

# TEST PROJECT - AIRCRAFT MAINTENANCE

## Electrical Module

WSC2015\_TP14\_M1\_electrical\_actual

Submitted by:

Name: All Experts at WSC2013





## COMPETITOR'S WORKING DOCUMENT

Objective	
<b>Objective</b>	To test the Competitor's ability to utilize the Standard Wiring Practices Manual to fabricate, install and terminate wire loom as per wiring diagram.
<b>Time allotted</b>	Total of 2.5 hours: 2 hours for completing the test board + 0.5 for troubleshooting a given test board
<b>Process:</b>	
<b>1</b>	Install hardware and prepare wire circuit board per attached Figure #1(board drawing) and Boeing Standard Wiring Practices Manual 20-10-11 Para5B
<b>2</b>	Prepare wiring for installation per Boeing SWPM 20-10-11 Para 11 and SPWM 20-10-11 Para 3 and 4.
<b>3</b>	Install and terminate wires to terminal block (TB) per Figure two wiring diagram and Boeing SWPM 20-10-12 Para G (Clamping), using three clamps Boeing SWPM 20-15-04 Para 2 (Insulation Removal) Boeing SWPM 20-15-21 Para A (Tag Crimping)
<b>4</b>	Install and terminate wires to switches per Figure two wiring diagram and Boeing SWPM 20-15-04 Para 2 (Insulation Removal) Boeing SWPM 20-15-21 Para A (Tag Crimping) Boeing SWPM 20-30-00 Para 3 (Installation torque for CB terminals)
<b>5</b>	Install and terminate wires to lamp assemblies per Figure two wiring diagram. Note: L1 = RED L2 = AMBER, Boeing SWPM 20-10-14 Para 2 (Installation of heat shrinkable Sleeves)
<b>6</b>	Install connectors and terminate per Figure two wiring diagram and SWPM, Repair Kit instructions (Assy of MIL-DTL-38999 Series III)
<b>7</b>	Check operation of lighting circuit
<b>8</b>	Do the troubleshooting (separate board), Complete the defect report, Restore the board operational with tools supplied.

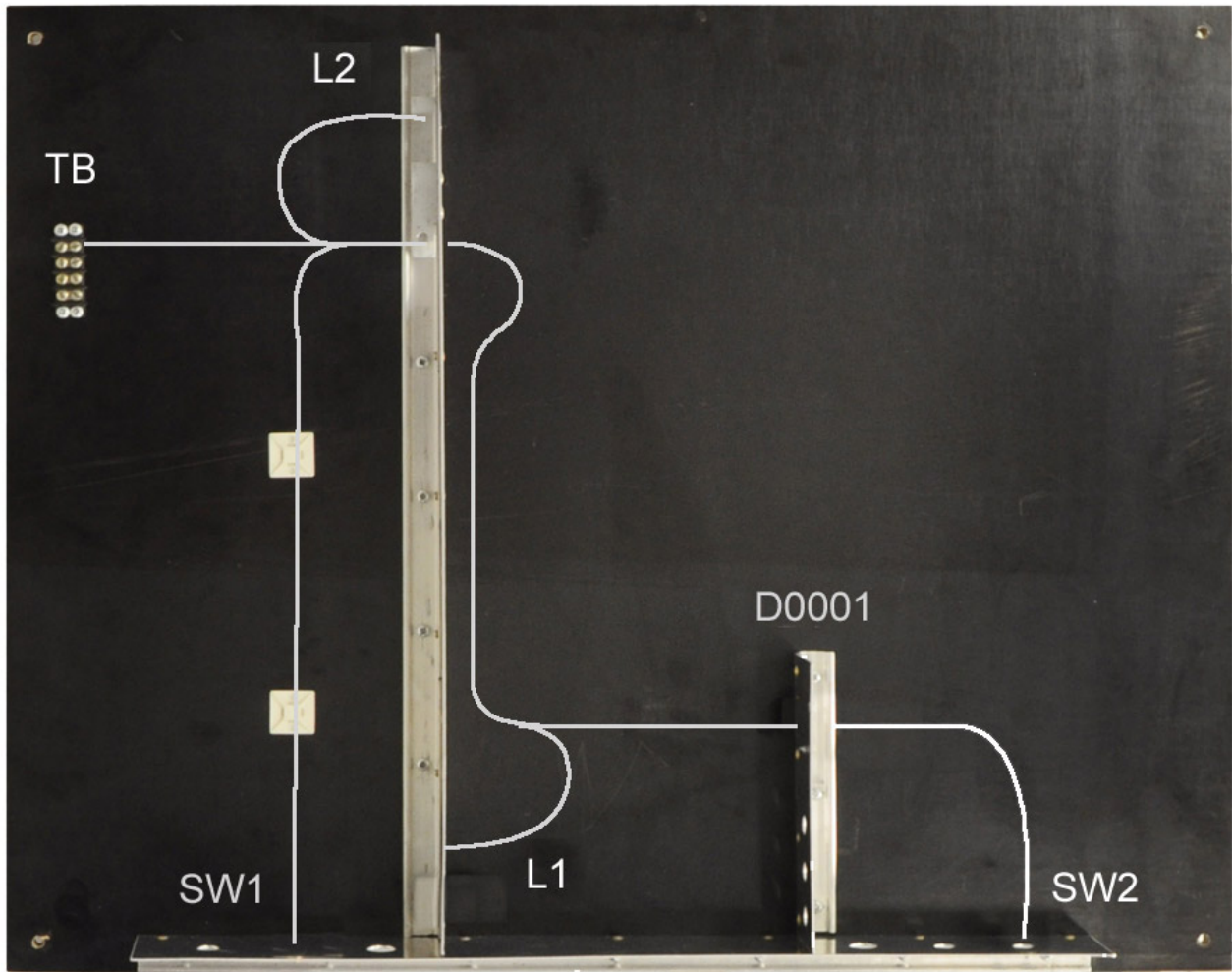


## DATA/MATERIAL PROVIDED

- Electrical Board Diagram (Figure #1)
- Wiring Diagram (Figure #2)
- Boeing SPWM
- Daniels DMC286-02 Maintenance/Repair Kit
- Soldering Iron
- Power Supply
- Tefzel- insulated Wire AWG22, Pre-cut, pre tied bundle
- Hardware for installing the connector and clamps
- Connector Qty: 1, P/N JD38999/26WD97PN
- Connector Qty: 1, P/N JD38999/20WD97SN
- Connector Pin Qty: 5, P/N M39029/58-363
- Connector Socket Qty: 5, P/N M39029/56-351
- Light Assemblies Qty 2
- Light bulbs GE330
- Switches Qty: 2, SPDT
- Terminal Lugs Qty 12: P/N MS35036-149
- P-Clamps Qty 3, P/N MS21919-WDG3
- Multimeter
- Grommet AMB-1, AMB-1.6
- Shrink sleeve
- Flux
- Soldering tin
- Soldering remover
- Isoprophanol alcohol

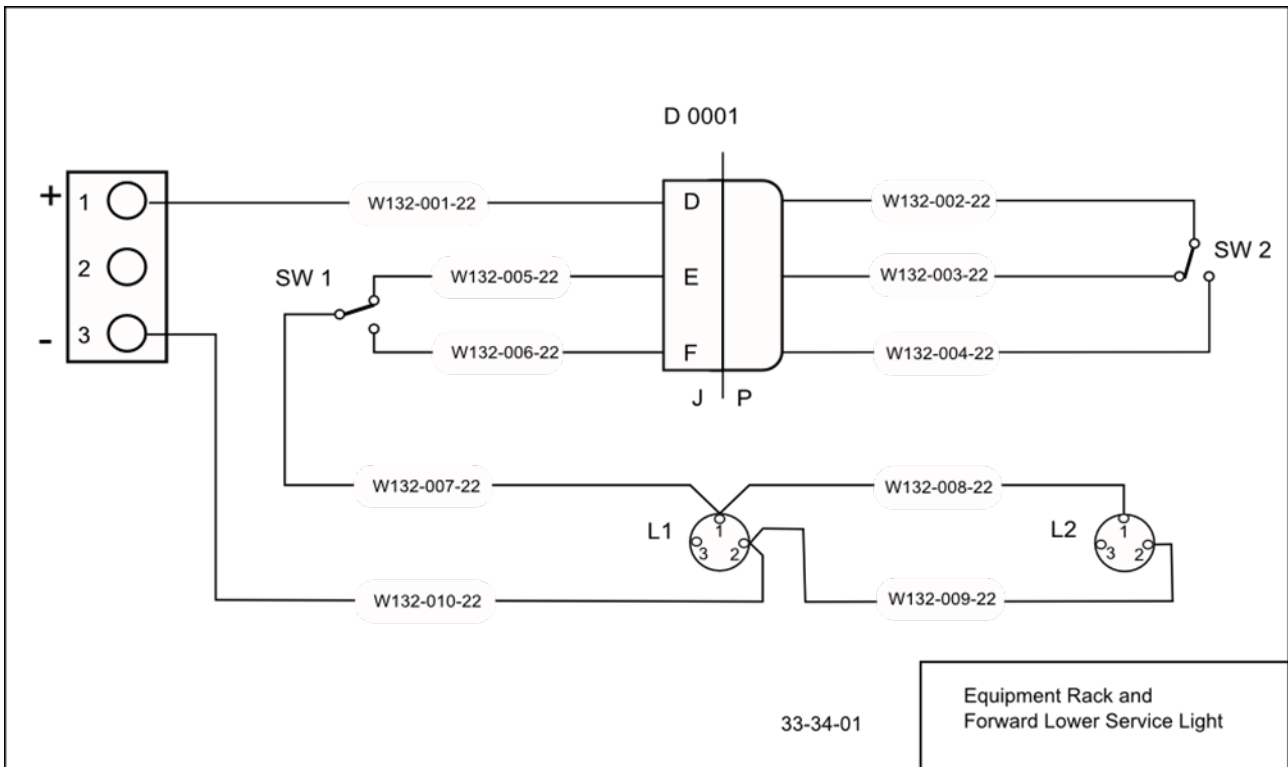


## FIGURE ONE – ELECTRICAL BOARD DIAGRAM





## FIGURE TWO – WIRING DIAGRAM



# TEST PROJECT - AIRCRAFT MAINTENANCE

## PFCU MODULE

WSC2015\_TP14\_M5\_PFCU\_actual

Submitted by:

Name: All Experts at WSC2013



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WSC2015



# COMPETITOR'S WORKING DOCUMENT

The following is a list of sections or information that must be included in all Test Project proposals that are submitted to WorldSkills.

<b>Objective</b>	To test the Competitor's skill for inspecting, removing and reinstalling components in an airworthy condition.
<b>Time allotted</b>	3 hours 30 minutes
<b>Process:</b>	
1. Preparation (a) Access Panels  (b) Control Check HST  (c) Defect report (d) Ensure Hydraulic pressure is disconnected.	(a) Remove as required, store safely on racking (b) Inspect the complete HST for airworthiness condition. (c) Complete the defect report and hand it over to the expert. (d) Confirm with Expert, Display warning Sign
2. Removal (a) PFCU flexible hydraulic hoses <b>NB Ensure that each attachment bolt and nut are kept as a set to avoid misalignment of split pin holes on refit.</b> (b) PFCU input control rod (c) PFCU Fixed end and Ram end attachment bolts  (d) PFCU (e) PFCU (f) PFCU	(a) Remove wire locking from the PFCU unions and disconnect from the PFCU  (b) Remove split pin and disconnect from the PFCU input lever (c) Remove split pins, nuts and washers. Note position of thick and thin washers (d) Support body. Remove attachment bolts x2 (e) Remove from HST (f) Examine, Eye End spherical bearing
3. Fit (a) PFCU (b) PFCU attachment bolts  (c) PFCU Input control rod  (d) PFCU Hydraulic hoses	(a) Position in the HST and align the eye ends. (b) Fit ensuring correct bolt orientation and washer position. Do not torque load the nuts or fit split pins at this stage. (c) Connect. Do not torque load the nuts or fit split pins at this stage. Connect and tighten. Ensure hoses are correctly routed during the tightening procedure.



<p>4. Inner Bell Crank Removal</p> <p><b>Ensure that each attachment bolt and nut is kept as a set to avoid misalignment of split pin holes.</b></p> <p>(a) Inner Bell Crank assembly Input and output control rod Attachment bolts.</p> <p><b>NB During operation 4.2 note which of the 2 sets of holes the mounting bolts are fitted into. They must be refitted in to the alternative set of holes.</b></p> <p>(b) Inner Bell Crank pivot block</p> <p>(c) Inner Bell Crank assembly</p>	<p>(a) Remove split pins and disconnect the input and output Control rods from the inner bell crank input and output lever arms.</p> <p>(b) Remove mounting bolts x2, remove the Inner bell crank assembly from the HST.</p> <p>(c) Remove the split pin, nut and washer from the Pivot block stud and remove the Bell crank lever arm from the pivot block.</p>
<p>5. Inner Bell Crank Examination</p> <p>(a) Bell Crank Lever</p> <p>(b) Bell Crank Lever pivot Block Stud</p> <p>(c) Bell Crank Lever and pivot block</p> <p>(d) Bell crank assembly</p>	<p>(a) Clean and examine, ensure No radial movement exists between the bell crank and the needle roller bearing.</p> <p>(b) Examine for thread damage.</p> <p>(c) Reassemble; refit the nut and washer, torque load to the value in the HST torque table. (Chap 07-00). Fit the split pin.</p> <p>(d) Ensure free to rotate.</p>
<p>6. Inner Bell Crank Fit</p> <p>(a) Inner Bell Crank Assembly</p> <p>(b) Pivot Block</p> <p>(c) Inner bell crank Output/PFCU input Control rod</p>	<p>(a) Locate over alternate mounting holes.</p> <p>(b) Fit mounting bolts (x2) Hand tighten bolts then torque load to value given in HST torque tables. (Chap 07-00)</p> <p>(c) Re connect to the Inner Bell Crank assembly output Lever. Fit the attachment bolts and nuts, torque load to value given in HST torque tables. (Chap 07-00). Fit the split pin.</p>
<p>7. Fit (continued)</p> <p>(a) Outer Bell Crank assembly</p> <p>(b) Outer Bell crank Output control rod</p> <p>(c) Inner Bell Crank Input control rod</p>	<p>(a) Disconnect outer bell crank/inner bell crank input control rod and remove from the HST</p> <p>(b) Remove all wire locking and slacken both eye end locknuts</p> <p>(c) Reconnect input control rod. Do not torque load the nuts or fit split pins at this stage.</p>





<p>8. Outer Bell Crank Removal</p> <ul style="list-style-type: none"><li>(a) Outer Bell Crank Input Control Rod</li><li>(b) Outer Bell Crank mounting bolts</li><li>(c) Outer Bell Crank pivot block</li></ul>	<ul style="list-style-type: none"><li>(a) Disconnect control rod from Outer Bell crank/torque tube output lever.</li><li>(b) Remove mounting bolts x2 Remove outer bell crank assembly from HST.</li><li>(c) Remove split pin, nut and washer from the pivot block stud and remove the bell crank lever arm from the pivot block.</li></ul>
<p>9. Examination</p> <ul style="list-style-type: none"><li>(a) Bell Crank Lever</li><li>(b) Bell Crank pivot block stud</li><li>(c) Bell crank lever and pivot block</li><li>(d) Bell crank assembly</li></ul>	<ul style="list-style-type: none"><li>(a) Clean and examine, ensure no radial movement exists between the bell crank and the needle roller bearing.</li><li>(b) Examine for thread damage.</li><li>(c) Reassemble; refit the nut and washer, torque load to the value in the HST torque table (chap 07-00). Fit the split pin.</li><li>(d) Ensure free to rotate.</li></ul>
<p>10. Fit</p> <ul style="list-style-type: none"><li>(a) Outer bell crank Output/inner bell rank input control rod</li></ul>	<ul style="list-style-type: none"><li>(a) Reconnect to the outer bell crank assembly output lever. Fit attachment bolts. <b>Do not torque load the nuts or fit split pins at this stage.</b></li></ul>
<p>11. Outer Bell Crank Control adjustment</p> <ul style="list-style-type: none"><li>(a) Torque Tube assembly</li><li>(b) Torque Tube Output control rod</li><li>(c) Rigging pin</li><li>(d) Torque Tube Output control rod</li><li>(e) Torque tube Output control rod</li><li>(f) Torque tube Output Control rod eye ends</li><li>(g) Torque tube Output control rod</li><li>(h) Refit output control rod</li></ul>	<ul style="list-style-type: none"><li>(a) Disconnect output control rod and remove from HST</li><li>(b) Remove all wire locking and slacken both eye end locknuts.</li><li>(c) Ensure removed</li><li>(d) Reconnect to the torque tube output lever and outer bell crank lever. Hand tight only</li><li>(e) Adjust length to align witness marks on the outer bell crank.</li><li>(f) Ensure in safety, tighten locknuts.</li><li>(g) Remove from HST and wire lock locknuts.</li><li>(h) Reconnect to the outer bell crank input lever to the torque tube output lever. <b>Do not torque load the nuts or fit split pins at this stage.</b></li></ul>



<p>12. Inner Bell Crank Control adjustment</p> <ul style="list-style-type: none"><li>(a) Input control rod</li><li>(b) Control Rod</li><li>(c) Rigging Pin</li><li>(d) Input control rod eye ends</li><li>(e) Input control rod</li><li>(f) Input control rod</li></ul>	<ul style="list-style-type: none"><li>(a) Reconnect to the outer bell crank output lever.</li><li>(b) Adjust length to align witness marks on inner bell crank.</li><li>(c) Ensure sliding fit.</li><li>(d) Ensure in safety, tighten locknuts.</li><li>(e) Remove from HST and wire lock the lock nuts.</li><li>(f) Reconnect to the outer bellcrank output lever and the inner bellcrank input lever. <b>Do not torque load the nuts or fit split pins at this stage.</b></li></ul>
<p>13. Control Rods Final Fit and freedom of movement check</p> <ul style="list-style-type: none"><li>(a) Control System</li><li>(b) Torque tube assembly input control rod</li><li>(c) Rigging pin</li></ul>	<ul style="list-style-type: none"><li>(a) Torque nuts to value in HST table (Chap 07-00) and fit split pin.</li><li>(b) Torque nut to value in HST table</li><li>(c) (Chap 07-00) and fit split pin.</li></ul>
<p>14. PFCU Final Fit</p> <ul style="list-style-type: none"><li>(a) PFCU Hydraulic Hoses</li><li>(b) PFCU attachment bolts x2</li><li>(c) PFCU input control rod attachment bolt</li><li>(d) All control rods</li><li>(e) Control Check Rig</li></ul>	<ul style="list-style-type: none"><li>(a) Wire lock unions x4</li><li>(b) Torque nuts to value in HST table (Chap 07-00) and fit split pin.</li><li>(c) Torque nut to value in HST table (Chap 07-00) and fit split pin</li><li>(d) All disturbed control rods Torque load to the value given in the HST table (chap 07-00) and split pin.</li><li>(e) IAW (Chap 67-00 para. 2.5)</li></ul>
<p>15. Recovery</p> <ul style="list-style-type: none"><li>(a) Rigging pin</li><li>(b) Access panels</li></ul>	<ul style="list-style-type: none"><li>(a) Remove if Fitted</li><li>(b) Carry out internal Husbandry checks and refit all removed panels (Chap 07-10) Torque load fasteners to torque values in the HST torque table (Chap 07-00)</li></ul>



# TEST PROJECT - AIRCRAFT MAINTENANCE

## Sheet Metal Module

WSC2015\_TP14\_M7\_sheet\_metal\_actual

Submitted by:

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WSC2015



# COMPETITOR'S WORKING DOCUMENT

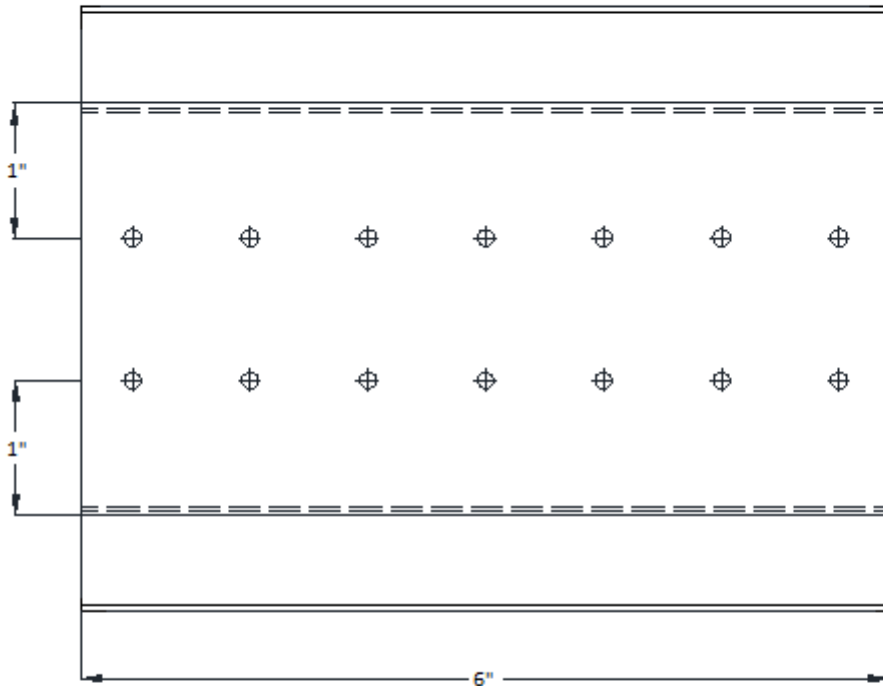
<b>Objective</b>	To test the Competitor's ability to interpret drawings, bend sheet metal with a high degree of accuracy, layout fastener and install solid shank rivets in accordance with the supplied drawings and AC 43.13-1B.
<b>Time allotted</b>	3½ hours
<b>Process:</b>	
<b>1</b>	Each contestant will receive the following: (a) Sheet Metal Tool Kit (b) Drawing (see page four) (c) Two 8" x 8" pieces of 2024-T3 0.032" aluminium and a selection of solid shank rivets of various lengths
<b>2</b>	Find correct Bend Radius in AC43.13-1B
<b>3</b>	Calculate bend allowance using empirical formula. Note all bends are 90°. Record in page six.
<b>4</b>	Calculate dimensions for flat layouts of Top Hat Section and Channel. (developed lengths) Record on page seven and eight respectively.
<b>5</b>	Form a Top Hat Section and channel using correct bend sequence and fit as required to make the assembly shown in the drawing in accordance with standard practices. (AC 43.13-1B section four)
<b>6</b>	Layout the fasteners locations as per the drawing and AC 43.13-1B section four and drill. (Drill sizes in Jeppesen Maintenance Handbook)
<b>7</b>	Determine required rivet length per AC 43.13-1B section four.
<b>8</b>	Install fasteners per AC 43.13-1B section four



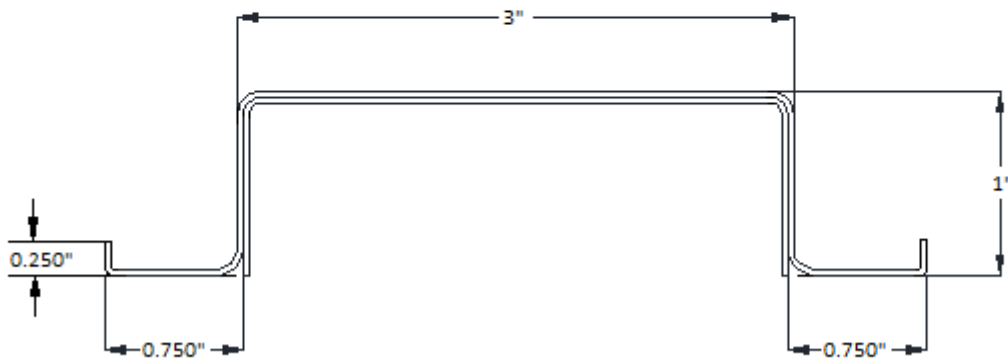
# PROJECT DRAWING



Elevation View of Assembled Materials



Plan View of Assembled Materials



End View of Assembled Materials



## Notes

1. Make all parts from 2024-T3 0.032"
2. Check for correct Bend Radius.
3. Top Hat section dimensions to be  $\pm 0.025''$   
Tolerance of  $\pm 0.025''$  is allowed  
(FOR EVERY DIMENSION OUT OF TOLERANCE 0.5 POINTS DEDUCTED)
4. Channel dimensions to be  $\pm 0.025''$   
Tolerance of  $\pm 0.025''$  is allowed  
(FOR EVERY DIMENSION OUT OF TOLERANCE 0.5 POINTS DEDUCTED)
5. All edges to be smooth and nick free, round all corners to 0.125" radius tolerance of  $\pm 0.025''$  is allowed.  
(OUTSIDE THE TOLERANCE 0.125 POINTS DEDUCTED PER RADIUS)  
(0.125 POINTS DEDUCTED PER ROUGH EDGE OR IMPROPER ROUNDING OFF)
6. All fasteners to be MS20470AD4 rivets (0.036 per incorrect fastener installed) Spaced equidistantly as per Standard Practices (AC 43-13-1B) (0.166 POINTS DEDUCTED FOR EACH ROW OF RIVETS WHERE FASTENER PITCH IS NOT EQUIDISTANT; TOLERANCE  $\pm 0.0625$  INCH ALLOWED COMPARED TO AVERAGE PITCH)
7. Maintain 2D edge distance on all fasteners  
(0.125 POINTS DEDUCTED PER RIVET WHERE EDGE DISTANCE IS  $>$  OR  $<$  2D;  
TOLERANCE OF  $-0$  AND  $+0.025''$  ALLOWED BEFORE DEDUCTION)  
(0.107 POINTS DEDUCTED FOR RIVET MISALIGNMENT BASED ON TOLERANCE OF 0.025")
8. For all other defects noted that are not stipulated above in 2 thru 7 deduct 0.5 points per occurrence
9. For every incorrect manufactured head 0.107 points deducted.
10. For every incorrect shop head 0.142 point deducted.
11. If area is not cleaned up 0.50 point will be deducted.
12. Correct bend allowance/hat section layout and channel layout calculated. (0.50 point deducted for each incorrect calculation).
13. Surface finish to be the same RMS standard as per the raw material at the beginning of project. Any deviation from original surface of finished project 0.5 marks removed.
14. Any tooling damage of hat section that has not been accounted for at beginning of project (must be documented by two judges minimum) otherwise 0.25 marks removed per occurrence.



## EMPIRICAL FORMULA

Name: \_\_\_\_\_ Country: \_\_\_\_\_

**Bend Allowance (BA)** =  $(0.01743 \times BR) + (0.0078 \times MT) \times \text{Degree of Bend (90}^\circ\text{)}$

BR = Bend Radius

MT = Metal Thickness

**Bend Allowance Calculation: Correct to three decimal places.**





# FLAT LAYOUT CALCULATIONS TOP HAT SECTION

Name: \_\_\_\_\_ Country: \_\_\_\_\_

**Flat Layout Calculation: (Top Hat Section) Correct to three decimal places.**



# FLAT LAYOUT CALCULATIONS CHANNEL

Name: \_\_\_\_\_ Country: \_\_\_\_\_

**Flat Layout Calculation: (Channel) Correct to three decimal places.**

## Skill name

## Aircraft Maintenance

## Criteria

## Mark

A	Sheet Metal Module	20.00
B	Flight Control Rigging Module	15.00
C	Daily Inspection Module	10.00
D	Removal and Installation of Aircraft Component	20.00
E	Blending of Compressor Blade	10.00
F	Hot Section Inspection using Boroscope	10.00
G	Troubleshoot Electrical Wiring Defect	15.00

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
A1	Working Safety and Area Clean Up	O	Proper usage of PPE	
		O	Completion of Area Clean up	
		O	Completion Time	
A2	Dimensions and form/ Surface Finish	O	Top Hat Section Dimensions Flat #1	
		O	Top Hat Section Dimensions Flat #2	
		O	Top Hat Section Dimensions Flat #3	
		O	Top Hat Section Dimensions Flat #4	
		O	Top Hat Section Dimensions Flat #5	
		O	Top Hat Section Dimensions Flat #6	
		O	Top Hat Section Dimensions Flat #7	
		O	Channel dimensions Flat #1	
		O	Channel dimensions Flat #2	

A3	Riveting Installation	<input type="checkbox"/> Channel dimensions Flat #3 <input type="checkbox"/> Correct bend radius checked <input type="checkbox"/> Grain Direction <input type="checkbox"/> Correct Material Specification Used <input type="checkbox"/> All Edges Smooth and Nick Free <input type="checkbox"/> All Corners Rounded to 0.125" Radius <input type="checkbox"/> Tooling damage		
A4	Bend Allowance Calculation	<input type="checkbox"/> Fastener Pitch <input type="checkbox"/> Edge Distance and rivet row alignment <input type="checkbox"/> Fastener Selection <input type="checkbox"/> Shop Heads <input type="checkbox"/> Manufactured Heads  <input type="checkbox"/> Bend Allowance correct calculation <input type="checkbox"/> Flat Layout of Hat Section calculation <input type="checkbox"/> Flat Layout of Channel calculation		
Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
B1	Adjustments	<input type="checkbox"/> Ailerons Faired In Neutral <input type="checkbox"/> Cable Tension <input type="checkbox"/> Up Travel Stop Set To 14 degrees <input type="checkbox"/> Down Travel Stop Set To 12 degrees <input type="checkbox"/> No Tension allowed On Rigging Pin when installed		
B2	Safety Devices	<input type="checkbox"/> Lockwire Turnbuckle Safety <input type="checkbox"/> Safety Clips Installed Correctly <input type="checkbox"/> Travel Stops Correctly Safetied <input type="checkbox"/> All Other AN Hardware Properly Safetied		
B3	Working Safety and Area Clean Up	<input type="checkbox"/> Proper usage of safety glasses when cotterpinning <input type="checkbox"/> Area could be cleared of all tools and materials		

Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
C1	Working Procedure of DI	<input type="radio"/> PPE/Ground Equipment <input type="radio"/> PPE/Ground Equipment <input type="radio"/> PPE/Ground Equipment <input type="radio"/> All Process Steps Followed Satisfactorily <input type="radio"/> Tool Control		
C2	Defects/ paperwork	<input type="radio"/> Accuracy of Written Defect #1 <input type="radio"/> Accuracy of Written Defect #2 <input type="radio"/> Accuracy of Written Defect #3 <input type="radio"/> Accuracy of Written Defect #4 <input type="radio"/> Accuracy of Written Defect #5 <input type="radio"/> Accuracy of Written Defect #6 <input type="radio"/> Accuracy of Written Defect #7 <input type="radio"/> Accuracy of Written Defect #8 <input type="radio"/> Accuracy of Written Defect #9 <input type="radio"/> Accuracy of Written Defect #10 <input type="radio"/> Accuracy of Written Defect #11 <input type="radio"/> Accuracy of Written Defect #12 <input type="radio"/> Accuracy of Written Defect #13 <input type="radio"/> Accuracy of Written Defect #14 <input type="radio"/> Paperwork Correctly Completed <input type="radio"/> Legibility		
Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
D1	Preparation and Safety Precautinos	<input type="radio"/> Appropriately attired <input type="radio"/> Safety measures before starting		

D2	Zonal inspection	<input type="radio"/> Handling of the panels <input type="radio"/> COSHH assesment used
D3	Handling of hardware	<input type="radio"/> Zonal inspection performed before PFCU removal <input type="radio"/> Defects found and reported
D4	PFCU Removal	<input type="radio"/> Proper methods used in removing the locking hardware <input type="radio"/> Proper methods used in installation of locking hardware
D5	PFCU Examination and Refit	<input type="radio"/> pipes disconected not using x2 spanner <input type="radio"/> not using bags or blanks to protect hoses <input type="radio"/> Disconnect control rod <input type="radio"/> PFCU Removed (without interference) <input type="radio"/> PFCU not supported throughout
D6	Inner Bell Crank Removal	<input type="radio"/> Lotoxane wipe used <input type="radio"/> spherical bearing lubricated <input type="radio"/> PFCU examined for damage <input type="radio"/> OM 15 oil used to lubricate bearing <input type="radio"/> excess oil,waste wipes,and gloves disposed of correctly <input type="radio"/> PFCU stored safely <input type="radio"/> PFCU supported throughout <input type="radio"/> Ram end bolt, washers and nut fitted <input type="radio"/> Torque loaded fasteners correctly <input type="radio"/> Fixed End bolt, washers and nut fitted <input type="radio"/> Fixed End washers correctly orientated <input type="radio"/> Torque loaded fasteners correctly
		<input type="radio"/> Disconnect control rod <input type="radio"/> Inner Bell Crank removed <input type="radio"/> Detach lever arm from pivot block <input type="radio"/> Bell crank assembly cleaned <input type="radio"/> Lotoxane wipe used <input type="radio"/> Bell crank assembly examined for damage <input type="radio"/> Bell crank assembly reassembled correctly <input type="radio"/> Torque loaded correctly <input type="radio"/> Correctly split pinned <input type="radio"/> Bell crank assembly lubricated <input type="radio"/> Grease XG287 used

D7	Outer Bell Crank Removal	<input type="checkbox"/> Ensure correct movement of assembly <input type="checkbox"/> Inner Bell crank stored correctly <input type="checkbox"/> Disconnect control rod <input type="checkbox"/> Outer Bell Crank removed <input type="checkbox"/> Detach lever arm from pivot block <input type="checkbox"/> Bell crank assembly cleaned <input type="checkbox"/> Lotoxane wipe used <input type="checkbox"/> Bell crank assembly examined for damage <input type="checkbox"/> Bell Crank assembly reassembled correctly <input type="checkbox"/> Torque loaded correctly <input type="checkbox"/> Grease XG287 used <input type="checkbox"/> Ensure correct movement of Bell Crank assembly <input type="checkbox"/> Outer Bell crank stored correctly
D8	Bell Crank Refit (outer & inner)	<input type="checkbox"/> Located over alternate mounting holes <input type="checkbox"/> Torque loaded fasteners correctly <input type="checkbox"/> Pivot block bolts wire-locked
D9	Torque Tube to Outer Bell Crank control rod adj	<input type="checkbox"/> Loosened eye end locknuts X2 correctly <input type="checkbox"/> Reconnected in HST correctly <input type="checkbox"/> Adjusted length correctly <input type="checkbox"/> Ensured rod is in safety <input type="checkbox"/> Tightened locknuts X2 correctly <input type="checkbox"/> Refitted in HST ensuring witness marks align on outer Bell Crank <input type="checkbox"/> Torque loaded fasteners correctly X2
D10	Outer Bell Crank to Inner Bell Crank control rod	<input type="checkbox"/> Loosened eye end locknuts X2 correctly <input type="checkbox"/> Reconnected in HST correctly <input type="checkbox"/> Adjusted length correctly <input type="checkbox"/> Ensured rod is in safety <input type="checkbox"/> Tightened locknuts X2 correctly <input type="checkbox"/> Refitted in HST ensuring witness marks align on Inner Bell Crank <input type="checkbox"/> Torque loaded fasteners correctly X2
D11	Freedom of Movement Check and Final alignme	<input type="checkbox"/> Nut, Bolt and washer removed <input type="checkbox"/> Nut, Bolt and washer stored safely <input type="checkbox"/> Freedom of Movement check done <input type="checkbox"/> Nut, bolt and washer refitted.

D12	Final fit and Recovery	<input type="checkbox"/> Torque loaded fasteners correctly <input type="checkbox"/> Inserted rigging pin to ensure witness marks align <input type="checkbox"/> Supervisors check requested  <input type="checkbox"/> All hydraulic pipes connected correctly <input type="checkbox"/> Husbandry check carried out <input type="checkbox"/> Panels refitted <input type="checkbox"/> Torque sequence used <input type="checkbox"/> Correct use of Maintenance Procedure throughout <input type="checkbox"/> NO POWER sign removed/stored <input type="checkbox"/> Tool check carried out		
Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
E1	Working Procedure of Blade Blending	<input type="checkbox"/> Correct PPE Used <input type="checkbox"/> Correct Handling Of The Compressor Wheel <input type="checkbox"/> Dimensions of blending iaw MM <input type="checkbox"/> Correct blade identified <input type="checkbox"/> Correct usage of specialty tools for blending compressor blade <input type="checkbox"/> Correctly completed defect report J Blending Of The Compressor Blade To Within the Manufacturer's		0 1 2 3
Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
F1	Working Procedure of Hot End Inspection	<input type="checkbox"/>	Correct use of PPE	



F2	Boroscope unit usage & inspection	<input type="radio"/>	Use & Handling Of Boroscope Unit	
F3	Properly Completed Defect Report Of The Bores	<input type="radio"/>	Defects identified as per Master List of Compressor Turbine	
F4	Removal Of All Relative Hot Section Component	<input type="radio"/>	Defect Report as per Master List for Compressor Turbine Stator	
F5	Usage Of The Manufacturer's O & M Manual	<input type="radio"/>	No flag of the ignition dissipation danger or confirmation that eng	
		<input type="radio"/>	Handling of Fuel Nozzles without lint free gloves and referral to O	
		<input type="radio"/>	Manifold components not bagged.	
		<input type="radio"/>	Use of specialist tools, Dye Marker (PWC05-027), Pusher (PWC	
		<input type="radio"/>	All open orifices (created by the boroscope task) are to be bagge	
		<input type="radio"/>	Torque calibration check	
		<input type="radio"/>	Correct torque value applied IAW MM	
		<input type="radio"/>	Nut drag torque	
		<input type="radio"/>	Correct tool to install fuel nozzles	
		<input type="radio"/>	Wirelocking not to standard (AC43-13)	
		<input type="radio"/>	Not referring to relevant section in MM.	
Sub Criteria ID	Sub Criteria Name or Description	Aspect Type O = Obj S = Sub J = Judg	Aspect - Description	Judg Score
G1	Hardware installation	<input type="radio"/>	Light Assemblies orientated correctly	
		<input type="radio"/>	Switches orientated correctly	
		<input type="radio"/>	Lightening hole protection grommet correctly installed	
		<input type="radio"/>	Connector correctly installed	
		<input type="radio"/>	Clamp properly installed	
G2	Wiring Preparation and Loom Installation	<input type="radio"/>	Wires correct length	
		<input type="radio"/>	Wire Idents correctly installed	
		<input type="radio"/>	Loom branched correctly	
		<input type="radio"/>	Correct installation of tie wraps	
		<input type="radio"/>	Wirebundle fit in clamp	
		<input type="radio"/>	Loom correctly tied	
G3	Use of tools			

G4	Connector Installation and Termination	<input type="checkbox"/>	Use of Wire Stripper
		<input type="checkbox"/>	Crimp tool, pins and sockets
G5	Crimp Tag Terminations	<input type="checkbox"/>	Crimp tool, terminal lugs
		<input type="checkbox"/>	Correct crimping of terminal lugs
		<input type="checkbox"/>	Soldering Station
		<input type="checkbox"/>	Multimeter correct use
		<input type="checkbox"/>	Power supply correct use
G6	Solder Terminations	<input type="checkbox"/>	Correct installation of wire to pin/socket
		<input type="checkbox"/>	Correct tool used for contact insertion/ extraction
		<input type="checkbox"/>	Contact locked in cavity
G7	Wire Loom Continuity Check and Operational Check	<input type="checkbox"/>	Filler pins for empty terminals asked
		<input type="checkbox"/>	Correct stripping length of insulation
		<input type="checkbox"/>	Correct crimp tag type selected
		<input type="checkbox"/>	Correct length of conductor protruding from tag front
G8	Area Clean up	<input type="checkbox"/>	Shrink Sleeving used
		<input type="checkbox"/>	Soldering defects
		<input type="checkbox"/>	Correct length of bared wire at soldered terminal end
G9	Documentation completed	<input type="checkbox"/>	Solder joint not cleaned with isopropyl alcohol
		<input type="checkbox"/>	Loose connection (post solder)
G10	Fault Finding	<input type="checkbox"/>	Correctly performed continuity test
		<input type="checkbox"/>	Correct function of circuitry (functional test)
G11	Wastage of material	<input type="checkbox"/>	Area cleaned after completion of work
		<input type="checkbox"/>	Documentation completed correctly
		<input type="checkbox"/>	Defects found and reported
		<input type="checkbox"/>	Circuit restored functional
		<input type="checkbox"/>	More material asked



Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
[0.50 marks; -0.25 marks for any infraction]	Y/N	5	0.50
If area is not cleaned up 0.25 points will be deducted	Y/N	2	0.50
If Project not completed in time allowed	Y/N	2	0.50
For every dimension out of tolerance 0.5 points dedeucte	Y/N	6	0.50
For every dimension out of tolerance 0.5 points dedeucte	Y/N	6	0.50
For every dimension out of tolerance 0.5 points dedeucte	Y/N	6	0.50
For every dimension out of tolerance 0.5 points dedeucte	Y/N	6	0.50
For every dimension out of tolerance 0.5 points dedeucte	Y/N	6	0.50
For every dimension out of tolerance 0.5 points dedeucte	Y/N	6	0.50
For every dimension out of tolerance 0.5 points dedeucte	Y/N	6	0.50
For every dimension out of tolerance 0.5 points dedeucte	Y/N	6	0.50
For every dimension out of tolerance 0.5 points dedeucte	Y/N	6	0.50
For every dimension out of tolerance 0.5 points dedeucte	Y/N	6	0.50

Criterion A      Total Mark      20.00

For every dimension out of tolerance 0.5 points deduced	Y/N	6	0.50
-0.5 if not checked	Y/N	5	0.50
-0.5 if incorrect	Y/N	5	0.50
Use only 2024-T3 0.032"	Y/N	5	0.50
[1.00 marks; -0.10 per rough edge or nick]	Only Allowed ± 0.0	5	1.00
[1.00 marks; -0.10 per radius]	Only Allowed ± 0.0	5	1.00
[1.0 marks; -0.10 per occurrence of surface damage if dev	Same RMS standa	5	0.50
0.166 points deducted for each row of rivets where fastener	Rows to be equidis	6	2.00
[1.00 marks; -0.25 per rivet edge distance out of tolerance	Maintain 2D edge c	6	2.00
Use only MS20470AD4-4 (0.036 per incorrect fastener ins	Y/N	5	0.50
[2.00 marks; -0.142 if incorrect shop head IAW AC 43-13-	Correct shop head	5	2.00
[2.00 marks; -0.107 for every manufactured head damage	Correct manufactu	5	1.50
Ref. Judges Document (Not neat -0.02)	Y/N	6	0.50
Ref. Judges Document (Developed Length) (Not neat ded	Y/N	6	0.50
Ref. Judges Document (Developed Length) (Not neat ded	Y/N	6	0.50
Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
[2.00 marks; -1.00 mark per aileron]	[2*Y/N]	7	2.00
[2.00 marks; -0.50 marks per 1 lb of tension beyond limit]	20 lbs +/- 1 lb	7	2.00
[2.00 marks; -0.50 marks per 1 degree outside tolerance]	Up Travel Stop set	7	2.00
[2.00 marks; -0.50 marks per 1 degree outside tolerance]	Down Travel Stop	7	2.00
[0.50 marks; If any of the rigging pins is not loose or can't	No tension on All 3	7	0.50
[2.00 mark; -1.00 marks per non-standard practice includi	As Per AC 43 -13 S	7	2.00
[1.00 marks; -0.5 marks per non-standard installation or m	As Per AC 43 -13 S	7	1.00
[1.00 mark; -0.25 marks per incorrect or missing safety of	As Per AC 43 -13 S	7	1.00
[1.00 mark; -0.125 marks per incorrect or missing safety o	As per standard pr	7	1.00
[1.00 mark if a competitor has to be noticed]	[Y/N]	7	1.00
[ -0.50 when area not properly cleaned up]	[Y/N]	7	0.50

Criterion B Total Mark 15.00

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
Proper usage of flashlight when required [ -0.10 when req	Proper usage of fla	4	0.10
[0.4 marks; -0.4 marks when ground equipment strikes or	Does not strike or c	4	0.40
[0.4 marks; -0.2 marks when rotor rotated without checkin	Rotation of rotor sy	4	0.40
[1.00 marks; -0.5 marks deducted per occurrence of deviat	All processes as pe	4	1.00
Tools left in the working area on completion	Y/N	1	0.10
As per Master Defect list (14 minimum in total)0.5 marks d	Y/N	4	0.50
As per Master Defect list (14 minimum in total)0.5 marks d	Y/N	4	0.50
As per Master Defect list (14 minimum in total)0.5 marks d	Y/N	4	0.50
As per Master Defect list (14 minimum in total)0.5 marks d	Y/N	4	0.50
As per Master Defect list (14 minimum in total)0.5 marks d	Y/N	4	0.50
As per Master Defect list (14 minimum in total)0.5 marks d	Y/N	4	0.50
As per Master Defect list (14 minimum in total)0.5 marks d	Y/N	4	0.50
As per Master Defect list (14 minimum in total)0.5 marks d	Y/N	4	0.50
As per Master Defect list (14 minimum in total)0.5 marks d	Y/N	4	0.50
As per Master Defect list (14 minimum in total)0.5 marks d	Y/N	4	0.50
As per Master Defect list (14 minimum in total)0.5 marks d	Y/N	4	0.50
As per Master Defect list (14 minimum in total)0.5 marks d	Y/N	4	0.50
[0.50 marks; -0.10 marks deducted per incorrect completio	As per Standard P	4	0.50
[0.50 marks; -0.10 marks deducted for untidiness of repor	5*Y/N	4	0.50

Criterion C Total Mark 10.00

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
-0.2 points in occurrence of following: safety glasses not u	2*Y/N	5	0.40
-0.2 points in occurrence of following: Hyd/Electric power r	2*Y/N	2	0.40

Criterion D Total Mark 20.00

-0.1 points in occurrence of following: loose fasteners of r	9* Y/N	3	0.90
-0.2 points if not reading the assesment inPFCU examinatio	3*Y/N	1	0.60
	Y/N	2	0.20
As per masterlist		2	1.20
-0.1 points in occurrence of following: hardware not remov	16*Y/N	3	1.60
-0.1 points in occurrence of following: hardware not install	16*Y/N	3	1.60
-0.2 points if improper method is used	Y/N	8	0.20
-0.2 points if not bagged	Y/N	8	0.20
-o.2 points if not disconnected	Y/N	8	0.20
if rested on equipment or dropped - 0.4	Y/N	8	0.40
-0.3 if not supprted	Y/N	8	0.30
-0.1 if not used	Y/N	8	0.10
-0.1 if not lubricated	Y/N	8	0.10
-0.3 if not examined	Y/N	8	0.30
-0.1 if not lubricated	Y/N	8	0.10
disposed into the correctly labled bin (Hazardous waste - i	Y/N	8	0.10
-0.1 if not stored safely	Y/N	8	0.10
if rested on equipment or dropped - 0.3	Y/N	8	0.30
-0.1 if not fitted	Y/N	8	0.10
deduct 0.2 if no touque wrench used	Y/N	8	0.20
-0.2 if not fitted	Y/N	8	0.20
correct thickness washers correctly orientated -0.2 if incor	Y/N	8	0.20
-0.2 if an inproper method is used	Y/N	8	0.20
-0.1 if not disconnected	Y/N	8	0.10
NOTE: check which set of holes removed from	Y/N	8	0.10
-0.1 if not detached	Y/N	8	0.10
-0.1 if not cleaned	Y/N	8	0.10
Lotoxane wipe used & waste disposed into correct bin	Y/N	8	0.10
-0.1 if not examined	Y/N	8	0.10
-01 for incorrect reassembly	Y/N	8	0.10
-0.2 for incorrect method used	Y/N	8	0.20
either castleated method or as AC 43	Y/N	8	0.10
Bell crank assembly lubricated	Y/N	8	0.10
Grease XG287 used	Y/N	8	0.10

-0.1 if not ensured	Y/N	8	0.10
-0.1 if incorrectly stored	Y/N	1	0.10
-0.2 if not disconnected	Y/N	8	0.20
NOTE: check which set of holes removed from	Y/N	8	0.10
0.2 if not removed	Y/N	8	0.10
-0.1 if not cleaned	Y/N	8	0.10
Lotoxane wipe used & waste disposed into correct bin	Y/N	8	0.10
-0.1 if not examined	Y/N	8	0.10
-01 for incorrect reassembly	Y/N	8	0.10
-0.2 for incorrect method used	Y/N	8	0.10
Grease XG287 used	Y/N	8	0.10
-0.1 if not ensured	Y/N	8	0.10
-0.1 if incorrectly stored	Y/N	1	0.10
deduct 0.2 if not alternative mount used either on inner or	2*Y/N	8	0.40
deduct 0.2 per occurrence of incorrect torqued fastener	2*Y/N	8	0.40
deduct 0.2 per occurrence of incorrect or missing lockwire	2*Y/N	8	0.40
NOTE: one is left hand thread one is righthand thread.	Y/N	8	0.10
-0.1 if incorrectly reconnected	Y/N	8	0.10
-0.2 for incorrect length	Y/N	8	0.20
deduct 0.1 if not in safety	Y/N	8	0.10
-0.1 if incorrectly tightened	Y/N	8	0.10
-0.2 if not aligned	Y/N	8	0.20
-0.2 for incorrect method used	Y/N	8	0.20
-0.1 for incorrect method used	Y/N	8	0.10
-0.1 for incorrect method used	Y/N	8	0.10
using witness marks on bellcrank	Y/N	8	0.10
-0.1 if not ensured	Y/N	8	0.10
Tightened locknuts X2 correctly [0.10 marks]	Y/N	8	0.10
Refitted in HST ensuring witness marks align on Inner Bell	Y/N	8	0.20
Torque loaded fasteners correctly X2 [0.20 marks]	Y/N	8	0.40
-0.1 if not removed	Y/N	8	0.10
-0.1 if not stored safely	Y/N	8	0.10
-0.2 if not checked	Y/N	8	0.20
correctly oriented	Y/N	8	0.10



-0.2 for incorrect method used	Y/N	8	0.20
-0.1 if not inserted	Y/N	8	0.10
supervisors to check lines on bellcranks with pin fitted	Y/N	2	0.20
-0.2 if not correct	Y/N	8	0.20
Husbandry check carried out	Y/N	2	0.30
deduct 0.2 for each panel (total of three) not correctly refitted as described in manual	3*Y/N	1	0.60
	Y/N	1	0.60
-0.6 if Maintenance Procedure not followed	Y/N	1	0.60
NO POWER sign removed/stored	Y/N	2	0.20
all tools returned as initial set up	Y/N	2	0.40

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
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Criterion E Total Mark 10.00

deduct 0.5 for each non-occurrence of glasses & gloves	2*Y/N	5	1.00
deduct 0.25 marks per occurrence of incorrect handling of Manufacture's Mark		9	2.00
Deduct 1 mark per occurrence of exceeding the limit of M		12	2.00
-1.0 mark if incorrect blade identified	Y/N	9	1.00
-0.35 marks per incorrect usage iaw manual (note : longitude)	3*Y/N	3	1.00
-0.20 marks per incorrect or missing defect item not properly	Manufacture's Ma	2	1.00
		9	2.00
Not airworthy			
Acceptable, Profile of the airfoil restored, marks of blending			
Acceptable, Profile of the airfoil restored, polishing adequate			
Excellent; the profile of airfoil restored, polishing flawless			

Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
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Criterion F Total Mark 10.00

deduct 0.5 for each non-occurrence of glasses & gloves	2*Y/N	5	1.00
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deduct 0.2 points of occurrence of improper use & handling	Y/N	12	2.00				
deduct 0.4 for each defect not correctly identified.	Manufacturer's Ma	10	2.00				
Deduct 0.5 for each defect not correctly identified.		10	2.00				
Deduct 0.10 for each non-occurrence.	Y/N	2	0.20				
Deduct 0.10 for each non-occurrence.	Y/N	1	0.20				
Deduct 0.20 if any component not bagged.	Y/N	10	0.20				
Deduct 0.10 for each non-occurrence	Y/N	10	0.20				
Deduct 0.10 for each non-occurrence	Y/N	10	0.20				
	Y/N	1	0.20				
	Y/N	10	0.20				
	Y/N	10	0.20				
	Y/N	10	0.20				
	Y/N	1	0.20				
Deduct 0.25 points per occurrence of not referring to MM.	Manufacturer's Ma	1	1.00				
<table border="1" style="width: 100%; background-color: #cccccc;"> <thead> <tr> <th style="width: 30%;">Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)</th> <th style="width: 15%;">Requirement or Nominal Size (Obj Only)</th> <th style="width: 10%;">WSSS Section</th> <th style="width: 10%;">Max Mark</th> </tr> </thead> </table>				Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark
Extra Aspect Description (Obj or Subj) OR Judgement Score Description (Judg only)	Requirement or Nominal Size (Obj Only)	WSSS Section	Max Mark				
-0.1 points per occurrence of incorrect Light Assy installation	2 x Y/N (As per dra	11	0.20				
-0.1 points per occurrence of incorrect Switch installation	2 x Y/N (As per dra	11	0.20				
	Y/N (As per AC21-	11	0.20				
-0.1 points per occurrence of incorrect orientation of conn	Master key at 12 o	11	0.30				
-0,1 points per occurrence of incorrectly installed Clamp an	3 x Y/N	11	0.30				
	SWPM	11	0.30				
-0.1 per occurrence of missing ident, incorrect orientation	SWPM	11	0.50				
-0,1 per incorrectly branched loom	SWPM	11	0.30				
-0,2 per incorrectly cut or loose tie wrap	Y/N (Banduit)	11	0.20				
-0,1 points per loose clamp	3 x Y/N	11	0.30				
-0,2 points per occurrence of loose knots, insufficient knots	SWPM	11	0.60				

**Criterion G Total Mark 15.00**

-0.1 point if function test not performed, loose insulation bit		11	0.20
-0.2 points deducted per occurrence of misuse of crimp tool		11	0.80
-0.2 point deducted per occurrence of calibration date not checked		11	0.40
-0.1 points per incorrect crimp (no diamond grip)	8 x Y/N	11	0.80
0.1 points deducted per occurrence of misuse of soldering iron		12	0.30
0.05 points deducted per occurrence of misuse of multimeter		12	0.15
0.1 point deducted per occurrence of misuse of power supply		12	0.40
-0.05 points per occurrence of: incorrect length of stripped wire	6 x Y/N	11	0.30
	Y/N	11	0.10
-0,2 points if any of contacts not locked in cavity	Y/N	11	0.20
-0,1 points if fillers not asked	Y/N	11	0.10
-0.04 points per occurrence		11	0.20
-0.04 points per occurrence		11	0.20
-0.04 points per occurrence		11	0.20
-0.05 points per missing shrink sleeve		11	0.20
Dry joints, Lamp Assembly/ wire insulation burned, Excessive heat		11	0.60
-0.05 per incorrect length	6 x Y/N (AC12-99)	11	0.30
-0.05 per uncleaned connection	4 x Y/N	11	0.20
-0.05 per loose connection	4 x Y/N	11	0.20
-0.1 points occurrence of following: Power applied to board		12	0.40
	Y/N	12	1.00
-0.04 points in occurrence of following: Soldering Iron not checked		12	0.20
-0.1 point in occurrence of following: (1) "Done by" not initialled	4 x Y/N	2	0.40
As per Faults Master List		12	1.50
	Y/N	12	1.50
If any of wire, pins/sockets or terminal lugs is asked, -0,25		12	0.75

Competition	Total Mark	100.00
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