



MAINTENANCE TECHNICAL TRAINING

FOR TRAINING PURPOSES ONLY

SUBJECT: B727 ENGINES ATA 71-80 DOC ID 1216E DATE 12/89 PAGE 183

CHAPTER 10

A. ENGINE TRIM

1. General Information

- a. Engine trimming will accomplish the setting of Idle RPM and the thrust level at the part-power trim stop. Engine MIL trim adjustment determines the fuel flow increment between the part power trim stop and the "full open" lever position at the fuel control.
- b. These two adjustments establish the proper fuel flow - power lever relationship for the pilot. Also, correct Idle RPM assures good engine acceleration in the airplane.
- c. A brief run to take-off power at part throttle followed by a single slam acceleration and deceleration from and to Idle are included to ensure that the take-off rating is available and that engine response is normal.
- d. On a Standard Day at Sea Level, a newly "trimmed" engine could have approximately "Take-off thrust +15% overboost" capability if the thrust lever were inadvertently advanced to full throttle. Normally, the take-off thrust is set at Part Throttle. Ambient temperature and the manner in which the engine is rated will affect the amount of unused thrust lever travel between Take-off and Full Throttle at the Pilot's throttle stand. Assuming a standard day condition, there will be an increasing amount of unused lever travel as ambient air temperature decreases while this cushion will shrink as the ambient air temperature at sea level increases above 59°F.
- e. Engine "trimming" will be required as follows:

After installation of new engine, a fuel control change or if it becomes necessary to restore thrust lever travel between take-off and full throttle position at the pilot's aisle stand.
- f. The APU should be shut down during engine trim to prevent APU exhaust ingestion into the engine inlets.



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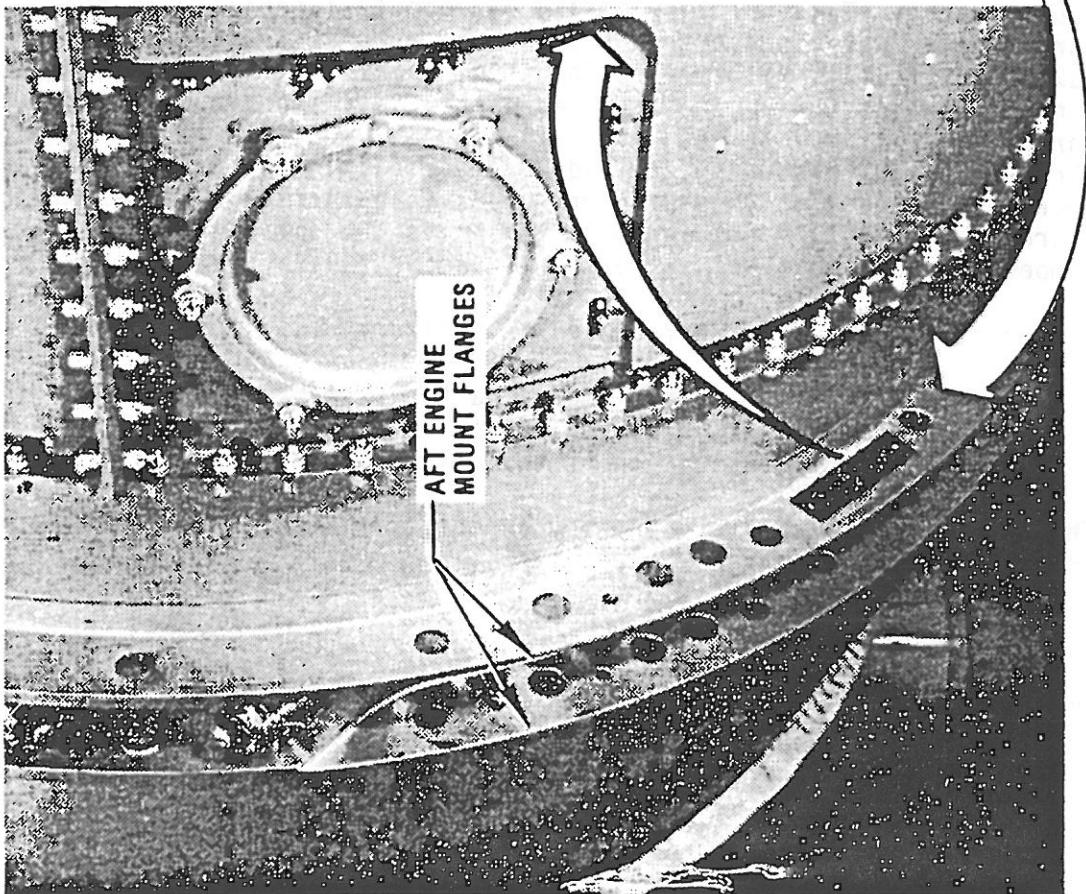
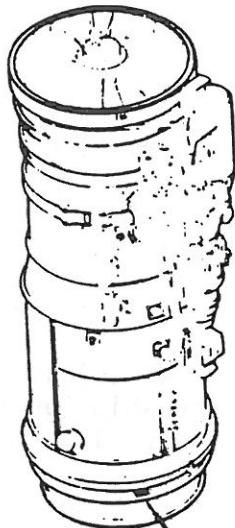
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DATA PLATE EPR - 1.65
ALL JT8D ENGINES
USED FOR MAKING AN ENGINE
CONDITION CHECK ONLY

ENGINE SERIAL NO.	P653541B
SPEED DATA AT 60°F	88.83%
	10,881

NOTE: N2 SPEED DATA WILL
VARY PER ENGINE



ENGINE DATA PLATE



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2. Data Plate Aft Right Side of Engine

- a. During the Production Test Cell Operation, prior to delivery, the engine is checked for proper operation and certain adjustments are made to insure the performance matches a standard for that engine model. Once the engine has been fully adjusted and performance checked, a reference speed is established for use in service. The reference speed is called "DATA PLATE SPEED". Data Plate Speed is established from a curve which relates EPR (Engine Pressure Ratio) and High Pressure Compressor rpm (N2). This curve is slightly different for each engine. Prior to extracting the Data Plate Speed, the curve is corrected to sea level conditions. The corrected curve is then entered at a given EPR of 1.65 (for all engines). The speed corresponding to an EPR of 1.65 is then stamped on the Data Plate in % N2 and actual rpm. Data Plate Speed can now be used to determine engine condition in service. A certain tolerance band is specified in a +%N2 and -%N2 deviation from the corrected Data Plate Speed. NOTE: Data Plate Speed must be corrected for temperature prior to making a Data Plate Speed check.
- b. The engine Data Plate is located on the front face of the forward turbine support flange at the 4 o'clock position.
- c. It may be necessary to deactivate the part-power trim stop on a hot day (since Data Plate EPR will be above the Part-Power trim setting) prior to performing the Data Plate check. Engine Data Plate Speed is based on an EPR of 1.65 for all models of JT8D engines and is used to check the internal condition of the engine.

3. Thrust and Start Controls - Fuel Control

- a. Located on right side of fuel control unit are two adjustments which are used for engine trimming. These are:

IDLE - For engine idle RPM

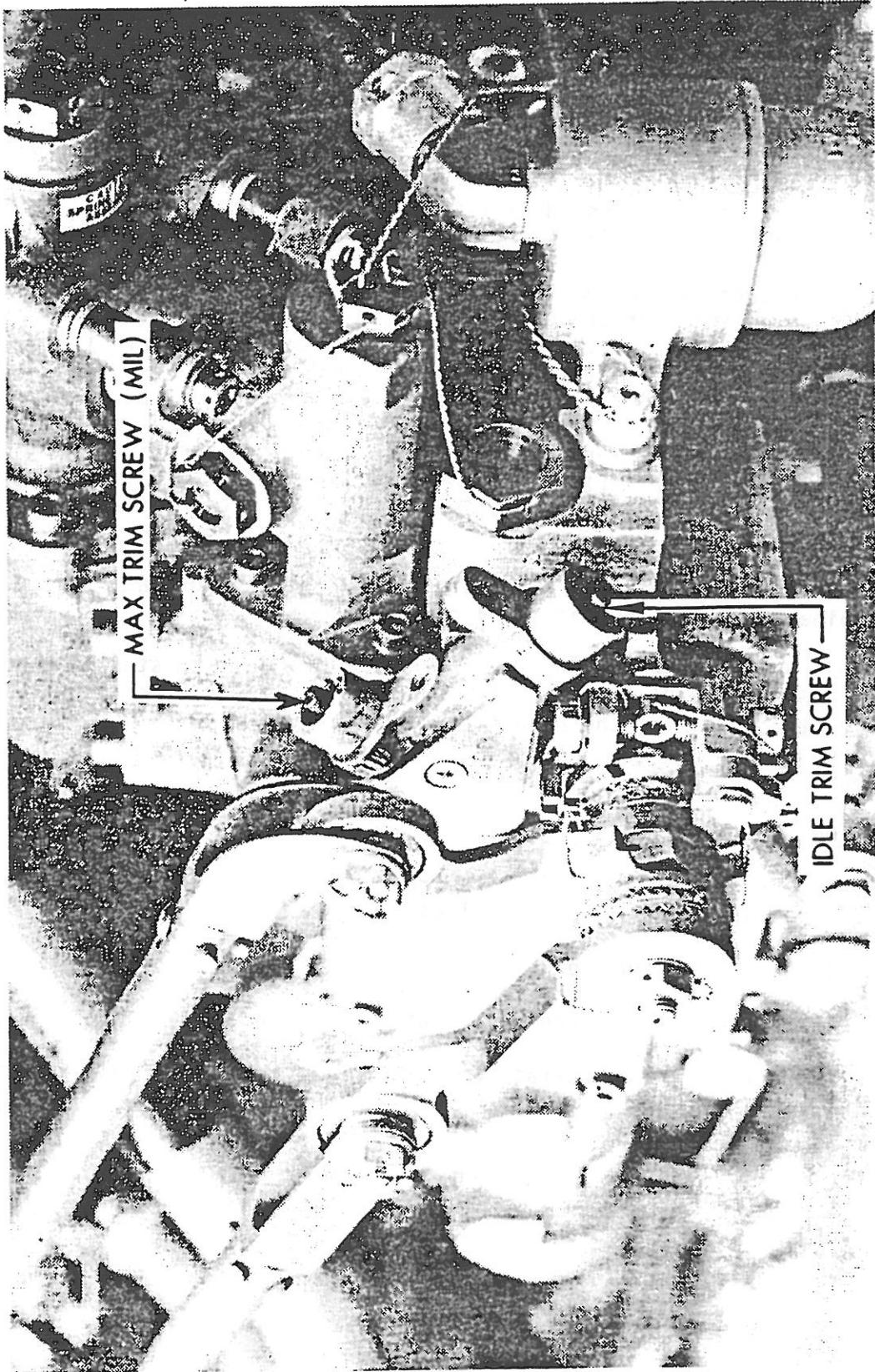
MAX (or MIL) - For engine output at part power.
- b. The two screws can be operated manually or a remote trim kit can be used.



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JT8D FUEL CONTROL



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B. PART POWER TRIM SPACER

1. A two position part-power trim stop with a "S" or standard position and a "C" or cold position is installed on the fuel control. In order to improve accuracy during engine trim runs in cold weather, P&WA has extended existing engine trim curves at low temperatures and revised the procedure for the use of the "C" (cold) and "S" (standard) part power trim stop on every model of the JT8D engine.
2. The revised procedure requires all "trimming" to be accomplished using the "S" stop except when the part power trim setting exceeds take-off EPR. When this happens, the "C" stop is to be activated and the engine "trimmed" using the "C" stop values given in the engine trim tabulations.
3. On a standard day the "PLA" (Power Lever Angle) is restricted to 77.1° of forward thrust travel.
4. For a cold day trim, the "PLA" is restricted to 68.5° of travel.
5. The part power spacer is to be stowed ("S" showing) and safety wired in the de-activated position.

C. COMPPAIR PORTABLE TRIM KIT

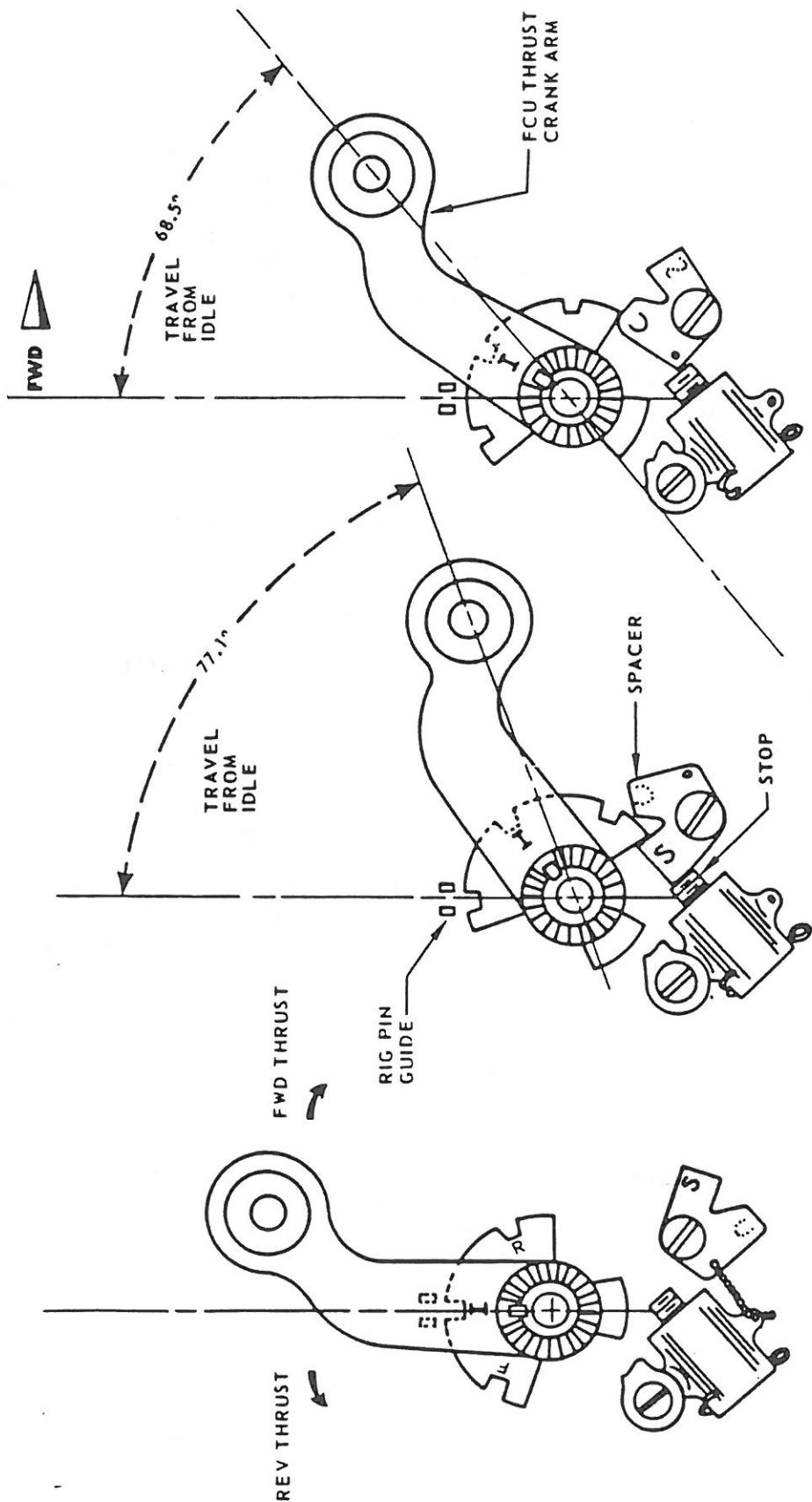
1. The trim kit allows the precision adjustment of N2 RPM from the cockpit during a trim run. This will be accomplished at idle and part power.
2. The optional battery powered trim kit consists of a control box, connector cables and two motor/gearbox assemblies connected together by a thumbscrew/bracket assembly. This assembly can be mounted on the fuel control unit.
3. Select switches on the control box are for "engine" selection - 1, 2 or 3, an "idle/max" switch which selects the motor and "inc/dec" switch which will control direction of rotation of the motor, thus increasing or decreasing N2 RPM.
4. The DC ammeter will show current draw during the motor operation. Excessive amp indication during operation indicates problems in the drive motor, gearbox or trim screw of the trim kit.



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COLD DAY

STANDARD DAY

STOWED

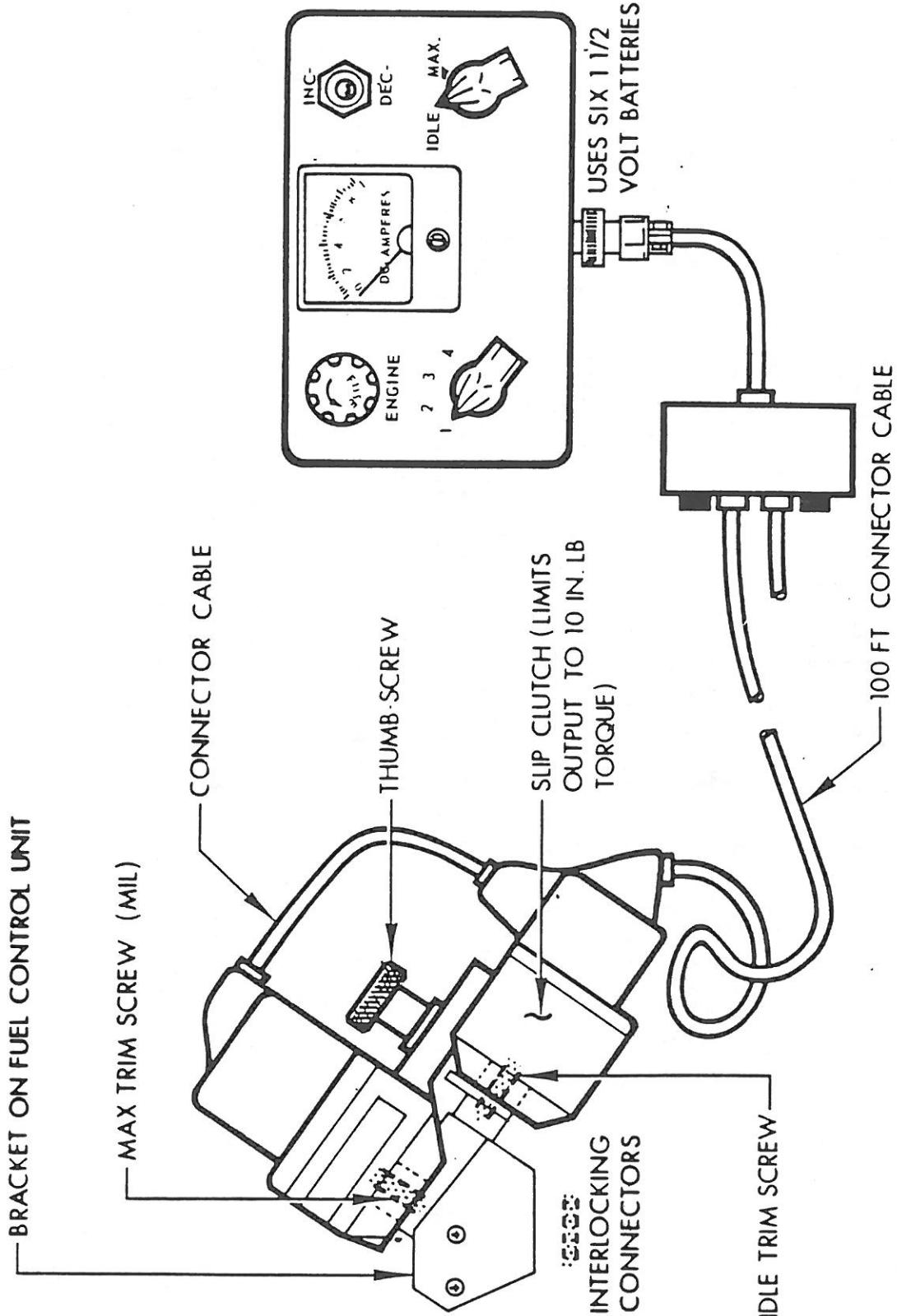
PART POWER TRIM SPACER



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COMPAIR PORTABLE TRIM KIT



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BAROMETER - INCHES OF MERCURY		29.3	29.4	29.5	29.6	29.7	29.8	29.9	30.0	30.1	30.2	30.3	30.4	30.5	30.6	
DATA PLATE NO. F	IDLE PLATE NO. 1+3	DATA NO. 1+3	48.3	48.5	48.7	48.8	49.0	49.2	49.3	49.5	49.7	49.8	50.0	50.2	50.3	50.5
DATA PLATE NO. 1+3	DATA PT7 NO. 2	DATA NO. 2	47.9	48.1	48.3	48.4	48.6	48.7	48.9	49.1	49.2	49.4	49.6	49.7	49.9	50.1
16 -3.59 (56.61)	NO. 1+3 PP PT7 NO. 2 PP PT7	NO. 1+3 PP PT7 NO. 2 PP PT7	64.8	65.0	58.5	58.7	58.9	59.1	59.3	59.5	59.7	59.9	60.0	60.2	60.4	60.6
			63.7	63.9	57.6	57.8	58.0	58.2	58.4	58.6	58.8	59.0	59.2	59.4	59.6	59.8
			*	*	*	*	*	*	*	*	*	*	*	*	*	*
20 -3.41 (56.71)	NO. 1+3 PP EPR NO. 1,2,3 TO EPR NO. 2 PP PT7/PAW	NO. 1+3 PP PT7 NO. 2 PP PT7	64.0	65.0	65.2	58.6	58.8	59.0	59.2	59.4	59.6	59.8	60.0	60.1	60.3	60.5
			63.5	63.7	63.9	64.1	57.7	57.9	58.1	58.3	58.5	58.7	58.9	59.1	59.3	59.5
			*	*	*	*	*	*	*	*	*	*	*	*	*	*
22 -3.23 (56.81)	NO. 1+3 PP EPR NO. 1,2,3 TO EPR NO. 2 PP PT7/PAW	NO. 1+3 PP PT7 NO. 2 PP PT7	64.3	64.5	64.8	65.0	65.2	58.5	58.7	58.9	59.1	59.3	59.5	59.7	59.8	60.0
			63.2	63.5	63.7	63.9	64.1	57.7	57.9	58.0	58.2	58.4	58.6	58.8	59.0	59.2
			*	*	*	*	*	*	*	*	*	*	*	*	*	*
24 -3.05 (56.91)	NO. 1+3 PP EPR NO. 1,2,3 TO EPR NO. 2 PP PT7/PAW	NO. 1+3 PP PT7 NO. 2 PP PT7	64.1	64.3	64.5	64.7	65.0	65.2	68.4	58.6	58.8	59.0	59.2	59.4	59.5	59.7
			63.0	63.2	63.4	63.7	63.9	64.1	7.6	57.8	57.9	58.1	58.3	58.5	58.7	58.9
			*	*	*	*	*	*	*	*	*	*	*	*	*	*

* USE COLD WEATHER PART POWER TRIM STOP
APPLICABLE TO PMA JT8D-17

FOR TARGETS TO -RIGHT OF
- LEFT OF

STAGGERED LINE USE C STOP
STAGGERED LINE USE S STOP
SAMPLE ENGINE TRIM PAGE



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D. SAMPLE ENGINE TRIM PAGE

1. General Instructions for Use of Engine Trim Data Sheet

- a. Determine page in 727 Maintenance Manual on which data for ambient temperature, barometric pressure and correct engine model is located. If ambient temperature or barometric pressure is found to fall between values given in the chart, correct data can be obtained by interpolation (finding midpoint of difference in this case).
- b. Using the appropriate page, determine the target values corresponding to the ambient temperature (OAT) and/or barometric pressure:
 - (1) DATA - Correction factor added to, or subtracted from, engine PLATE data plate percent rpm to compensate for nonstandard day CORR. conditions.
% N2
 - (2) IDLE - Percent N2 rpm target to which IDLE trim screw is & N2 adjusted. Upper values apply to No. 1 and No. 3 No. 1+3 engines. Lower values, in parenthesis, apply to No. 2 (No. 2) engine.
 - (3) DATA - Engine data plate power setting target corresponding to PLATE 1.65 EPR. This target is used during part power trim PT7 operation to check engine performance deterioration.
 - (4) PP Pt 7- Pt7 target to which MIL trim screw is adjusted during part power trim operation.
 - (5) PP EPR - EPR reference for personnel in control cabin. This value gives an indication of the accuracy of the airplanes EPR indicating system. Do not use this value for engine trim unless precision trim instrumentation is not available and airplane instruments are known to be accurate.
 - (6) TO EPR - EPR target to which engine is operated, after part power trim operation, to check availability of TAKEOFF power and amount of throttle cushion.
 - (7) PP - Ratio of engine exhaust pressure to ambient pressure. Pt7/PAM These values are not part of the normal trim run, however, they may be used to check No. 2 engine EPR indicating system when an excessive EPR discrepancy is apparent.



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BAROMETER, INCHES OF MERCURY		29.3	29.4	29.5	29.6	29.7	29.8	29.9	30.0	30.1	30.2	30.3	30.4	30.5	30.6		
DATA PLATE • F	IDLE NO. 1+3 NO. 1+3 INO. 2)	DATA PLATE PTT	NO. 1+3	48.3	48.5	48.7	48.8	49.0	49.2	49.3	49.5	49.7	49.8	50.0	50.2	50.3	50.5
18 -3.59 (56.61)	58.6	NO. 1,2,3 T0 EPR	NO. 1+3 PP PTT	64.8	65.0	58.5	58.7	58.9	59.1	59.3	59.5	59.7	59.9	60.0	60.2	60.4	60.6
			NO. 2 PP PTT	63.7	63.9	57.6	57.8	58.0	58.2	58.4	58.6	58.8	59.0	59.2	59.4	59.6	59.8
20 -3.41 (56.71)	58.7	NO. 1,2,3 T0 EPR	NO. 1+3 PP PTT	64.5	65.0	58.6	58.8	59.0	59.2	59.4	59.6	59.8	59.9	60.0	60.1	60.3	
			NO. 2 PP PTT	63.5	63.7	63.9	64.1	64.3	64.5	64.7	64.9	65.1	65.3	65.5	65.7	65.9	65.9.5
22 -3.23 (56.81)	58.8	NO. 1,2,3 T0 EPR	NO. 1+3 PP PTT	64.3	64.5	64.8	65.0	65.2	65.5	65.8	66.0	66.3	66.5	66.8	67.0	67.2	
			NO. 2 PP PTT	63.2	63.5	63.7	63.9	64.1	64.3	64.5	64.7	64.9	65.1	65.3	65.5	65.7	65.9
24 -3.05 (56.91)	58.9	NO. 1,2,3 T0 EPR	NO. 1+3 PP PTT	64.1	64.3	64.5	64.7	65.0	65.2	65.4	65.6	65.8	66.0	66.2	66.4	66.5	59.7
			NO. 2 PP PTT	63.0	63.2	63.4	63.7	63.9	64.1	64.3	64.5	64.7	64.9	65.1	65.3	65.5	65.7

- USE COLD WEATHER PART POWER TRIM STOP
- APPLICABLE TO PWA JT8D-17

FOR TARGETS TO -RIGHT OF STAGGERED LINE USE C STOP
 - LEFT OF STAGGERED LINE USE S STOP
 SAMPLE ENGINE TRIM PAGE



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2. Example of Engine Trim Using a Typical Trim Table

- a. Assume:

Ambient Temperature (OAT)	20°F
Barometric Pressure	29.7 In. Hg
Engine Data Plate Speed	88.83%
Engine Position to be Trimmed	No. 2

- b. This temperature and barometric appear on one page of the trim tables. Trim targets have an "asterisk" and lie to the right of the "staggered" line, therefore, "C" (COLD PART POWER TRIM STOP MUST BE USED.)

Targets are as follows:

- (1) Data Plate Correction %N2 is - 3.41; therefore, the adjusted data plate RPM is 88.83 - 3.41 or 85.42.
- (2) Idle %N2 is 56.7
- (3) Part Power (Eng. 1+3) Pt7 is 58.6 In. Hg.
- (4) Part Power Pt7 is (Eng. 2) 57.7 In. Hg.
- (5) Part Power EPR is 1.97
- (6) Takeoff EPR is 2.20
- (7) No. 2 PP Pt7/PAM is 1.94

NOTE: Item (7) is used only when No. 2 EPR appears to be out of limits in such cases:

- (a) Disconnect the No. 2 Pt2 line at the firewall.
- (b) Advance the thrust lever to the part power trim stop.
- (c) Compare the cockpit EPR reading with Pt7/PAM (item 7). If these numbers are within limits, the system is OK.
- (d) Reconnect the Pt2 line.

Whenever the accuracy of No. 2 EPR is in question, this final check should be used before attempting to troubleshoot the system. It will often show that there is no problem.

- c. Upon completion of engine trim the engine must have the idle check and adjusted as necessary from the trim chart.
- d. Complete JT8D engine run-up record (FEL-M-495).



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LHO TECHNICAL OPERATIONS PROCEDURE MANUAL

Ref: 18-1-236

Paper: 1

Date: 25 Nov 88

Subject:

JT8D Engine Run-Up Form, FedEx M-485

Scope: AOD Personnel

Approved By: Managing Director,
Maintenance Plans and Forecasts

1. PURPOSE

The JT8D Engine Run-Up Form, FedEx M-485, is used to record engine parameters during troubleshooting or after engine or component replacement. The form is used in conjunction with procedures contained in the *Jet Run-Up Handbook* and the *P&WA JT8D Maintenance Manual*.

2. INSTRUCTIONS FOR COMPLETION

The mechanic performing the engine run completes each step listed on the form. These steps are self-explanatory and are also covered in the *Jet Run-Up Handbook*.

3. ROUTING

- A. The originator retains the goldenrod copy, folds the remaining copies, and comats to Powerplant Engineering for review.
- B. After the review is completed, Powerplant Engineering forwards the form to Powerplant Records and Aircraft and GSE Reliability. A copy is placed in the appropriate engine file and the original is given to the JT8D Powerplant engineer.



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LHO TECHNICAL OPERATIONS PROCEDURE MANUAL

Rev: 18-1-236
Page: 2
Date: 25 Nov 88



JT8D ENGINE RUN-UP FORM

Reason for Test:

PWA Maintenance Manual Required Test: AML/WO #:

Engine S/N: Model: Data Plate N2 RPM:

Requested By: Employee #: Date:

MAXIMUM OPERATING LIMITS ENTER LIMITS FOR THE ENGINE MODEL UNDERGOING TEST

T.O. EPR: N1: T.O. EGT: Starting EGT:

N2: Oil Pressure: Oil Temperature:

OBSERVED DATA

RECORD ALL DATA REQUIRED FOR THE APPLICABLE TEST

A/C: Engine Position: Target T.O. EPR: OAT C:

Barometer: Wind Speed/Direction: Max Starting EGT: Accel. Time:

EPR: N1: EGT: N2:

Fuel Flow: Oil Pressure: Oil Temperature: PCP:

Ps4: PT7: Breather Pressure: Bleed Valve Closed:

Bleed Valve Open: Peak Inlet Vibration: Peak Exhaust Vibration:

Comments:

RUN-UP COMPLETED AND ENGINE ACCEPTED FOR SERVICE BY:

NAME: EMP #: DATE: AML #:

FOLLOWING VARIOUS REPAIRS AND/OR REPLACEMENT OF THE ENGINE AND/OR COMPONENTS, PERFORM THE CORRESPONDING TEST AS OUTLINED IN THE PWA MAINTENANCE MANUAL, ADJUSTMENT/TEST SECTION.

FedEx M-485 REV 7180
FedEx Publishing Services

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Pink Copy - Reliability; Goldeneed Copy - Originator



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