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COMPONENTE Component	O.S W.O	MODELO Model	PN	SN
FUEL CONTROL UNIT		AP-B3 Main Fuel Control		

IDENTIFICAÇÃO IDENTIFICATION	
TÍTULO TITLE	FICHA PARA REGISTROS DE TESTE DA FUEL CONTROL UNIT FUEL CONTROL UNIT TEST SHEET

PUBLICAÇÃO PUBLICATION	REFERÊNCIA REFERENCE	TLN	DATA DATE
TURBINE ENGINE MAIN FUEL CONTROL	SECTION III	TLN02570	May 15/1993 Revision 06
		CONJUNTO MAIOR MAIN PART	
		PN	SN

TESTE APLICÁVEL AOS PART NUMBERS TEST APPLICABLE TO PART NUMBERS				
440970-1	440970-2	440970-3	440970-4	440970-4 (Less -2)
6892328	6893609	23064874	23067638	23073556

TESTE DA UNIDADE DE CONTROLE DE COMBUSTÍVEL FUEL CONTROL UNIT TEST				
ITEM Item	PROCEDIMENTOS TOLERÂNCIAS Procedures Serviceable limits	Resultado Result	Data Date	Executante Performed by
A	Defina o ângulo de aceleração em 90 graus. Set throttle at 90 degree angle.			
B	Remova a carcaça traseira e fixe o acessório de medição na carcaça principal. Remove the rear cover and attach T27256 measuring fixture speed rack depressor to the main body.			
C	Use a seguinte formula para calcular a diferença total ou a espessura total requerida para os calços. A dimensão predefinida da formula deve ser mantida com o controle até a calibração final. Use the following formula to calculate the total difference or the total thickness of shims required. The mechanical preset formula dimension shall remain with the control through final calibration. PART "A" – 0.0785 = – PART "B" TOTAL DIFF			
D	Defina a pressão P1 em 250 ± 50 PSIG e aplique 5 in.Hg de vácuo. Com a chave de torque T26792, ajuste a tensão da mola de balanço para 0.077 ± 0.002 in no relógio apalpador. Set P1 pressure at 250 ± 50 PSIG and apply 5 inches of Hg vacuum. With the T26792 torque wrench, adjust the balance spring tension adjustment to 0.077 ± 0.002 inch on dial indicator.			
E	Aproxime todos os fluxos totais para um valor entre 200 e 500 PPH abaixo do requerido. Approach all total flows from a value of 200 to 500 PPH lower than the requirement			

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TESTE DA UNIDADE DE CONTROLE DE COMBUSTÍVEL FUEL CONTROL UNIT TEST				
ITEM <i>Item</i>	PROCEDIMENTOS TOLERÂNCIAS <i>Procedures Serviceable limits</i>	Resultado <i>Result</i>	Data <i>Date</i>	Executante <i>Performed by</i>
F	Com a válvula <i>Cutoff</i> aberta e porta P4 tamponada, aplique gradativamente combustível a uma pressão de 600 ± 10 PSI na porta P1. Não é permitido vazamentos. <i>With the cutoff valve in the open position, P4 fuel outlet port capped, apply fuel pressure gradually to control the P1 fuel inlet port at a pressure of 600 ± 10 PSI. There is to be no leakage</i>			
G	Com a válvula <i>Cutoff</i> fechada, aplique combustível a uma pressão de 125 ± 10 PSI na porta P1. <i>With the cutoff valve closed, apply fuel to the control P1 fuel inlet port at a pressure of 125 ± 10 PSI.</i>			

INSTRUÇÕES DE PREAJUSTE | PRESET INSTRUCTIONS

SUBASSEMBLY FLOW BENCH SPEED RACK VERSUS SPEED					
T.S. 8288					
PRELIMINARY PROCEDURE					
A. Mount control on flow bench with the T27259 adapter. B. Attach the following hoses: Fuel inlet (P1), bypass (P0), P1 and P0 pressure taps. C. Attach a line to the main body P0 pressure tap with a shutoff valve installed in this line in order to bleed main body. D. Cap all other openings and pressure taps. E. Move throttle to 90° throttle angle. F. Assemble fixture T25796 to fixture T25795 and install assembly to main control rear body. G. Remove low temperature stop and insert tool (T27265).					
TEST PROCEDURE					
(Preparation)					
TEST PT.	THROTTLE DEG.	CONTROL RPM	SPEED RACK TRAVEL (INCHES)		
			MIN.	REC.	MAX.
1.					See Note 1.
2.	90	800	0.067	0.075	Speed Rack Check Notes 2, 4, & 10.
3.	90	1200	0.142	0.166	Speed Rack Check Notes 2 & 10.
4.	90	1880	0.360	0.385	Speed Rack Check Notes 2 & 10.
5.	90	3000	0.922	0.926	Speed Rack Check Notes 2, 5, & 10.
6.	90	3300	1.094	1.119	Speed Rack Check Notes 2 & 10
7.	90	3000	within	0.012	Hysteresis Check Notes 3 & 10 From that recorded at Pt. 5.
8.	90	1200	within	0.012	Hysteresis Check Notes 3 & 10 From that recorded at Pt. 3.
9.	90	800	within	0.012	Hysteresis Check Notes 3 & 10 From that recorded at Pt. 2.
10.	36	3060			Speed Rack Check Notes 2 & 10.
NOTES: "Zero" dial indicator with zero fuel supply. (Rack must be pulled out to obtain correct "Zero".) - Approach test point from LOWER speed. - Approach test point from HIGHER speed. - Adjust feedback spring to meet travel limits. (CCW to increase. One turn increases rack travel approximately 0.031 inch.) - Adjust ratio screw to meet travel limits. (Turn CW to increase travel.) - Final rack travel run to be made after lockwiring the feedback spring adjustment. - Record adjustment and parts replaced. - Control is to be mounted with cut-off motor actuator in 12:00 o'clock position. - When using speed rack zero positioning fixture - - be sure to completely disengage expander from cam shaft before taking data. - For points 2 thru 10 use P4 limits or 200-300 PSIG.					

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TEST SPECIFICATION 2448-01
SUBASSEMBLY FLOW BENCH P_{T2} ACTUATOR TEST

PRELIMINARY PROCEDURE

- A. Mount control on fixture T27261 with the front body and rear cover removed.
- B. Attach P1 to the control fuel inlet and attach a hose from P1 tap to bench gage.
- C. Install a tee in compressor inlet pressure connector. Install a hose from vacuum source to one leg of "T." From the other leg attach a second hose to the Hg manometer. Cap all other openings on P_{T2} actuator housing.
- D. Move throttle to 90°.
- E. Attach dial indicator T26769 to main body over pressure actuator rack and zero dial indicator.
- F. Cap outlet, inlet, bypass, and pressure taps (except P1).

TEST PROCEDURE

Test Point	Pc Inch Hg Absolute	Rack Travel Inch			Note	Test Conditions
		Min.	Rec.	Max.		
1.	Local		0.000		2	Install dial indicator and "zero" at zero fuel supply. Outlet shall be plugged throughout run. Set 0 P4 psig.
2.	48	0.753		0.785	1	
3.	30	0.478		0.491	1	Adjust lever ratio (CW for more travel). Re-check TPT 5 and readjust balance spring, if necessary, to rack travel limits.
4.	10	0.150		0.168	1	
5.	5	0.076		0.080	1	Adjust balance spring to set rack travel limits.
6.	2	0.000		0.050	1	
7.	5	Within		0.011	2	Hysteresis limit from TPT 5.
8.	10	Within		0.011	2	Hysteresis limit from TPT 4.
9.	30	Within		0.011	2	Hysteresis limit from TPT 3.
10.	48	Within		0.011	2	Hysteresis limit from TPT 2.

NOTES:

1. Approach test points from higher Pc value.
2. Approach test points from lower Pc value.
3. Final rack travel must be run at TPT's 2 and 5 only after lockwiring of lever ratio adjustment, halfball adjustment, and plate screws and after lockwiring and sealing of the lever ratio cover and bellows tension adjustment.
4. Maintain Po pressure of 0 psig and P4 of 200-300 psig unless otherwise specified.

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MECHANICAL PRESET OF ACCELERATION AND PART THROTTLE CAM

PRELIMINARY PROCEDURE

- A. Set throttle at 90 degree angle.
- B. Remove low temperature stop and attach dial indicator T27344 and zero dial indicator at the casting machined surface of the low temperature stop.
- C. Remove rear cover and attach speed rack depressor T27256 to the main body.

NOTE: When setting speed rack indicator pull up speed rack with fingers and then release. Zero dial indicator.

NOTE: Lubricate cams and cam followers with grade 1010 oil.

TEST PROCEDURE

TEST POINT 1.1

"Zero" speed rack dial ind. (Pull out on rack to be sure speed piston is seated.) Adj. manual thermo. to visually align accel. cam follower with +165°F dimple. Locate dimple precisely by adj. manual thermo. and observing point of metering valve trav. reversal. Approach from both directions in determining temp. Dial ind. reading to be assigned to +165°F.

TEST POINT 1.2

Add .198" to determine +59°F. temp. station and reposition manual thermo. to obtain this reading.

TEST POINT 2.1

Depress speed rack as specified and set metering valve indicator (zero setting). Use speed rack travel recorded on speed rack versus speed preset for Test Points 2.1, 2.2 and 2.3.

TEST POINTS 2.2 and 2.3

Adjust acceleration cam micromatic. CW increase dial reading. It is important that Test Point 2.1 be reset after each adjustment.

TEST POINTS 3.1 and 3.3

Check and compare these points. If readings are not equal, reset throttle pointer and stops slightly to balance the readings.

TEST POINT 3.4

Adjust P.T. pickup screw. CW increase dial reading.

TEST POINT 3.2

Check only after 3.4 is set, use throttle pointer and stop adjustment to set as required. Recheck Test Points 3.1 and 3.3.

TEST POINT 3.5

Adjust P.T. face cam. This adjustment will upset pickup (3.4) in same direction except less sensitive-ly, so set beyond desired point then trim pickup (3.4). Recheck 3.5 and repeat procedure if required.

TEST POINT 3.6

Adjust P.T. cam micromatic. Reset 3.4 if required. CCW increase dial setting.

NOTE: On completion of preset, measure and record on history card depth from casting flange to end of cam shaft at 59°.

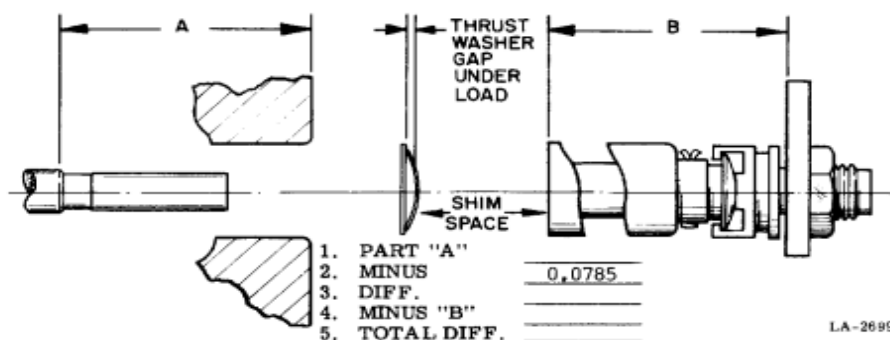
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MECHANICAL PRESET OF ACCELERATION AND PART THROTTLE CAM (Continued)

TEST PROCEDURE (Continued)

NOTE: The "A" dimension for part throttle cam shimming having been established just prior to the installation of the flat washer and the spring washer and recorded, proceed now as follows:

1. After the final setting has been made on the part throttle scheduling cam, remove the adjusting plug and cam assembly to establish dimension "B".
2. Using tool 2550903, insert the adjusting nut end of the adjusting plug into detail 1; then with the part throttle cam properly installed on the adjusting plug, slip detail 2 over the cam and adjusting plug and into detail 1 until it bottoms on the inner face of the adjusting plug retaining flange.
3. With all parts held firmly together, measure the amount by which the end of the cam either extends into the end of detail 2 or protrudes over the end of detail 2.
4. The length of detail 2 is 2.0000 ± 0.0005 ".
5. The amount by which the end of the cam may protrude over the end of detail 2 must be subtracted from 2.0000", or the amount by which the end of the cam extends into detail 2 must be added to 2.0000" to obtain Dimension "B" of the illustration of Figure 1.
6. Using the formula in the illustration of Figure 1, solve for the total difference or the total thickness of shims required.
7. Use tool 2550904 to install the required number of shims onto the throttle shaft and against the spring washer. Place packing (58, Figure 2-37) on adjusting plug (57). Spray ID of casting bore with WD-40 and install previously preset part throttle cam and adjusting plug.
8. If it should be necessary for any reason to remove the shims and to prevent them falling into the control, use a piece of paper folded into a trough and insert through the adjusting plug boss after it has been removed. Use tool 2550905 to remove the shims from the shaft.



- NOTE:**
1. The total difference is the amount of shims that should be installed. Shim to as near this value as is possible with the shim assortment released on the parts list.
 2. Check thrust washer gap with gages 0.035" GO 0.062" NO GO.
 3. This mechanical pre-set sheet must remain with the control thru final calibration.

Figure 1. Mechanical Preset Part Throttle Schedule (Face Cam) Shimming

MECHANICAL PRESET ACCELERATION AND PART THROTTLE CAM									
TEST PT.	SPEED RPM	SPEED RACK TRAV.	THRO. ANGLE	TEMP. °F.	MET. MIN.	VALVE REC.	TRAV. MAX.	TEST CONDITIONS	
1.1	0	0.000	90	+165				RECORD DIAL READING	IN.
1.2	0	0.000	90	+59				RECORD DIAL READING	IN.
2.1	3000		90	+59		0.5000		ACCEL. CAM SETTING	Note #1
2.2	800		90	+59	0.6086		0.6101	CAM MICROMATIC SETTING	Note #1
2.3	1200		90	+59	0.5983		0.5998	CAM MICROMATIC SETTING	Note #1
3.1	3250	1.075	0	+59				POINTER SETTING	
3.2	3250	1.075	45	+59	0.5667		0.5697	POINTER SETTING	
3.3	3250	1.075	62	+59	within		0.003	POINTER SETTING of PT. 3.1	
4	3250	1.075	36	+59	0.5763		0.5778	PART THROTTLE PICK-UP SETTING	
5	3250	1.075	90	+59	0.471		0.473	FACE CAM SETTING	
6	3000		36	+59	0.5294		0.5309	CAM MICROMATIC SETTING	Note #1

x Approach points from higher travel. All other points from a lower travel.

NOTE: 1. All final data must be taken after adjustment and lockwiring as any change may upset previous settings.

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MECHANICAL PRESET OF SPEED TEMPERATURE SHAFT TRAVEL AND LIVE THERMOSTAT

PRELIMINARY PROCEDURE

- A. Install the T27344 fixture in place of the low temperature stop.

CAUTION: MAKE CERTAIN CAM FOLLOWERS ARE ON CAMS.

- B. Install the T27238 fixture over the manual temperature positioner T25877 and secure with socket head cap screw.

TEST PROCEDURE

(Preparation)

Test Point

- 1 With fixture T27344 attached, zero dial indicator on main body casting machined surface at the low temperature stop boss, after first assuring that dial gage tip aligns with end of speed temperature shaft and provides freedom of movement. Then loosen indicator attaching screw and position dial indicator tip directly over the end of the speed temperature shaft. Tighten indicator attaching screw.
- 2 Align the dial indicator tip of the T27238 fixture on the center of the adjusting screw of the manual temperature positioner T25877.
- 3 Adjust the manual temperature positioner adjustment until the temperature shaft dial indicator reads the same as recorded in Mechanical Preset test point 2. This represents the +59°F temperature station.
- 4 Adjust the dial indicator over the manual temperature positioner to read zero.
- 5 Adjust the manual temperature positioner adjustment until the temperature shaft dial indicator travels 0.230" in the cold direction (CCW). The manual temperature positioner dial indicator should read 0.066".
- 6 If the manual temperature positioner indicator does not read 0.066 inch, reset the manual temperature positioner to the +59°F reading used in Test Procedure No. 3 above. Adjust temperature actuator lever ratio adjustment in accordance with note below.

WARNING: A RATIO ADJUSTMENT MUST ALWAYS BE MADE AT THE +59°F STATION TO PRECLUDE THE POSSIBILITY OF THE ACCELERATION CAM FOLLOWER FALLING OFF THE END OF THE ACCELERATION CAM.

NOTE: If the manual temperature positioner dial indicator reading is higher than 0.066 inch, the scribe line on the ratio adjustment should be moved toward the 11:30 o'clock position. If lower, move the scribe line toward the 12:30 o'clock position. The 12:00 o'clock position is referenced to the center line with the control positioned on the drive end.

Reset the +59°F reading on the temperature shaft dial indicator. Then zero the manual temperature positioner dial indicator. Rerun test procedure No. 5 above.

- 7 After obtaining the 0.066 inch reading on the manual temperature positioner dial indicator, adjust manual temperature positioner back to the +59°F reading obtained in test point 3 above. Then move the manual temperature positioner so the temperature shaft dial indicator travels 0.094 inch in the hot direction (CW). The manual temperature positioner dial indicator should read 0.027 inch.
- 8 If the manual temperature positioner dial indicator does not read 0.027 inch, recheck test procedure 3, 4, 5, 6 and 7 above.
- 9 Remove rear cover and install the T27256 fixture on main body so that fixture is positioned over speed temperature rack.

CAUTION: HOLD SPEED TEMPERATURE SHAFT FROM GOING TOWARD THE COLD DIRECTION. MAKE CERTAIN CAM FOLLOWERS ARE ON CAMS.

- 10 Remove the T27238 and the T25877 fixtures and install the thermostat assembly.

NOTE: Unless otherwise specified, approach all probe temperatures +59°F and colder from a higher temperature (lower dial indicator reading). Approach all probe temperatures hotter than +59°F from a lower temperature (Higher dial indicator reading).

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MECHANICAL PRESET (Continued)

TEST PROCEDURE (Continued)

(Preparation)

Test Point

- 11 Depress T27256 to 0.160". Place thermostat probe in a +59°F bath and allow to stabilize for 5 minutes. Then with the thermostat adjusting end nut, adjust thermostat to the dial indicator reading recorded at test point 2 during the mechanical preset of acceleration and part throttle cams. Release depressor and reset to 0.160 inches before recording final dial indicator reading. If a thermostat or eccentric adjustment is made, approach the +59°F temperature station from the hot side.

NOTE: Refer to the "Temperature Adjustment Limits", either adding or subtracting to obtain correct temperature setting, whenever measuring speed temperature shaft movement as a result of thermostat probe temperature variations.

- 12 Place temperature probe into a -65°F bath and allow to stabilize for 5 minutes. Release depressor and reset to 0.160 inches before recording final dial indicator reading. The speed-temperature shaft travel is to be within a dimension of 0.227 to 0.233 inches. To determine this travel subtract the dial indicator reading recorded at test point 12 from the dial indicator reading recorded at test point 11. If the travel observed is not within the specified limits, the ratio eccentric adjustment shaft is to be adjusted.

CAUTION: ECCENTRIC IS TO BE ADJUSTED ONLY AT +59°F TEMPERATURE STATION. THIS ELIMINATES THE POSSIBILITY OF THE FOLLOWER FALLING OFF THE ACCELERATION CAM.

NOTE: Adjust eccentric adjustment shaft counterclockwise to increase travel. One serration of the eccentric adjustment shaft will change travel approximately 0.003 to 0.005 inch. The scribe line on the eccentric shaft is not to be turned more than 90 degrees from a position pointing toward the front body. If eccentric adjustment is made, test points 11 and 12 must be rerun.

- 13 Place probe into a +110 degree bath and let stabilize for 5 minutes. Release depressor and reset to 0.160 inch. Then record dial indicator reading. The speed temperature shaft travel is to be within a dimension of from 0.085 to 0.105 inch. To determine this travel, subtract the dial indicator reading recorded at test point 11 from the dial indicator reading recorded at test point 13. The difference should be between the travel limits 0.085 to 0.105 inch. If not in travel limits, an eccentric adjustment will have to be made. Then test points 11 through 13 will have to be rerun.
- 14 Place temperature probe into a +59°F bath. Approach from a colder temperature. Let stabilize for 5 minutes. The dial indicator reading is to be within 0.012 of the reading recorded at test point 11. This is a hysteresis check.
- 15 Lockwire and seal the thermostat adjusting nut and recheck the +59°F temperature station (approaching from a higher temperature). This should agree with test point 11 dial indicator reading.

TEMPERATURE ADJUSTMENT CORRECTION LIMITS

To correct for variations in stabilized bulb temperature readings (not to exceed $\pm 3^{\circ}\text{F}$), add 0.002" shaft travel for each degree of observed bulb temperature above specified set point. Subtract 0.002" shaft travel for each degree of observed bulb temperature below specified set point.

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AP-B3 PRECALIBRATION

Test Pt.	Speed RPM	Fuel Supply PPH	Thro. Angle Deg.	P4 PSI	Po PSI	Nozzle Flow PPH			P1-P2 "Hg.	Test Conditions
						Min.	Rec.	Max.		
1.1	3250	5200		370	75	2190		2230		
.2	3250	5200	"	115	75	350		380		Set "B" dimension. Set PT25.0 "Hg. abs.
2.1	1200	3600	90	105	30	445		475		Check "A" nut.
.2		4800	90	310	60	1590±10		of 2.1		
3.1	0	5500	90	500	75	3700		3900		Maximum flow.
4.1	3250	5200	36	240	75	795		825		Part throttle pickup. Note 1.
.2	3250	5200	90	370	75	2430		2530		Part throttle schedule cam (face cam). Note 1.
.3	3080	5000	0	310	60	2095		2275		Part throttle setting cam. Note 1.

NOTE 1: If adjustment is made to part throttle schedule cam (face cam) the shimming must be checked.
Limit 0.035 inch GO 0.062 inch NO GO.

NOTE: Temperature for all points +59°F.

NOTE: Observe the following conditions for the aforementioned test points.

TEST PROCEDURE: (Explanations)

NOTE: Retorque bypass cover any time the bypass adjustment cover plug is loosened during precalibration or final calibration. If bypass cover is retorqued on final calibration, the acceleration curve and Point 6.12 must be rerun.

Remove rear cover. Install weir plate (No. 2550668). Remove bypass adjustment cover plug and install "bypass adjustment extension" No. 2550670. Install dial indicator No. 2550669 on metering valve and zero dial indicator. Install outboard protractor. Install bypass robber plug (No. 2550667) and open robber plug valve. Supply lube oil to front body bearings 3.6 to 9 PPH at 10 PSI.

NOTE: Retorque bypass cover anytime the bypass adjustment cover plug is loosened during precalibration or final calibration. If bypass cover is retorqued on final calibration the acceleration curve paragraph 3 and Point 6.10 must be rerun.

UNLESS OTHERWISE SPECIFIED

1. Approach PT2 from a value not less than 5" Hg. above specified value.
2. Approach speed settings from a value of at least 200 RPM less than requirement.
3. Approach P4 from a value of at least 30 PSI less than requirement.
4. Manually position camshaft to 59°F.
5. Set PT2 to 30" Hg. abs. pressure.

TEST POINTS:

- 1.1 Set specified flow by adjusting throttle setting or "A" nut. Maintain this "A" dimension while checking Test Point 1.2. Approach PT2 after selecting throttle angle.

NOTE: If flow is lean and was noticed to decrease sharply just before reaching speed, turn maximum governor adjustment CCW as required.

- 1.2 Adjust "B" dimension micromatic if necessary to obtain specified flow (CW increases flow). If adjustment is made, reset Point 1.1 and recheck Point 1.2.

TEST POINTS:

- 2.1 Increase speed per note. Check "A" dimension setting (reset if necessary) and note metering valve dial reading.
- 2.2 Increase speed as required to obtain 0.100 inch metering valve travel from above position. The fuel flow should change per flowsheet. If the difference is less, increase P1-P2 bypass head by adjusting bypass CW. If the difference is excessive, adjust bypass CCW.
- 3.1 Remove "A" dimension nut. Check maximum "A" (CCW on metering valve stem increases flow). Make certain tab washer is bent whether adjusted or not. (Two up - two down.)
CAUTION: Before "A" nut is removed and until replaced, maintain T.A. per F/S.

NOTE: Points of paragraphs 1, 2 and 3 may be roughed in with open body and weir plate using correlated speeds and flow. Correlated speed for Test Point 2.1 is 1140 open body and TEST SPEC. RPM for closed body.

Remove robber plug number 2550667 and close the robber plug valve. Remove metering valve indicator No. 2550669 and weir plate No. 2550668. Install air purge line in robber outlet. Install "slave" cover T25795 with indicator T25796. Recheck paragraphs 1 and 2 closed body.

NOTE: All points in paragraphs 1 and 2 must be in limits with rear cover in place.
- 4.1 Set throttle angle from WO.
- 4.2 Set RPM from below 3100 RPM.
- 4.3 Set throttle angle from WO and RPM from 3200 RPM. DO NOT UNDER SHOOT.

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CALIBRATION PROCEDURE

SECTION

1. FOR THROTTLE ANGLES, USE OUTBOARD PROTRACTOR OF NOT LESS THAN 6" RADIUS.

Index outboard protractor at 0°. Be sure throttle pointer reads 0° on control quadrant. Make sure the travel range will allow 90° rotation. Reset 90° throttle stop only to set proper travel range. Control quadrant must agree within 1°. Locking device must fit freely at 0° throttle angle without bending protractor arm or allowing excess clearance.

2. INSTALL MANUAL CAMSHAFT POSITIONER.

Using live temperature, approach +59°F from +110°F. If camshaft depth exceeds the value recorded on the preflow data by more than 0.010 inch, thermostat leakage is suspected. Replace thermostat and return control for temperature preset.

3. UNLESS OTHERWISE SPECIFIED

- A. All data recorded in paragraph 1 through 6 is to be taken with the thermostat probe immersed in a 40°F or colder bath. For paragraph 7, immerse probe in a -75 to -80°F bath. Set manual positioner to depths recorded on history card to simulate desired temperature.
- B. Approach all PT2 (In Hg absolute) values from a value of at least 5" Hg HIGHER than requirement. PT2 hysteresis TPT's are all approached from at least 5.0 (In Hg absolute) LOWER than the PT2 requirement.
- C. Approach all speeds from a value of at least 200 RPM LOWER than requirement.
- D. Approach all total flow values from a value of 200-500 PPH LOWER than requirement.
- E. Approach all P4 pressures from a value of approximately 30 PSI LOWER than requirement.
- F. Approach Po pressure from a value of approximately 5 PSI LOWER than requirement.
- G. Approach all throttle angles from a value of at least 5° LOWER than requirement.
- H. Governor solenoid is to be de-energized unless otherwise specified.
- I. Set test conditions in the following sequence:
 - a. Starting Test Bench: (1) Temperature station, (2) Throttle angle, (3) Increase total flow until by-pass barely regulates; bleed air from control; close bleed line; set total flow, (4) Speed, (5) P4, (6) P T2. (Exercise unit before recording data.)
 - b. Approaching test point, adjust items (requiring adjustment) in this sequence: (1) P T2, (2) Temperature station, (3) Throttle angle, (4) Speed, (5) P4, (6) Total flow, (7) P0 pressure.
- J. Drive shaft rotation shall be CCW as viewed from shaft end of control.

4. PARAGRAPH:

- 1.1 Fuel flow must be 2430 to 2530 PPH. Transfer dial indicator reading of 59°F camshaft depth from temperature preflow to flowsheet. (Set "A" dimension or face cam if required.)
- 1.2 Test leakage in electric cut-off.
- 1.3 To return from electric cut-off, the cut-off motor actuator switch is reversed in polarity.
- 1.4 To increase Po pressure above 30 psi, close bypass back pressure valve to obtain desired pressure. Adjust manual cut-off stop lever micromatic to cut-off flow between 11-13 degrees from contact of the cut-off stop. CW increases angle.
- 1.5 Open cut-off lever to 53-55° angle without overshooting. Record exact cut-off angle and nozzle flow.
- 1.6 Increase P0 to specified value and record front body lube oil flow, and combined front body leakage from the overboard drain.
- 1.7 Observe external leakage for (3) minutes. No leakage permissible.
- 1.8 Remove lower plug and observe leakage after testing point 1.7. No leakage permissible.
- 1.9 Record maximum throttle and cut-off torques. Must be smooth. If throttle torque is excessive, make certain that idle reset of governor, is correctly adjusted before rejecting control.
- 1.10

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CALIBRATION PROCEDURE (Continued)

ALTITUDE CURVE

- 2.1 Set 90° throttle angle, approach PT2 from 35", then adjust throttle angle to meet flowsheet limits. With this throttle angle, reset PT2 from 35". Flow must be in flowsheet limits; if not decrease throttle angle in increments of 1/2° and PT2 until flow limits are met, and will repeat from 35". Maintain this throttle angle while running paragraph.

NOTE: Approach all throttle angle from above when setting point 2.1.

- 2.4 If out of limits at this test point, a "B" dimension micromatic adjustment is required. To LEAN, adjust CCW; to ENRICH, adjust CW. However, if micromatic is adjusted, a rerun of test points 2.1 and 2.4 is necessary after re-selecting throttle angle for 2.1. PT2 rack stop must be backed out (CCW) so that it cannot stop the rack at point 2.4.
- 2.5 Hysteresis: Increase PT2.
- 2.6 Adjust pressure rack stop in decreasing flow direction CCW from approximately 500 PPH.
- 2.1-2.7 Final data is to be recorded after completion of paragraph six (6).

ACCELERATION CURVE

NOTES: P1-P2 HEAD ADJUSTMENT (BY-PASS)

This adjustment is to be made according to Precalibration Work Sheet.

- 3.4 "A" NUT ADJUSTMENT
Set "A" dimension nut to obtain fuel flow specified and check points 3.3 through 3.7. Retrim if required. This adjustment changes all paragraph 3 points equally (CCW to enrich) (1 hole = 30 PPH)
- 3.7 CAM ROTATION
If 3.7 is out of limits cam rotation will be required. (CCW enriches flow.)

NOTE: Cam rotation will require rechecking of the "A" nut adjustment (above). 100# flow change at 3.7 will cause about 20# flow change on test points 3.3 through 3.6.

3.1-3.2 SPEED RACK STOP ADJUSTMENT

Set speed rack stop adjustment to specified flows (CW to enrich flow).

CALIBRATION PROCEDURE (Continued)

GOVERNOR CURVE

Just before setting 4.1-4.3, turn inner detent screw adjustment of reset device full CCW until bottomed, then CW seven (7) turns. Next back out outer serrated adjustment until it stops.

- 4.1 Set maximum governor adjustment to meet limits. (CCW to increase flow and/or RPM.)
- 4.2 Record speed (RPM) when nozzle flow (PPH) is within specified limits.

NOTE: Nozzle flow (PPH) fluctuation as a result of test bench speed (RPM) fluctuation is acceptable.

- 4.3 Hysteresis. Decrease speed.

- 4.4 With solenoid de-energized, and with throttle set at 15° instead of 35°, reduce speed per flowsheet from that recorded speed at point 4.2. Adjust outer serrated reset adjustment. (CW to increase) to meet flow limits. (Set to low side.) Advance throttle to 90° then back to 35°. Record speed (RPM) when nozzle flow (PPH) is within specified limits.

NOTE: Nozzle flow (PPH) fluctuation as a result of test bench speed (RPM) fluctuation is acceptable.

NOTE: If the governor reset device is adjusted, rerun throttle torque (Test Point 1.9).

NOTE: An increase in fuel flow may be noted at 35° over that set at 15°. Increase speed slowly until flow meets requirement of point 4.4. Speed per flowsheet limits from point 4.2. Record in right hand column of point 4.4.

NOTE: If a major decrease in fuel flow occurs when moving from set point 15° to 90° and back to 35° the part throttle pick-up screw is set lean. To determine if this is true, reduce speed to 3250 RPM. If there is no flow increase, the pick-up screw is definitely set lean and must be reset. However, it should not be necessary to reset maximum governor or outer reset adjustment.

NOTE: Point 4.4 must be in limits when throttle is approached from 90° throttle angle and final data must be taken in this manner.

- 4.5 Move throttle to 0°. No adjustment should be required. The outer reset adjustment controls this and may be trimmed only as permitted by limits of point 4.4.

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CALIBRATION PROCEDURE (Continued)

- 4.6 Solenoid energized. Set to limits with inside detent idle reset adjustment. (CW increase.)
- 4.7-4.8 When moving from 4.6 to 4.7 no change should occur. An RPM correction of 10 RPM is allowed to off-set any change that does occur.
- 4.9 MINIMUM STOP. Set eccentric shaft to obtain specified flow. (CCW increase.)
- 4.10 MINIMUM STOP CHECK.

CAM LATCH INDEXING CHECK

- 5.1 With the solenoid energized, decrease throttle from 80 to 30°. (DO NOT OVERSHOOT.) Set RPM as required to meet flow limits. Record speed (RPM) when nozzle flow (PPH) is within specified limits.
- NOTE: Nozzle flow (PPH) fluctuation as a result of test bench speed (RPM) fluctuation is acceptable.
- 5.2 With the solenoid energized, reduce throttle to 27°. (DO NOT OVERSHOOT.) Set RPM as required to meet flow limits.
- NOTE: Failure to meet limits means throttle stops and throttle lever adjustment is necessary. Balance 0 and 62° part throttle flows per paragraph point 5.4, part 1.
- 5.3 GOVERNOR RESET RESPONSE
Set conditions of point 4.9 with solenoid de-energized and P4 of 190 PSI. Then energize solenoid and record the time that P4 takes to decrease to 90 PSI or below.
- 5.4 After completion of 5.3 and with no pressure adjustments, de-energize the solenoid and record the time that P4 takes to increase to within 10 PSI of the set point (190 PSI).

PART THROTTLE CURVE

NOTE: Before proceeding, reduce speed, fuel supply, and the P1 and P0 pressure to zero. Restart control in reverse sequence to proceed with calibration. Be sure to reapproach 30 "Hg PT2 from 35 "Hg.

CALIBRATION PROCEDURE (Continued)

1. THROTTLE STOPS AND PROTRACTOR ADJUSTMENT. Set the following test conditions and record the fuel flow:

RPM	FUEL SUPPLY	PT2	THROTTLE ANGLE	TEMP.	P4	NOZZLE FLOW
a) 3250	5200	30	0	59	270	
b) 3250	5200	30	62	59	270	

These flows should be the same. If these flows are different by more than 40#, proceed as follows:

EXAMPLE: Nozzle flow test condition (a) - 1450#
 Nozzle flow test condition (b) - 1650#

Reset test condition (a) and adjust the 0° throttle stop to get 1550# flow which is midway between the original (a) and (b) readings. This raises the (a) reading 100# and lowers the (b) reading 100# to make them equal.

CAUTION: After adjusting the 0° throttle stop, it is necessary to rezero the outboard protractor before the (b) reading can be obtained again for comparison. After these flows are equalized, re-set the 90° throttle stop to obtain 90° travel on the outboard protractor and reset the control pointer as in paragraph A of this procedure.

- 6.1 PART THROTTLE PICK-UP ADJUSTMENT. If adjusted - Part Throttle Schedule Cam (Face Cam) must be checked.
- 6.2 (Decrease throttle angle) Maintain RPM of point 6.1.
- 6.12 FACE CAM ADJUSTMENT. If adjusted - Part Throttle Schedule (Face Cam) shimming must be in limits .035"GO - .062"NO GO.

NOTE: P1 P2 not to increase more than 4.0"Hg. of Pt. 3.6. If increase is greater, check by-pass cover torque.

- 6.4 & 6.9 PART THROTTLE CAM ROTATION. Part throttle setting cam rotation if adjusted face cam must be checked.

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CALIBRATION PROCEDURE (Continued)

- 6.3-6.4 Decrease speed (other points paragraph 6 requires increasing speed.)
and 6.9
6.6, 6.8 Decrease throttle angle. Do not overshoot.
6.13

INTERNAL LOCKWIRING IS TO BE DONE AT THIS POINT.

TEMPERATURE COMPENSATION

All temperature compensation data record is to be taken by manually positioning the camshaft to the position indicator on the temperature preflow, while the live thermostat probe is immersed in a -75 to 80°F bath.

CAUTION: In order to prevent possible damage to the cam follower lever, be careful when setting cold temperature. Do not back out position more than .020" past -65°F. If the cam were to be moved completely out from under the cam follower, a rather sharp increase in flow will be noted. In such case, shut down operations, remove rear cover, hold acceleration cam follower away from cam and turn positioner CW to desired reading.

- 7.1 Hold probe in -80°F bath. Set dial indicator reading to 59°F depth recorded on temperature preflow. Approaching from the hot temperature, record throttle angle, as described in 2.1, to obtain a specified flow.
- 7.2-7.4 Record dial indicator reading for -65°F as provided by preflow data on temperature preflow. Move camshaft to this dimension (CCW on positioning device). Record flow and throttle angle.
- 7.5 Decrease throttle to 36 degrees.
- 7.6 Decrease throttle to 15 degrees.
- 7.7-7.9 Record dial reading for +110°F as provided by preflow data on the temperature preflow. Move camshaft to this dimension (CW on positioner). Set throttle to the value recorded at Pt 7.1. Record flow and throttle angle.
- 7.10 Increase throttle to 36 degrees.
- 7.11 Decrease throttle to 15 degrees.

LIVE CAMSHAFT DEPTH

- 8.1
- Using live temperature, approach 59°F from 110°F. Camshaft depth should be within ± .007" of 59° recording on history card. If not, reset thermostat length. Recheck 59° from 110°F.
 - After establishing 59° from 110° set point 8.1 as described in 2.1.
- 8.2 Using live temperature approach 59° from -65°. After temperature has been stabilized, reset speed from 2900 RPM. If hysteresis is out of flowsheet limits, it is permissible to lower speed to 2900 RPM and then return to 3250 RPM. If control is still out of hysteresis limits, check speed rack guide clearance before rejecting control.

Lockwire and Seal.

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Engine Model: T-56-A8 Engine Manufacturer: Allison Installation Drawing: 330426 Service: NAVY Test Bench Rotation: CW Facing Bench		Fuel Specification: MIL-C-7024, Type II Fuel Specific Gravity: 0.765- 0.775 @ 60°F Fuel Viscosity: 1.17-1.27 Centistokes @ 70°F Fuel Temperatures: 85° ± 5°F		Oil Specification: MIL-O-6081 Oil Pressure: 10 PSIG or 4 to 9 PPH Flow Date Issued: Date Revised:										
NOTE: Check for oil flow continuity through test stand sight glass.				NOTES: a. Heavy Black Box in chart is meant for operator's entry. b. Diagonal Lines within blocks in chart mean "No recorded entry here". c. Ditto Marks within blocks mean that the readings recorded in the Heavy Black Box directly above are to be repeated.										
TEST POINT	SPEED RPM	FUEL SUPPLY PPH	PT2 "HG. ABS.	THRO ANGLE DEG.	BULB TEMP. °F.	Po PSI	P4 PSI OUTLET	NOZZLE FLOW PPH			P1-P2 "HG.	P1 PSI.	DIAL IND.	TEST CONDITIONS
								MIN.	REC.	MAX.				
1.1	3250	5300	30	90	+59	30	370							Cutoff Check
														cc/min. Electric cut-off. Set
.2	3250	5300	30	90	+59	45	OPEN	0.0		30.0				manual cut-off lever @ 60 degrees
.3	3250	5300	30	90	+59	30	370	-20.0		+20.0				Return Cutoff Within 20 PPH of Pt 1.1
														Set manual cut-off lever @ 60 degrees.
.4	3250	5300	30	90	+59	45	OPEN	0.0		+30.0				Set Manual Cutoff 11-13° Rec.
.5	3250	5300	30	90	+59	30	370	Within ±20 of Pt. 1.1					Set Return Cutoff 53-55° Rec.	
.6	3250	5300	30	90	+59	100	320							Max. Comb. Front Body Leak 5 Drops/Min
											REC.			Frnt. Body Oil Flow 3.6 9 PPH
.7	3250	4800	30	90	+59	35			500	P4 = 800 - 860				Ext. Leak. 0 0 for 3 Min.
.8	0	0												Press. Bellows Housing Leak. 0 0
.9	0	0		O to WO										Thro. Torque 15"/# Max.
.10	0	0		WO to O										Cutoff Torque 15"/# Max.
ALTITUDE CURVE														
2.1	3250	5200	30		+59	75	370	2190		2230				Alt. Comp.
.2	3250	5200	45	"	+59	75	500	3050		3300				
.3	3250	5200	15	"	+59	75	220	1060		1150				
.4	3250	5200	5	"	+59	75	115	355		385				
.5	3250	5200	30	"	+59	75	370	Within ±70 of Pt. 2.1					Hysteresis	
.6	3250	5300	2	90	+59	75	120	280		370				Press. Rack Stop P1 = 156-180 PSI
.7	3250	4400	2	90	+59	75	120	280		370				P1-P2 to within 3.0" Hg. @ Pt. 2.6
ACCELERATION CURVE														
3.1	520	1000	30	90	+59	30	90	245		260				Speed Rack Stop
.2	600	1400	30	90	+59	30	95	245		260				Accel. Curve Note #1
.3	800	2200	30	90	+59	30	95	275		315				
.4	1200	3600	30	90	+59	30	105	440		480				
.5	1880	5600	30	90	+59	50	140	770		830				Note #1
.6	2350	3800	30	90	+59	50	190	1080		1170				Note #1
.7	3000	4800	30	90	+59	60	310	1955		2115				

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Engine Model: T-56-A8 Engine Manufacturer: Allison Installation Drawing: 330426 Service: NAVY Test Bench Rotation: CW Facing Bench	Fuel Specification: MIL-C-7024, Type II Fuel Specific Gravity: 0.745-0.775 @ 60°F Fuel Viscosity: 1.17-1.27 Centistokes @ 70°F Fuel Temperatures: 85° ± 5°F	Oil Specification: MIL-O-6081 Oil Pressure: 10 PSIG or 4 to 9 PPH Flow Date Issued: _____ Date Revised: _____
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NOTE: Check for oil flow continuity through test stand sight glass.

NOTES: a. Heavy Black Box in chart is meant for operator's entry.
 b. Diagonal Lines within blocks in chart mean "No recorded entry here"
 c. Ditto Marks within blocks mean that the readings recorded in the Heavy Black Box directly above are to be repeated.

TEST POINT	SPEED RPM	FUEL SUPPLY PPH	PT2 HG. ABS.	THRO ANGLE DEG.	BULB TEMP. °F.	Po PSI	P4 PSI OUTLET	NOZZLE FLOW PPH			P1-P2 HG.	P1 PSI	DIAL IND.	TEST CONDITIONS
								MIN.	REC.	MAX.				
GOVERNOR CURVE														
														Min. Rec. Max.
4.1		5500	30	90	+59	80	330	1960		2040				Gov. Setting 3425 3435 RPM
.2		5500	30	90	+59	90	220	570		630				3460 3500 RPM
.3		5500	30	90	+59	80	330							Hyst. within 25 RPM of 4.1 w/in 50 PPH of Pt. 4.1
.4		5500	30	35	+59	85	220	570		630				Diff. from 4.2 -85 -95 RPM
.5		5500	30	0	+59	85	290	1150		1250				3338 3398 RPM
.6		3800	30	9	+59	50	130	705		755	Sol.	Ener.		2340 2360 RPM
.7		3800	30	30	+59	50	130	705		755	Sol.	Ener.		Speed within 10 RPM of 4.6
.8		3800	30	30	+59	50	130	375		425	Sol.	Ener.		2370 2400 RPM
.9	3150	5200	30	15	+59	65	90	270		300	Sol.	Ener.		Min. Stop
.10	3600	5500	30	90	+59	90	90							Min. Stop Check Within 40 PPH of PT 4.9

GOVERNOR RESET RESPONSE CHECK CAM LATCH INDEXING CHECK														
5.1		5500	30	30	+59	85	220	570		630	Sol. Ener.			Speed within 50 RPM of Pt. 4.4
.2		3800	30	27	+59	50	130	705		775	Sol. Ener.			Speed within 15 RPM of Pt. 4.6
.3	3150		30	15	+59						Sol. Ener.			3 Sec. Max. Gov. Reset Response
.4	3150		30	15	+59						Sol. DE-Ener.			3 Sec. Max. Gov. Reset Response

PART THROTTLE CURVE														
6.1	3250	5200	30	36	+59	75	240	795		825				Part Throttle
.2	3250	5200	30	31	+59	75	240	Within 15 of		Pt. 6.1				
.3	3200	5200	30	36	+59	75	240	790		830				
.4	3060	5000	30	36	+59	60	280	1495		1615				
.5	3200	5200	30	36	+59	75	240							Hysteresis within 30 PPH of Pt. 6.3
.6	3250	5200	30	15	+59	75	220	580		620				
.7	3250	5200	30	18	+59	75	220							Within 15 PPH of Pt. 6.6
.8	3250	5200	30	0	+59	75	280	1475		1595				
.9	3080	5000	30	0	+59	60	310	2095		2275				
.10	3250	5200	30	45	+59	75	260	910		990				
.11	3250	5200	30	70	+59	75	300	1730		1880				
.12	3250	5200	30	90	+59	75	370	2430		2530				Note #1
.13	3250	5200	30	70	+59	75	300							Hysteresis Within 25 PPH of Pt. 6.11

TEST POINT	SPEED RPM	FUEL SUPPLY PPH	PT2 HG ABS	THROT ANGLE DEG.	BULB TEMP °F	Po PSI	P4 PSI OUTLET	NOZZLE FLOW PPH			P1-P2 "HG	P1 PSI	DIAL IND.	TEST CONDITION
								MIN.	REC.	MAX.				
TEMPERATURE COMPENSATION														
7.1	3250	5200	30		+59	75	370	2190		2230				
.2	1200	3600	30	"	-65	30	120-	450		490				
.3	2350	3800	30	"	-65	50	130	1630		1770				
.4	3250	5200	30	"	-65	75	550	3470		3760				
.5	3250	5200	30	36	-65	75	270	1155		1255				
.6	3250	5200	30	15	-65	75	240	715		785				
.7	1200	3600	30		+110	30	110	410		450				
.8	2350	3800	30	"	+110	50	130	910		970				
.9	3250	5200	30	"	+110	75	340	1735		1875				
.10	3250	5200	30	36	+110	75	240	715		785				
.11	3250	5200	30	15	+110	75	220	525		580				
8.1	3250	5200	30		+59	75	370	Within 30 of		Pt. 7.1				Live Temp. Check
.2	3250	5200	30		+59	75	370	Within 50 of		Pt. 8.1				

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FINAL CALIBRATION ADJUSTMENT SUMMARY						
Adjustment Provided in Control Design	Is Adj. Pre-Set Pre-Flowed Final Calibration		Make No Further Adjustments *	Adjust If Necessary To Meet Flow Sheet Limits	Torque The Adj. To Meet These Values Inch Pounds	
	Yes	No			Min.	Max.
PT2 Servo Lever Balance Adj.	X		X			
PT2 Servo Half-Ball Clearance	X		X			
PT2 Servo Lever Ratio Adj.	X		X			
PT2 Bellows Tension	X		X			
PT2 Cross-shaft Gear Mesh Clearance	X		X			
"B" Dimen. Micro Adj.	X			X	40	50
PT2 Rack Stop Adj.	X			X	20	30
Speed Spool Assy. & Set-Up	X		X			
Speed Feedback Balance Adjustment	X		X		20	25
Speed Servo Ratio Adj.	X		X			
Speed Servo Half-Ball Adjustment	X		X		9	10
Speed Rack Stop	X		X		20	30
Adj. Gov. Cam Rotation	X		X			
Shim Gov. Tip Height	X		X			
Gov. Break Adj. (Flow-wise)	X			X		
Min. Flow Adj.	X			X	15	20
Thro. Shaft Gear Mesh Clearance	X		X			
Part Thro. Pick-up Screw	X			X	20	30
Face Cam (Spread) Adj.	X			X	55	60
P-T Setting Cam Rotation	X			X	40	50
Scheduling Cam Rotation (Thro. Stops & Pointer)	X			X	40	50
Max. Flow	X		X		50	60
"A" Dimension	X			X	40	50
Max. Flow	X		X		40	50
"A" Dimension	X			X		
Accel. Setting Cam Rotation	X			X	40	50
Temp. Eccentric Shaft Ratio Adj.	X		X			
Set ± 59° Temp. Sta. with Thermo Adj. Nut	X			X	40	60
Speed Rack Guide Assembly	X		X			
Cut-off Lever Detent Adj.	X		X			
Cut-off Manual Lever Micro.		X		X	40	50
Press. Valve Detent Screw	X		X			
Relief Valve Shim Section	X			X	110	130
By-pass Detent Servo Valve Adj.	X			X	110	120
Cold Temp. Stop Adj.	X		X		110	120
PT2 Bellows Bumper Nuts	X				25	30
Max Gov. Reset Adj. (Serrated Lock)		X		X		
Min. Gov. Reset Adj. (Detent)		X		X		
Cam Lever Shaft Clamp Screw	X		X		3	5
Cam Lever Shaft Locknut	X		X			
* Normally a cause for rejection to pre-set or repair.						

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FLOWSHEET OR PARAGRAPH(S) POINT ADJUSTED	FLOWSHEET OR PARAGRAPH(S) POINT AFFECTED
1. "A" DIMENSION	2.1-2.7, 3.1-3.7, 6.1-6.13, 7.1-7.11
2. P1-P2 HEAD (BYPASS)	2.1-2.7, 3.1-3.7, 4.1-4.10, 5.1-5.3, 6.1-6.13, 7.1-7.11
3. "B" DIMENSION MICROMATIC	5.3, 6.1-6.13, 7.1-7.11
4. PART THROTTLE STOPS & POINTER	1.9, 2.1, 6.1-6.13, 7.1-7.11
5. PICK-UP SCREW	6.1-6.13, 2.1-2.7
6. PART THROTTLE FACE CAM	2.1-2.7, 6.1-6.13, Face cam shimming
7. MAX. GOVERNOR ADJUSTMENT	4.1-4.3
8. GOVERNOR RESET - INSIDE DETENT	4.6-4.8, 5.1-5.4
9. GOVERNOR RESET - OUTER ADJUSTMENT	4.4-4.5, 5.1-5.4
10. PART THROTTLE SETTING CAM	6.1-6.13
11. ACCELERATION SETTING CAM	3.1-3.7, 7.2, 7.3, 7.6, 7.7
12. PT2 RACK STOP	2.6-2.7
13. SPEED RACK STOP	3.1-3.2
14. CUT-OFF STOP MICROMATIC	1.1, 1.4-1.5
15. RELIEF VALVE	1.7
16. REPLACE CUT-OFF MOTOR	1.1, 1.2, 1.3
17. REPLACE CUT-OFF VALVE	1.1-1.6
18. REPLACE BYPASS VALVE	(same as item 2)
19. REPLACE RELIEF VALVE	(same as item 15)
20. REPLACE REAR COVER ASSEMBLY	1.1, 1.4-1.5, 2.6-2.7, 3.1-3.2
21. REPLACE GOVERNOR IDLE RESET	4.4-4.8, 5.1-5.4

Observações <i>Remarks</i>			