



DEPARTMENT OF THE NAVY

NAVAL INVENTORY CONTROL POINT
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IN REPLY REFER TO:
0232.01
19 JUL 99

Turbocombustor Technology
Attn: John Goings
3651 S.E. Commerce Avenue
Stuart, FL 34995

OPTIONAL FORM 89 (7-90)

FAX TRANSMITTAL

of pages = 1

To	TCT	From	NAVICP-P
Dept./Agency	JOHN GOINGS	Phone	CHATTERTON
Fax #	561-289-0476	Fax #	PH 215-697-4384
NSN 7540-01-317-7368		5099 .101 GENERAL SERVICES ADMINISTRATION	

Gentlemen:

I have reviewed your letter of 13 July addressed to Eric Kast at Cherry Point. After discussion with Eric and with Robert Hughes of NAVICP, it was determined that your proposal No. 2 in relation to flow testing under contract N00383-98-C-M101 is the most appropriate solution.

NAD Cherry Point will forward 3 units from inventory to TCT for TCT to use to establish a baseline EFA requirement for comparison to the current production units. Upon completion of the establishment of the baseline the GFM units shall be returned to NAD Cherry Point in RFI condition.

All flow documentation and results should be forwarded to NAVICP codes 0232.01 and 0733.3 for approval prior to flow testing of all 200 units on contract. (This includes submission of data related to the Flow Systems Inc. test stands.)

I am unable to confirm a PLT test date of 26 July as there are several considerations yet to be addressed as I discussed with you on the phone today.

If there are no problems related to flow testing it may be that only the QAR may have to witness the PLT, however, that decision will have to wait until Larry McPhillips returns from leave and you can agree with him on a test date.

All future correspondence related to this contract should be directed to Carl Chatterton at NAVICP.

Sincerely,

C. Chatterton
C. CHATTERTON, PCO

Copy to:
Robert Hughes, NAVICP
Eric Kast, NAD Cherry Point

FED Y'D 7/14/99

PEG,
FYI
gk



CHROMALLOY

ATTN: CARL CHATTERTON

TURBOCOMBUSTOR

TECHNOLOGY

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Stuart, FL 34997
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July 13, 1999

Naval Aviation Depot
Building 133
Cherry Point, NC 28533
Mail Code 4.4.8.1

ATTENTION: Eric Kast

CONTRACT NO.: N00383-98-C-M101, dated 03-June-98, Mod P00001 & Mod P00002

SUBJECT: J-79 Outer Combustion Liner P/N 7054M65G02 Rev. D Airflow Requirements

Dear Eric,

As you are aware from our telephone discussions over the last couple of weeks, TurboCombustor Technology, Inc. (TCT) is currently near the completion of its production run of 200 units that are contractually required for delivery by July 30, 1999 (see attached photos). For your information, TCT had specified as condition of accepting a contract for production of the J-79 Outer Combustion Liner that First Article Testing requirements be waived. The attached contract modification (MOD P00001) deleted all references to First Article Test (FAT) requirements. This was justified based upon TCT's performance on the previous contract (No. N00383-88-C-4698) for 3300 units.

One of the last operations to be performed on the J-79 Outer Combustion Liner is airflow measurement. TCT currently uses airflow measurement to determine the Effective Flow Area (EFA) of combustors manufacture for customers such as G.E. Aircraft Engines, Allied Signal, and Roll-Royce. In general terms, EFA is the measurement of the actual amount of airflow that will pass through an opening for a given pressure ratio across the part when all factors are considered such as part geometry and fluid dynamics.

Airflow or EFA measurement for the subject J-79 Outer Combustion Liner is a requirement of drawing notes 22 & 21. TCT uses flow stands manufactured by Flow Systems, Inc. of Berthoud, Colorado. Drawing Note 22 specifies the "Flow Stand must conform to 7032M59P05 or 7032M59P07..." From the available information, it has been concluded that these were specific GEAE designed and built Flow Stands used during the production of the J-79 engine in the mid 1970's.

When TCT processed the Flow Nozzle P/N 7032M37P04 as specified per drawing Note 22 and table AW on TCT's airflow stand, the average EFA was 7.759 in². The EFA per



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drawing Table AW for the Flow Nozzle is 5.0167-5.0367 in². Additionally, four random production units, and one unit manufactured by TCT under the previous contract as referenced above, were also flowed and their average values are listed in the table below. The Outer Combustion Liner EFA requirement per drawing Note 21 is 4.872-5.071 in². Although these values for the Flow Nozzle and production units are significantly higher than the drawing requirements, the values for all five Outer Combustion Liners are within 1.2% of each other. Note S/N TCT2255 was manufactured and accepted by the U.S. Government under the previous contract.

TCT Air Flow Results		
Serial No.	Avg. EFA (in ²)	Notes
TCT2255	7.8728	Manufactured under previous contract no. N00383-88-C-4698
TCT3942	7.8110	Current production lot
TCT3981	7.8670	Current production lot
TCT4056	7.7794	Current production lot
TCT4088	7.8026	Current production lot

The geometrical features of the J-79 Outer Combustion Liner that effect airflow are controlled by the drawing View AJ-AJ. This drawing view specifies the inside profile of the item 2 Nose. To vary airflow of the unit, adjustments only within the dimensional limits of this inside profile can be made. These adjustments to this inside profile have been determined to effect the airflow values a maximum of 1% before violating the dimensional limits. Due to the high airflow values of the units noted above, TCT has explored alternative airflow methods.

When TCT previously produced the 3300 J-79 Outer Combustion Liners under contract N00383-88-C-4698, the initial units were flow tested on a Fleming and Associates model A-36 flow stand at Chromalloy's Oklahoma facility. Subsequent units were flowed at TCT on a flow stand manufactured by Compair, Inc. of Burlingame, California specifically for the TCT contract. TCT has documentation demonstrating that the Fleming and Compair flow rigs produce results in accordance to the drawing and were witnessed by a Government QAR. After completion on the previous contract in 1992, the Compair flow rig was discarded.

TCT, with support of its sister company Chromalloy Arizona, flowed the same four production units as listed above on a Fleming and Associates model AF-36 flow stand. The EFA airflow results utilizing AF-36 Method 3 are attached (see Chromalloy Arizona Subsonic Air Flow Measurement Report dated 6/28/99). The AF-36 Method 3 uses two calibrated standard ASME nozzles to calibrate the flow stand for atmospheric conditions, then uses a "Master" to determine an offset for the specific part conditions. The "Master" for the J-79 Outer Combustion Liner is P/N 7032M37P04 Flow Nozzle. The table at the bottom of the Report specifies the specific results for each test. Serial numbers 3981, 3942, 4056, and 4088 were the production units tested. The RawEFA is the value before correction for atmospheric and part specific conditions. For example, S/N 3981, RawEFA

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is 7.7986 in². This value is corrected for atmospheric conditions by multiplying the RawEFA by .99607, then adding .02409 to determine the EFA (7.7986 in² X .99607 + .02409 = 7.7920 in²). This value is then further correct for the part conditions by subtracting 2.74657. This value is the difference between the "Master" actual, after correction for atmospheric condition, and the drawing Table AW requirements. The final unit AREA would be 7.7920 - 2.74657 = 5.045 in². The drawing requirement is 4.872-5.071 in², thus indicating an acceptable unit. There was however an error in this particular report; the "Master" value used was 4.984, but should have been between 5.0167 and 5.0267 per drawing Table AW. This would have caused S/N 3981 to be slightly high in airflow and required minor adjustments to the inside contour of the item 2 Nose to bring it back within drawing specification. The other three units would have remained within the drawing requirements.

To summarize the situation, the specific flow stands required per drawing note 22 are not available. Minimally, for any airflow measurement to be taken, TCT will need to submit a DD Form 1694 "Request for Deviation/Waiver" for an alternate flow stand to be used.

TCT proposes the following three options for your review and concurrence which will then be submitted on a DD Form 1694 for formal approval:

PROPOSAL NO. 1

Waive the requirement of drawing notes 21 and 22 for flow testing.

Supporting Rational of Proposal No. 1

1. The drawing, reference View AJ-AJ, tightly controls the geometrical features that affect the airflow of the Outer Combustion Liner.
2. Repair of the J-79 Outer Combustion Liner P/N 7054M65G02 by NADEP at Cherry Point, NC is accomplished without flow testing and is then directly install in the engine for use.

PROPOSAL NO. 2

Allow TCT to use its airflow system (see photos attached) for EFA validation of the 200 production units in lieu of the flow stands specified by drawing note 22. A representative unit from the U.S. Government inventory (new, used, or repaired) would be required and subsequently flowed on TCT's flow system to establish a baseline EFA requirement. This established baseline in conjunction with a tolerance of +/-2.8%, consistent to GEAE's revision "E" drawing for the same component, would be used for comparison to the 200 production units as opposed to the drawing Note 21 requirements.

Supporting Rational of Proposal No. 2

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As indicated above, TCT's flow data of current production units S/N TCT3942, 3981, 4056, and 4088 flowed within 1.2% of S/N TCT2255 which was manufactured under TCT's previous contract (No. N00383-88-C-4698) and accepted by the U.S. Government. This direct flow test provides comparison to an actual part and eliminates the variability factor of flow stand configurations. The use of TCT's state-of-the-art flow system permits expeditious delivery of all 200 Outer Combustion Liners.

PROPOSAL NO. 3

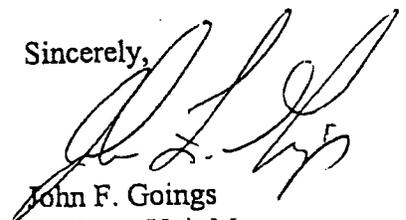
Use a Fleming and Associates model AF-36 flow system in lieu of the specific flow stands specified in drawing note 22. This proposal would require TCT to subcontract for the support of this requirement. This potentially could create logistical delays that in turn would impact delivery of the 200 Outer Combustion Liners.

Supporting Rational of Proposal No. 3

The AF-36 exhibit results utilizing its Method 3 technique that are within the specified drawing requirements of Note 21.

We encourage your expeditious review of the above and cordially invite you to visit our facility in Stuart, Florida to discuss the J-79 Outer Combustion Liner manufacture. This would also permit your review of the DD1423 technical data package items (see attached). We look forward to your comments and discussion.

Sincerely,



John F. Goings
Business Unit Manager
New Products

cc: Carl Chatterton - CO
Larry McPhillips - QAR
Roger Hollyfield - Tinker AFB

Attachments:

1. P/N 7054M65G02 Rev. D drawing sections
2. Contract modification P00001 and P00002
3. TCT flow system photos with production Outer Combustion Liners
4. Chromalloy Arizona Air Flow Measurement Report dated 6/28/99