.6*	98.8*	95.5*	98.0*	96.8*	99.1*	97.5*	98.4*	93.5*	101.6*

*NO CORRECTIONS FACTORS APPLIED

APPENDIX A

GROUP IV

RUN NO. 236 GROUP NO. IV

DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS

FIRST STAGE TURBINE NOZZLE GUIDE VANES REMOVED

INLET PRESS=109.3 KPA(15.9 PSIA), COMB EXIT TEMP=869.3 DEG C(1596.8 DEG F)

AIR FLOW= 0.80 KG/SEC(1.76#/SEC), FUEL FLOW= 78.6 KG/HR(173.2 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	0.0*	110.8*	111.0*	112.5*	112.6*	111.5*	111.7*	112.2*	109.6*	112.8*
63.0	0.0*	113.7*	114.2*	115.9*	115.4*	114.9*	114.7*	115.4*	113.1*	114.9*
80.0	0.0*	115.0*	115.7*	117.1*	116.6*	116.1*	116.2*	116.4*	114.6*	114.4*
100.0	0.0*	116.9*	117.4*	118.7*	118.4*	117.9*	118.1*	118.0*	116.5*	113.2*
125.0	0.0*	117.8*	117.7*	118.7*	118.2*	118.0*	118.2*	118.0*	116.8*	110.9*
160.0	0.0*	117.1*	117.1*	117.9*	117.7*	117.3*	117.4*	117.4*	116.2*	112.9*
200.0	0.0*	116.8*	115.7*	116.2*	116.4*	116.3*	116.2*	116.2*	115.1*	116.5*
250.0	0.0*	119.2*	118.1*	118.3*	118.3*	118.5*	118.5*	118.4*	117.8*	117.7*
315.0	0.0*	119.5*	119.0*	119.4*	119.2*	119.5*	119.4*	119.5*	118.3*	114.5*
400.0	0.0*	122.0*	121.9*	122.1*	121.6*	122.6*	122.9*	123.0*	121.1*	115.9*
500.0	0.0*	123.0*	122.2*	122.1*	121.2*	120.0*	119.8*	121.7*	118.0*	108.1*
630.0	0.0*	114.9*	114.6*	115.1*	114.7*	115.0*	115.1*	115.6*	113.5*	115.4*
800.0	0.0*	115.9*	114.6*	114.6*	113.9*	114.4*	114.6*	115.6*	113.0*	113.1*
1000.0	0.0*	113.1*	110.6*	109.7*	111.2*	109.9*	110.2*	112.5*	107.9*	114.0*
1250.0	0.0*	114.7*	112.1*	111.4*	113.3*	112.5*	112.7*	114.1*	111.7*	123.8*
1600.0	0.0*	112.2*	110.5*	109.6*	114.1*	113.7*	113.6*	109.9*	108.2*	124.8*
2000.0	0.0*	106.1*	104.3*	103.2*	109.5*	103.9*	103.7*	104.7*	103.4*	118.6*
2500.0	0.0*	105.2*	101.3*	103.1*	107.8*	103.4*	103.4*	103.9*	101.9*	112.6*
3150.0	0.0*	106.9*	99.8*	106.3*	106.8*	105.5*	105.3*	105.3*	103.6*	110.6*
4000.0	0.0*	106.5*	101.1*	104.2*	104.5*	103.8*	104.0*	104.9*	101.8*	111.1*
5000.0	0.0*	104.3*	101.6*	98.9*	101.2*	98.7*	98.1*	99.9*	98.6*	106.1*
6300.0	0.0*	105.8*	100.0*	101.0*	100.7*	101.4*	100.4*	101.2*	98.3*	93.2*
8000.0	0.0*	99.9*	97.0*	97.1*	97.7*	97.1*	96.5*	97.8*	96.9*	93.2*
10000.0	0.0*	102.3*	95.2*	97.9*	96.0*	96.9*	96.7*	96.8*	95.0*	98.1*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 232 GROUP NO. IV

DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS
FIRST STAGE TURBINE NOZZLE GUIDE VANES REMOVED
INLET PRESS=138.8 KPA(20.1 PSIA), COMB EXIT TEMP=760.3 DEG C(1400.5 DEG F)
AIR FLOW= 1.91 KG/SEC(4.22#/SEC), FUEL FLOW=134.0 KG/HR(295.5 #/HR)

	PROBE NO.									
FREQ. HZ	1	2	3	4	5	6	7	8	9	10
	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	0.0*	117.9*	118.9*	121.0*	119.6*	119.9*	119.6*	120.5*	117.1*	121.9*
63.0	0.0*	119.5*	120.6*	122.6*	121.2*	121.4*	121.4*	121.7*	118.9*	122.4*
80.0	0.0*	123.7*	124.7*	126.6*	125.1*	125.2*	125.4*	125.6*	123.3*	122.5*
100.0	0.0*	127.1*	128.1*	130.0*	128.5*	128.7*	128.9*	129.2*	127.0*	123.4*
125.0	0.0*	126.8*	127.6*	129.2*	127.9*	128.0*	128.3*	128.5*	126.5*	123.4*
160.0	0.0*	124.9*	125.1*	126.6*	125.4*	125.8*	125.6*	125.8*	123.9*	126.4*
200.0	0.0*	125.1*	124.7*	125.7*	125.1*	125.6*	125.3*	125.0*	123.7*	130.0*
250.0	0.0*	127.2*	126.5*	126.8*	126.6*	126.9*	126.7*	126.3*	125.7*	129.4*
315.0	0.0*	128.8*	128.6*	128.5*	128.6*	128.8*	128.5*	128.6*	127.1*	129.6*
400.0	0.0*	129.4*	129.9*	130.0*	129.7*	130.2*	129.9*	130.1*	127.9*	129.4*
500.0	0.0*	134.9*	134.9*	135.3*	134.2*	133.2*	133.4*	134.7*	130.4*	127.7*
630.0	0.0*	127.4*	127.8*	128.6*	127.7*	128.4*	128.5*	128.5*	126.2*	130.5*
800.0	0.0*	131.2*	130.6*	130.1*	129.6*	130.4*	129.9*	131.1*	128.7*	126.7*
1000.0	0.0*	125.1*	123.5*	123.0*	123.0*	123.2*	123.5*	123.6*	120.5*	128.3*
1250.0	0.0*	123.9*	122.5*	122.2*	122.5*	122.8*	123.3*	122.6*	119.6*	132.4*
1600.0	0.0*	122.7*	121.1*	119.5*	120.9*	120.5*	120.5*	120.8*	117.4*	130.6*
2000.0	0.0*	116.7*	116.2*	115.8*	118.1*	116.3*	116.1*	117.1*	113.4*	126.5*
2500.0	0.0*	115.9*	114.1*	117.3*	118.9*	117.1*	117.7*	118.1*	115.1*	124.1*
3150.0	0.0*	117.6*	112.3*	118.8*	118.3*	118.4*	118.3*	118.5*	117.3*	123.7*
4000.0	0.0*	116.2*	112.0*	115.1*	115.4*	115.4*	115.4*	116.2*	113.3*	123.3*
5000.0	0.0*	112.2*	110.3*	109.6*	112.0*	109.2*	109.2*	111.1*	108.6*	119.4*
6300.0	0.0*	114.1*	110.6*	111.8*	111.5*	112.2*	111.9*	112.5*	107.3*	107.0*
8000.0	0.0*	108.5*	108.5*	108.7*	109.7*	108.7*	108.7*	109.9*	106.7*	101.8*
10000.0	0.0*	111.1*	106.8*	108.0*	107.7*	108.2*	108.1*	108.6*	102.9*	103.7*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 233 GROUP NO. IV DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS

FIRST STAGE TURBINE NOZZLE GUIDE VANES REMOVED

INLET PRESS=186.9 KPA(27.1 PSIA), COMB EXIT TEMP=743.4 DEG C(1370.0 DEG F)

AIR FLOW= 2.42 KG/SEC(5.3 #/SEC), FUEL FLOW=149.1 KG/HR(328.6 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	0.0*	118.8*	119.6*	122.6*	120.8*	121.0*	120.9*	122.1*	118.2*	123.5*
63.0	0.0*	119.6*	120.9*	123.9*	121.8*	122.0*	121.9*	123.3*	119.6*	123.6*
80.0	0.0*	126.6*	127.6*	130.3*	127.9*	128.2*	128.4*	129.6*	126.7*	124.9*
100.0	0.0*	129.2*	129.9*	132.9*	130.4*	130.8*	131.0*	131.9*	129.1*	123.9*
125.0	0.0*	130.2*	131.0*	133.3*	131.0*	131.2*	131.4*	132.3*	129.8*	125.1*
160.0	0.0*	128.1*	128.4*	130.4*	128.5*	128.6*	128.5*	129.3*	127.1*	127.4*
200.0	0.0*	127.1*	126.6*	127.7*	126.9*	127.4*	127.2*	126.6*	125.5*	130.9*
250.0	0.0*	129.2*	128.5*	128.6*	128.4*	128.6*	128.3*	128.1*	127.4*	127.5*
315.0	0.0*	130.9*	130.7*	130.1*	130.5*	130.8*	130.2*	130.2*	129.3*	127.6*
400.0	0.0*	131.1*	131.6*	131.6*	131.4*	132.0*	131.5*	131.7*	130.0*	127.9*
500.0	0.0*	135.1*	135.1*	135.8*	134.4*	133.9*	134.4*	135.1*	131.1*	125.4*
630.0	0.0*	128.7*	129.1*	130.0*	129.3*	130.1*	130.2*	130.5*	128.1*	128.0*
800.0	0.0*	132.6*	132.4*	132.1*	131.9*	132.6*	132.1*	133.5*	130.8*	123.6*
1000.0	0.0*	126.2*	124.9*	125.0*	124.8*	124.8*	125.3*	125.4*	122.4*	123.4*
1250.0	0.0*	124.2*	123.1*	123.7*	123.8*	123.8*	124.4*	123.9*	121.2*	123.3*
1600.0	0.0*	121.1*	119.7*	119.9*	122.2*	120.7*	120.9*	120.7*	117.2*	120.5*
2000.0	0.0*	117.4*	117.6*	117.0*	119.9*	117.1*	117.8*	118.3*	115.0*	122.4*
2500.0	0.0*	116.7*	116.1*	118.2*	119.4*	117.1*	117.4*	118.6*	116.1*	119.9*
3150.0	0.0*	117.6*	114.4*	118.3*	118.7*	118.2*	118.3*	118.5*	116.9*	118.6*
4000.0	0.0*	118.1*	114.1*	116.5*	116.4*	116.0*	116.3*	117.1*	114.4*	123.3*
5000.0	0.0*	114.9*	113.7*	112.1*	114.0*	111.4*	111.5*	113.6*	110.7*	123.5*
6300.0	0.0*	117.3*	112.5*	113.6*	113.4*	114.3*	114.2*	114.2*	109.1*	108.9*
8000.0	0.0*	111.3*	110.6*	110.6*	111.8*	111.3*	110.9*	112.0*	108.9*	105.6*
10000.0	0.0*	112.3*	108.6*	110.1*	110.0*	111.1*	109.9*	110.9*	105.1*	104.4*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 202 GROUP NO. IV

DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS
FIRST STAGE TURBINE NOZZLE GUIDE VANES REMOVED
INLET PRESS=256.7 KPA(37.2 PSIA), COMB EXIT TEMP=751.8 DEG C(1385.3 DEG F)
AIR FLOW= 3.45 KG/SEC(7.60 #/SEC), FUEL FLOW=201.3 KG/HR(443.7 #/HR)

	PROBE NO.									
FREQ. HZ	1	2	3	4	5	6	7	8	9	10
	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	3.7	121.6	122.7	124.8	124.1	125.1	124.5	125.7	114.5	125.0
63.0	3.7	123.3	124.5	126.2	125.6	126.5	126.1	127.5	116.5	125.1
80.0	3.7	131.4	132.8	133.4	132.9	133.3	133.5	134.7	124.3	126.5
100.0	3.7	135.3	136.4	137.1	136.7	136.8	137.0	138.1	128.0	126.6
125.0	3.4	137.3	138.3	138.6	138.1	138.2	138.2	139.6	129.7	129.1
160.0	2.8	132.8	133.3	133.9	133.4	133.8	133.5	134.1	124.9	131.5
200.0	1.8	132.0	131.5	132.3	131.8	132.7	132.5	131.6	123.8	134.4
250.0	0.9	133.5	133.0	133.7	133.1	133.4	133.2	132.4	124.9	129.4
315.0	0.7	135.2	135.0	135.6	134.9	135.7	135.7	134.8	127.2	130.2
400.0	1.4	135.9	136.7	137.3	136.4	137.5	137.3	136.9	128.3	130.9
500.0	1.6	137.0	137.4	138.3	137.1	137.0	137.3	137.5	127.2	128.7
630.0	0.5	132.2	132.7	133.8	132.9	133.8	133.6	133.3	124.2	130.3
800.0	2.3	137.8	138.0	138.1	136.8	138.5	137.6	138.2	129.1	128.5
1000.0	2.9	133.0	131.9	132.1	131.5	131.9	132.7	132.2	122.3	128.5
1250.0	2.8	131.4	130.8	131.5	130.4	131.2	132.0	131.0	121.6	128.6
1600.0	3.7	129.2	127.7	128.3	129.3	128.6	129.3	128.1	117.7	127.1
2000.0	4.0	125.9	126.0	125.7	127.4	125.5	126.4	126.3	116.0	128.6
2500.0	3.2	124.6	124.1	125.6	126.1	124.8	125.3	125.4	116.4	125.1
3150.0	2.9	124.9	122.6	125.7	125.1	124.7	125.6	125.2	116.9	124.0
4000.0	3.5	125.5	122.0	124.6	123.4	123.9	124.7	124.5	115.1	129.0
5000.0	0.0*	118.6*	116.6*	116.6*	118.4*	115.9*	116.6*	117.6*	108.1*	124.3*
6300.0	0.0*	121.8*	116.4*	118.2*	117.9*	118.7*	119.0*	118.4*	106.8*	111.9*
8000.0	0.0*	116.5*	115.4*	116.0*	116.7*	116.7*	116.3*	116.7*	107.1*	110.0*
10000.0	0.0*	114.7*	113.2*	115.3*	115.0*	116.2*	115.2*	115.6*	103.3*	108.1*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 203 GROUP NO. IV DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS

FIRST STAGE TURBINE NOZZLE GUIDE VANES REMOVED

INLET PRESS=310.8 KPA(45.1 PSIA), COMB EXIT TEMP=698.5 DEG C(1289.4 DEG F)

AIR FLOW= 4.30 KG/SEC(9.5 #/SEC), FUEL FLOW=223.1 KG/HR(491.8 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	3.7	123.2	124.1	126.3	125.4	127.0	125.9	127.4	123.2	124.6
63.0	3.7	124.9	126.0	127.8	127.1	128.1	127.3	129.3	125.3	124.7
80.0	3.7	132.4	133.8	134.7	133.8	134.3	134.3	135.9	132.8	126.5
100.0	3.7	135.4	136.7	137.5	136.8	137.3	137.2	138.6	135.6	127.6
125.0	3.4	139.5	140.4	140.9	140.7	140.7	140.7	141.8	139.5	130.8
160.0	2.8	135.2	135.7	136.5	136.1	136.3	136.3	137.0	135.3	133.3
200.0	1.8	134.2	133.7	134.4	134.0	134.7	134.5	133.7	133.4	136.1
250.0	0.9	136.0	135.5	136.0	135.4	135.8	135.6	134.6	134.9	131.6
315.0	0.7	137.9	137.8	138.2	137.7	138.2	138.0	137.1	137.3	132.4
400.0	1.4	138.8	139.4	140.2	139.2	140.3	140.0	139.2	138.2	133.3
500.0	1.6	138.7	139.0	139.9	138.8	138.8	139.1	139.2	136.5	131.2
630.0	0.5	134.5	134.9	136.1	135.3	136.2	136.0	135.8	133.9	132.7
800.0	2.3	139.5	139.7	140.0	138.1	140.1	139.5	139.9	138.3	131.2
1000.0	2.9	135.8	134.5	134.9	134.0	134.9	135.2	134.9	132.4	131.3
1250.0	2.8	134.4	133.7	134.4	133.1	134.3	134.7	133.9	132.0	131.3
1600.0	3.7	131.9	130.3	131.1	132.0	131.4	131.9	130.8	127.7	129.9
2000.0	4.0	129.0	128.5	128.2	129.8	128.4	128.9	128.9	126.0	130.8
2500.0	3.2	127.6	126.7	128.0	128.6	127.6	128.1	128.1	126.4	127.0
3150.0	2.9	127.9	125.3	128.1	127.7	127.7	128.3	128.0	127.1	125.9
4000.0	3.5	128.2	125.0	127.3	126.2	126.9	127.6	127.3	125.5	132.4
5000.0	0.0*	122.6*	121.6*	120.2*	121.4*	119.3*	119.8*	121.2*	119.2*	131.5*
6300.0	0.0*	124.9*	120.4*	121.7*	120.7*	121.9*	121.8*	121.6*	117.5*	117.8*
8000.0	0.0*	119.9*	119.1*	119.7*	119.8*	119.9*	119.3*	119.9*	117.9*	111.0*
10000.0	0.0*	117.8*	116.4*	118.4*	117.9*	119.4*	118.4*	118.7*	113.9*	111.3*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 206 GROUP NO. IV DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS

FIRST STAGE TURBINE NOZZLE GUIDE VANES REMOVED

INLET PRESS=373.3 KPA(54.1 PSIA), COMB EXIT TEMP=723.6 DEG C(1334.4 DEG F)

AIR FLOW= 5.04 KG/SEC(11.1 #/SEC), FUEL FLOW=262.3 KG/HR(578.2 #/HR)

	PROBE NO.									
FREQ. HZ	1	2	3	4	5	6	7	8	9	10
	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	4.2	125.1	125.7	128.1	127.1	128.8	126.0	129.4	125.1	125.4
63.0	4.2	126.2	127.4	129.2	128.4	129.7	127.6	130.6	126.6	124.9
80.0	4.2	133.6	134.9	135.9	135.1	135.6	134.7	137.1	134.1	126.0
100.0	4.2	137.3	138.6	139.4	138.8	139.2	138.6	140.7	137.7	126.7
125.0	3.9	141.6	142.7	143.4	142.7	142.9	142.8	144.2	142.0	131.1
160.0	3.3	137.3	137.9	138.6	138.1	138.5	138.4	139.2	137.6	133.8
200.0	2.3	136.0	135.7	136.3	135.9	136.6	136.2	135.8	135.6	137.4
250.0	1.4	137.9	137.2	137.8	137.3	137.6	137.4	136.6	137.0	132.1
315.0	1.2	139.8	139.5	140.1	139.4	140.0	139.7	138.8	139.3	132.1
400.0	1.9	141.0	141.6	142.3	141.3	142.4	142.0	141.4	140.5	134.2
500.0	2.1	140.1	140.5	141.5	140.3	140.5	140.6	140.8	138.2	131.2
630.0	1.0	136.7	137.0	138.3	137.5	138.4	138.2	138.1	136.0	133.5
800.0	2.8	140.9	141.0	141.6	139.5	141.7	141.1	141.3	139.7	131.9
1000.0	3.4	138.2	136.8	137.2	136.3	137.3	137.6	137.3	134.8	132.3
1250.0	3.3	137.0	136.4	137.3	135.6	136.9	137.4	136.8	134.9	132.6
1600.0	4.2	134.3	132.6	133.7	134.5	133.6	134.2	133.2	130.1	131.4
2000.0	4.5	131.5	130.8	131.0	132.3	130.8	131.1	131.2	128.4	131.0
2500.0	3.7	129.7	129.1	130.3	130.9	129.9	129.9	130.5	128.9	127.1
3150.0	3.4	130.4	127.9	130.6	130.2	130.1	130.0	130.5	129.6	127.4
4000.0	3.9	130.2	126.8	129.5	128.6	129.3	128.8	129.6	127.8	129.9
5000.0	0.0*	123.4*	122.1*	122.1*	123.0*	121.3*	120.4*	122.7*	121.0*	129.1*
6300.0	0.0*	127.1*	122.6*	124.1*	122.6*	123.9*	121.8*	123.6*	119.6*	120.3*
8000.0	0.0*	122.5*	121.4*	122.4*	122.0*	122.3*	118.8*	122.2*	120.2*	112.7*
10000.0	0.0*	119.7*	118.8*	121.0*	119.8*	121.8*	116.4*	121.1*	116.4*	112.4*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 207 GROUP NO. IV DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS

FIRST STAGE TURBINE NOZZLE GUIDE VANES REMOVED

INLET PRESS=446.9 KPA(64.8 PSIA), COMB EXIT TEMP=725.2 DEG C(1337.4 DEG F)

AIR FLOW= 6.26 KG/SEC(13.8 #/SEC), FUEL FLOW=310.4 KG/HR(684.3 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	4.7	127.9	128.5	131.6	129.7	131.3	130.5	132.2	127.5	134.4
63.0	4.7	128.7	129.4	132.3	130.2	131.8	130.9	133.1	128.2	132.4
80.0	4.7	135.2	136.4	138.0	136.4	137.1	137.1	139.1	135.0	132.9
100.0	4.7	139.9	141.1	142.3	141.2	141.6	141.7	143.5	139.8	132.8
125.0	4.4	143.8	144.6	145.5	144.7	145.0	145.2	146.4	143.5	135.8
160.0	3.8	139.7	140.2	140.8	140.2	140.6	140.8	141.7	139.4	137.4
200.0	2.8	138.2	137.8	138.1	137.6	138.8	138.7	138.1	137.4	140.3
250.0	1.9	140.0	139.3	139.6	139.4	139.8	139.6	138.7	139.0	135.2
315.0	1.7	141.8	141.3	141.7	141.2	141.9	141.8	141.0	141.1	134.2
400.0	2.4	143.5	143.9	144.6	143.6	144.9	144.6	144.4	143.0	136.2
500.0	2.6	141.8	141.8	142.7	141.7	142.2	142.4	142.5	139.5	133.2
630.0	1.5	138.9	139.1	140.6	139.6	140.6	140.4	140.6	137.8	135.1
800.0	3.3	141.9	141.9	143.0	140.6	143.0	142.4	142.8	140.5	133.8
1000.0	3.9	141.0	139.2	140.2	138.8	140.1	140.4	140.2	137.1	134.8
1250.0	3.8	140.1	139.5	140.6	138.7	140.2	140.8	140.3	138.0	135.3
1600.0	4.7	137.4	135.5	136.9	137.9	136.5	137.2	136.8	133.0	134.3
2000.0	5.0	134.8	133.8	134.6	135.8	133.6	134.3	134.7	131.0	129.8
2500.0	4.2	132.8	132.1	133.4	134.2	132.7	133.2	133.9	131.5	127.3
3150.0	3.9	133.7	131.0	133.9	133.6	133.1	133.8	134.2	132.7	127.3
4000.0	4.5	133.3	129.9	133.0	132.5	132.5	133.1	133.5	131.2	128.1
5000.0	0.0*	125.4*	123.5*	124.9*	126.3*	123.9*	124.4*	126.0*	123.4*	123.0*
6300.0	0.0*	130.1*	125.4*	127.0*	126.1*	126.6*	126.8*	126.9*	121.9*	113.6*
8000.0	0.0*	126.1*	124.1*	125.3*	125.2*	124.9*	124.5*	125.6*	122.7*	110.6*
10000.0	0.0*	122.6*	121.9*	124.1*	123.2*	124.7*	123.9*	124.6*	119.0*	113.2*

*NO CORRECTIONS FACTORS APPLIED

RUN NO. 210 GROUP NO. IV DATE: FEB. 22, 1981

YF-102 TURBOFAN ENGINE OPERATING POINTS

FIRST STAGE TURBINE NOZZLE GUIDE VANES REMOVED

INLET PRESS=556.6 KPA(80.7 PSIA), COMB EXIT TEMP=829.3 DEG C(1524.7 DEG F)

AIR FLOW= 7.44 KG/SEC(16.4 #/SEC), FUEL FLOW=429.7 KG/HR(947.3 #/HR)

	PROBE NO.									
FREQ. HZ	1	2	3	4	5	6	7	8	9	10
	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	4.7	134.1	130.9	133.9	132.2	133.4	133.1	134.7	130.4	135.9
63.0	4.7	133.5	130.4	133.9	131.3	133.1	132.6	134.5	129.6	135.1
80.0	4.7	137.3	136.8	138.7	137.1	137.6	137.6	139.8	135.6	134.4
100.0	4.7	142.1	142.9	144.1	143.0	143.2	143.4	145.3	141.6	134.6
125.0	4.4	145.7	146.4	147.2	146.5	146.6	146.8	148.1	145.2	136.7
160.0	3.8	142.7	142.7	143.5	142.7	143.2	143.2	144.4	142.3	138.9
200.0	2.8	140.4	139.2	139.7	139.2	140.0	139.9	139.8	138.9	141.7
250.0	1.9	142.4	141.1	141.4	141.2	141.4	141.5	140.6	140.7	138.7
315.0	1.7	143.3	142.1	142.8	142.0	142.6	142.4	141.7	141.8	135.6
400.0	2.4	145.1	145.4	146.0	145.0	146.2	145.7	145.4	144.0	138.3
500.0	2.6	143.8	143.6	144.5	143.3	144.0	144.0	144.1	141.3	135.3
630.0	1.5	142.1	141.7	143.2	141.9	142.7	142.5	143.0	140.1	137.5
800.0	3.3	143.0	142.5	144.1	141.6	144.2	143.2	143.8	141.5	136.2
1000.0	3.9	144.1	141.8	142.7	141.0	142.5	142.8	142.8	139.8	136.8
1250.0	3.8	142.6	141.5	142.9	140.5	142.2	142.9	142.3	140.3	137.0
1600.0	4.7	139.7	137.5	139.4	140.0	138.5	139.2	138.9	135.2	136.9
2000.0	5.0	137.3	135.8	137.2	137.8	135.6	136.3	136.6	133.0	132.0
2500.0	4.2	134.9	134.5	136.0	136.2	134.5	135.1	135.9	133.5	129.2
3150.0	3.9	136.3	133.3	136.7	135.6	135.4	136.1	136.5	134.9	129.8
4000.0	4.5	136.1	132.2	135.8	134.6	134.9	135.5	135.9	133.6	129.3
5000.0	0.0*	128.5*	126.1*	127.4*	128.5*	125.9*	126.5*	128.0*	125.3*	124.8*
6300.0	0.0*	133.1*	128.1*	129.8*	128.3*	129.4*	129.3*	129.5*	124.1*	119.1*
8000.0	0.0*	129.7*	127.3*	128.4*	127.8*	127.6*	127.2*	128.2*	125.1*	115.6*
10000.0	0.0*	126.3*	125.2*	127.0*	126.2*	127.7*	126.9*	127.4*	122.1*	115.3*

*NO CORRECTIONS FACTORS APPLIED

APPENDIX A

GROUP V

RUN NO. 205 GROUP NO. V DATE: FEB. 22, 1981

YF-102 ZERO FUEL FLOW CONDITION

FIRST STAGE TURBINE NOZZLE GUIDE VANES REMOVED

INLET PRESS=372.6 KPA(54.0 PSIA), COMB EXIT TEMP=170.6 DEG C(339.2 DEG F)

AIR FLOW= 5.04 KG/SEC(11.12#/SEC), FUEL FLOW= 0.0 KG/HR(0.0 #/HR)

	PROBE NO.									
	1	2	3	4	5	6	7	8	9	10
FREQ. HZ	DYNAMIC PRESSURE LEVEL, DB RE 20 MICROPASCALS									
50.0	4.2	117.7	120.2	124.9	123.4	126.8	123.6	127.8	119.2	111.8
63.0	4.2	116.3	119.7	124.3	122.4	126.6	123.2	127.7	118.1	110.6
80.0	4.2	119.8	122.5	126.1	124.6	128.2	125.2	129.1	121.1	111.5
100.0	4.2	118.5	121.6	125.5	124.5	128.6	125.1	128.7	119.7	112.2
125.0	3.9	119.1	121.8	126.2	125.0	128.9	125.9	128.4	119.9	119.2
160.0	3.3	121.2	122.6	126.5	125.5	129.5	126.9	128.2	121.1	119.2
200.0	2.3	121.5	122.5	126.4	125.6	129.9	127.3	127.3	121.3	113.2
250.0	1.4	123.4	123.1	127.4	126.5	130.8	128.3	126.8	122.9	118.0
315.0	1.2	124.8	124.6	128.7	127.7	132.4	129.7	127.8	124.6	115.4
400.0	1.9	122.8	123.5	129.1	127.3	133.4	129.6	128.6	123.3	118.8
500.0	2.1	123.5	123.6	128.4	127.2	132.5	128.9	128.5	122.7	121.7
630.0	1.0	122.8	122.9	127.3	126.8	130.8	128.6	127.8	122.7	121.5
800.0	2.8	123.3	123.8	128.8	127.7	131.1	130.0	129.2	124.9	119.4
1000.0	3.4	123.9	123.2	127.6	128.6	129.2	129.5	128.6	124.1	123.4
1250.0	3.3	124.1	124.0	128.7	129.8	129.5	130.0	129.0	126.1	132.0
1600.0	4.2	123.4	123.5	128.3	131.2	128.4	128.9	129.1	127.0	134.9
2000.0	4.5	122.1	122.4	126.4	129.2	125.9	126.7	128.1	126.6	131.7
2500.0	3.7	122.0	122.3	125.3	127.5	124.6	125.0	126.7	127.1	130.6
3150.0	3.4	127.5	130.6	129.2	128.6	129.4	128.8	128.6	128.7	141.5
4000.0	3.9	127.9	130.3	130.5	131.0	132.2	131.5	131.9	130.2	149.5
5000.0	0.0*	120.7*	123.0*	123.1*	124.0*	122.4*	121.6*	122.7*	122.0*	129.3*
6300.0	0.0*	119.6*	121.4*	123.2*	122.8*	124.5*	123.8*	124.0*	120.2*	128.9*
8000.0	0.0*	117.2*	121.8*	123.8*	123.2*	123.4*	122.1*	123.7*	120.0*	130.1*
10000.0	0.0*	120.6*	119.6*	121.2*	120.4*	122.1*	120.4*	121.2*	116.8*	124.9*

*NO CORRECTIONS FACTORS APPLIED