

第 53 屆全國技能競賽

競賽試題及說明

職類名稱：飛機修護職類

共 5 頁第 1 頁

第一站 飛操鋼繩調校

(註：本公開試題在競賽時得約有百分之三十之調整)

一、題目：飛操鋼繩調校

二、說明：

- (一)本試題以飛機操縱鋼繩系統調校、鬆緊套保險及鋼繩張力測量為主要考試範圍，保險之裝置、拆卸、安裝位置與現場清理全程均列入評分標準。
- (二)針對現場之飛操鋼繩模擬訓練器(如附圖 1)，依據工作單步驟實施操作，選用適當之材料與工具進行鬆緊套保險，並於保險完成後交給裁判人員。經裁判人員同意後，依適當程序將保險之裝置拆下，恢復工作前之情況。
- (三)工作完畢，清點現場工具並清理工作現場。

三、評審要點：

(一)競賽時間：40分鐘。

(二)技能標準：

- 1.了解飛行操縱面鋼繩操縱作動原理，依據公告流程正確安裝飛行操縱鋼繩系統，及實施操縱面調整及操作。
- 2.保險材料與線徑規格選擇正確，長度取用時不致過長或過短，選用正確之工具、以正確之方法進行鬆緊套保險之安裝與拆卸。
- 3.保險之完成品應符合航空規範之規定：
 - A.鋼繩型別測量：需使用游標卡尺確認其選擇之鋼繩型別正確。
 - B.鋼繩張力調整及測量：需準確判斷飛機操縱系統鋼繩張力之調整適當。

(三)工作安全態度：

- 1.工具之使用是否熟練。
- 2.工作安全是否注意。
- 3.工具使用前後之檢查與清點。
- 4.工作現場之環境清潔保持與整理。

第 53 屆全國技能競賽

飛機修護職類

第一站 飛操鋼繩調校

試題工作單

題目：飛操鋼繩調校

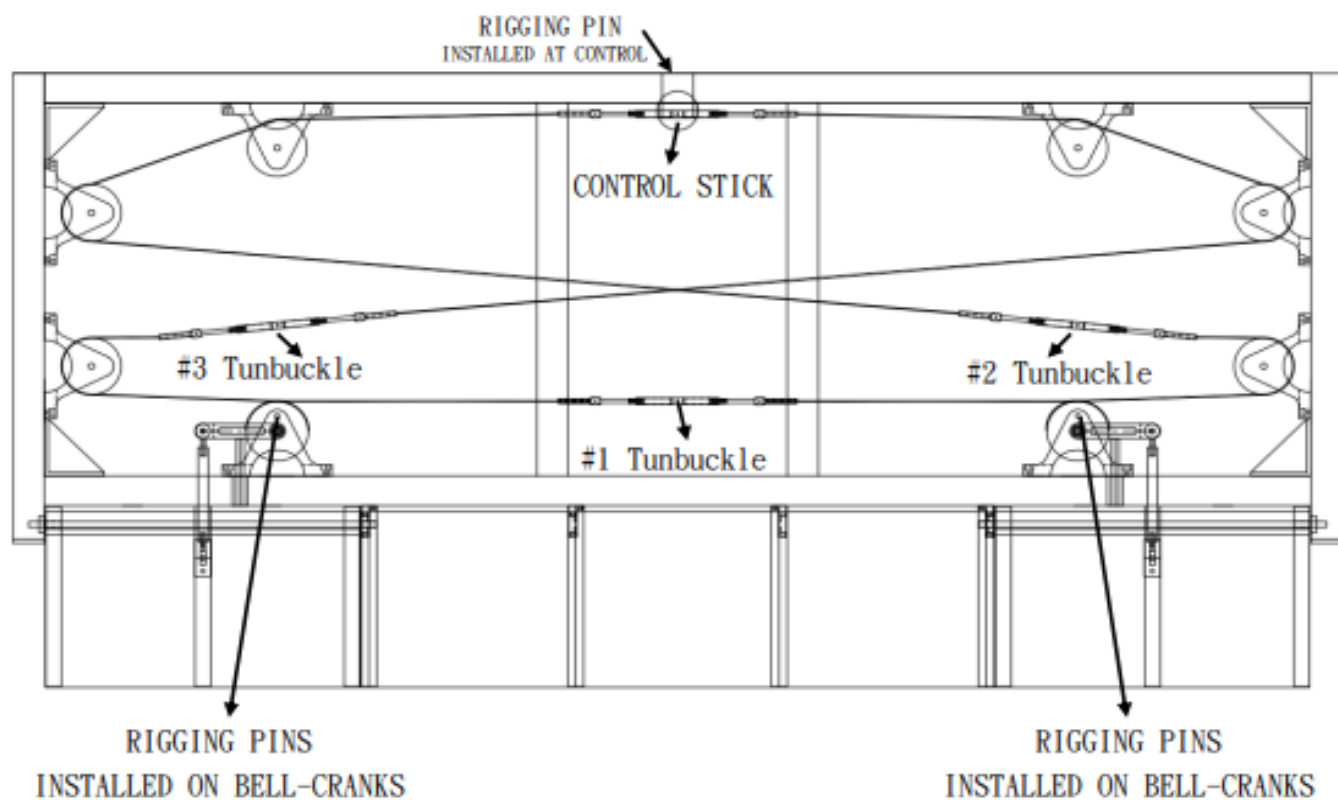
選手編號：_____ 選手姓名：_____

競賽時間：40分鐘 開始時間：_____時_____分，結束時間：_____時_____分

工作程序

- 一、安裝定位銷至控制桿置中位置(如附圖 1 及 1-1)。
- 二、安裝調校銷至鐘型曲桿(Bell-cranks)固定位置(如附圖 1 及 1-2)。
- 三、調整左側/右側副翼翼面行程控制調整桿行程至水平置中位置後，並將兩側固定螺帽先行用手帶緊即可。
- 四、依序執行確認#1、#2、#3 鋼繩鬆緊套位置(如附圖 1)並安裝鋼繩鬆緊套。
- 五、使用游標卡尺執行鋼繩外徑量測為：_____。
- 六、使用張力表執行鋼繩鬆緊套組之張力量測，依據(附表 1)將鋼繩調至指定張力值 $45\text{ lb}\pm 10\%$ ，量測三次(含)以上取其平均值。
- 七、#1Tunbuckle 鋼繩保險，必須為 Clip-type(如附圖 2-E)，
#2、#3Tunbuckle 鋼繩保險，必須為 SINGLE WRAP(如附圖 2-D)。
- 八、再次檢查鋼繩張力，並向裁判人員報告量測結果及填寫張力表實際量測讀值：
#2 鋼繩鬆緊套鋼繩張力量測讀值：_____。
#3 鋼繩鬆緊套鋼繩張力量測讀值：_____。
- 九、確認安裝控制桿定位銷及調校銷並檢查副翼翼面於水平置中位置；
- 十、移除所有控制桿定位銷及調校銷(RIGGING PIN)，並安裝電子數位角度規檢查左及右副翼翼面並執行調整至行程規範內(向上 $14^\circ\pm 1^\circ$ 、向下 $12^\circ\pm 1^\circ$)安裝調校鐘型曲桿(Bell-cranks)，確認行程於規範內後將止檔保險螺帽固定上緊及執行副翼翼面行程控制調整桿檢查孔目視檢查，將固定保險螺帽上緊並執行保險(如附圖 1-3)。
- 十一、執行檢查各控制翼面行程角度及相關固定保險，及所有飛行控制部件鋼繩鬆緊套保險是否正確及確認相關控制翼面於水平置中位置並安裝定位銷及調校銷。
- 十二、待裁判人員檢查完後，拆除所有保險，並實施完工後整理。

附圖 1 飛操鋼繩系統



定位銷



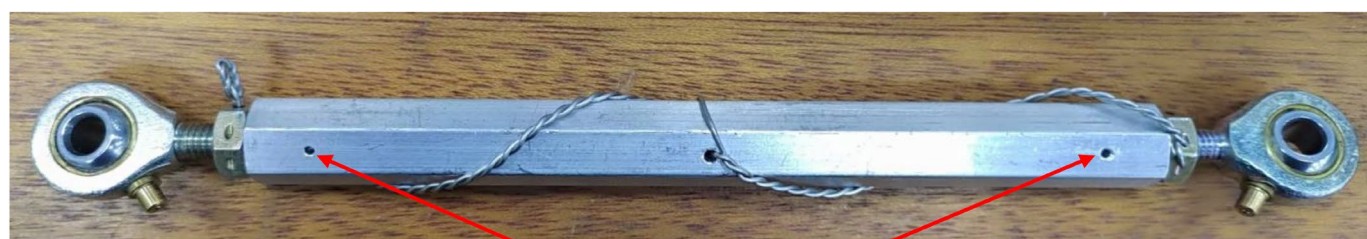
附圖 1-1

調校銷



附圖 1-2

附圖 1-3：行程調整桿保險方式(依據 AC43.13)



行程檢查孔

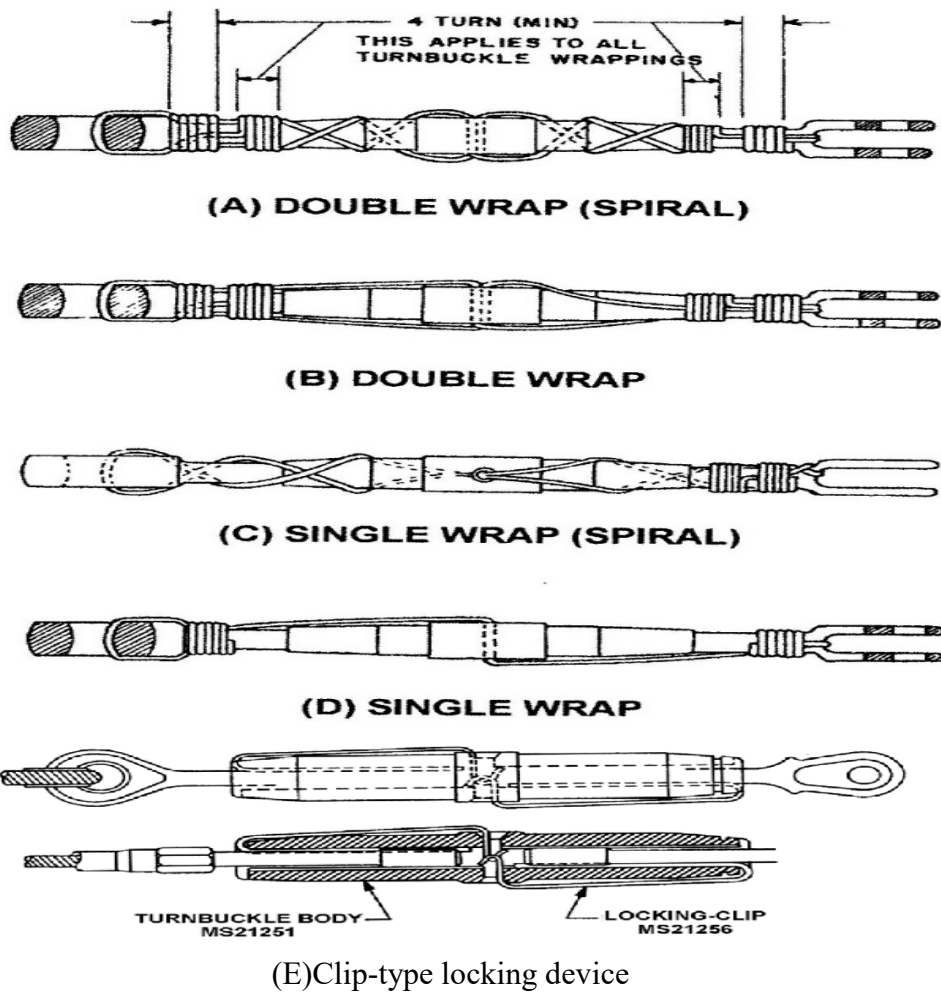
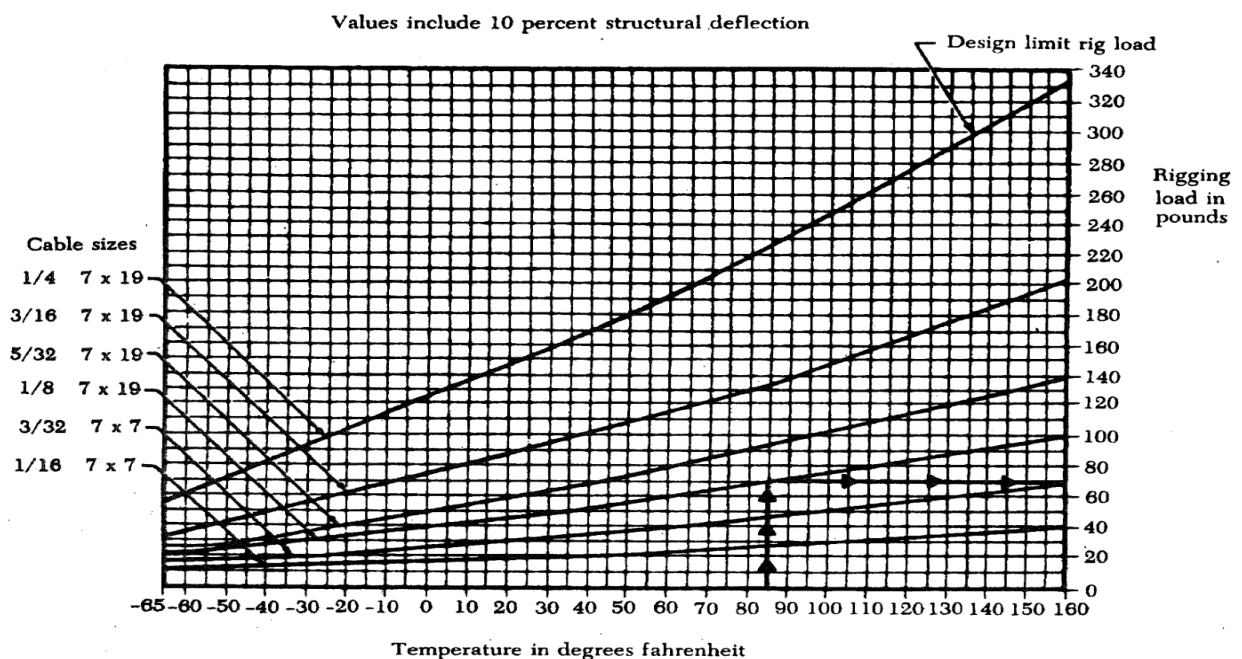


圖 2 鋼繩鬆緊套保險方式

附表 1



【本表為參考範本，以當日競賽場地提供為主，並僅限用於此次競賽】

附表 2 鋼繩尺寸對照表

Table 16-1. Safetywire, Type and Size for Various Turnbuckle Cable Diameters
↵

Cable Diameter	1/16	3/32 or 1/8	5/32, 3/16, 7/32, 1/4, 9/32, 5/16
Turnbuckle, AN155 Dash No.	-5S, 8-S, or-8L	-16S, -16L, -32S or -32L	-32S, -32L, -46L, -80L, -125L or-175L
Carbon Steel	0.032	0.040 ↵	0.047
Monel			0.040
Inconel	0.020	0.032	
Corrosion-Resistant Steel			0.041
Aluminum Alloy	0.023	0.040 ↵	0.047

第 53 屆全國技能競賽

競賽試題及說明

職類名稱：飛機修護職類

共 3 頁第 1 頁

第二站 技術手冊查閱與翻譯

（註：本公開試題在競賽時得約有百分之三十之調整）

一、題目：技術手冊查閱與翻譯。

二、說明：

- (一) 本試題執行原文飛機維護技術手冊查閱與翻譯工作。
- (二) 依指定問題執行相對飛機維護手冊查閱，依據情況查閱飛機維護手冊相關之章節及頁次，並將相對飛機維護手冊所對應問題之標準維護、檢查及作業方法、內容及程序結果填入工作單中並進行了解及翻譯工作。
- (三) 本試題主要考試範圍以波音飛機 B747-400 之 Airframe Maintenance Manual(AMM), 章節 Chapter 5,12,20,28 飛機維護手冊為主。。
- (四)工作完畢，整理手冊並清理工作場地。

三、評審要點：

(一)競賽時間：50 分鐘

(二)技能標準：

- 1. 依指定問題執行相對飛機維護手冊章節及頁次查閱工作。
- 2. 飛機維護手冊找出所對應問題之標準維護、檢查及作業方法及程序。
- 3. 維護手冊內容及程序進行了解及翻譯工作。

(三)工作安全與態度

- 1. 飛機維護手冊查閱使用是否熟練。
- 2. 工作態度認真良好。

第 53 屆全國技能競賽

飛機修護職類

第二站 技術手冊查閱與翻譯 工作單

題目：技術手冊查閱與翻譯。

選手編號：_____ 選手姓名：_____

競賽時間：50 分鐘 開始時間：_____ 時 _____ 分；結束時間：_____ 時 _____ 分

工作程序

一、請寫出下列之中文名稱？

1. AMM 維修手冊 20-30-02 章中,最新修訂版頁次為：

Page:_____ 修訂日期為:_____ (10 分)

2. AMM 第 28-11-20 page-401 章(章-節-目/開始頁次)中英文名為：

_____ (10 分)

二、請寫出下列之手冊相關技術問題？

1.執行 B747-400 飛機維護檢查時發現輪胎煞車過熱問題，需參考 AMM 維修手冊

_____ - _____ - _____ page-_____ (章-節-目/頁次)； 導致煞車過熱原因是：
_____ (中文寫出)(15 分)

2.B747-400 飛機維護作業，執行鎂金屬表面的油漆去除作業時， 要使用_____

_____ 清漆溶劑去除金屬表面的油漆，並使用 _____
(顏色及代碼) 沾黏毛刷清除，需參考 AMM 維修手冊 _____ - _____ - _____ page-
(章-節-目/頁次)；(15 分)

三、查閱手冊問答及翻譯，

1. 執行 B747-400 維護作業，若發現飛機液壓儲壓器壓力不足需要補充壓力時，需參考 AMM 維修手冊 _____ - _____ - _____ page-_____ (章-節-目/頁次) (5 分)，請簡述補充液壓儲壓器壓力之步驟程序：(寫出英文原文並翻譯成中文)(20 分)。

2.執行 B747-400 燃油系之燃油箱漏油檢查作業時，要採取那些步驟去分析評估燃油漏油型態，相關參考維護手冊：_____ - _____ - _____page-_____ (章-節-目/頁次) (5 分)中得知。 寫出評估燃油漏油型態步驟內容：(寫出英文原文並翻譯成中文)(20 分)

第 53 屆全國技能競賽

賽試題及說明

職類名稱：飛機修護職類

共 15 頁第 1 頁

第三站 電器線路圖施工與檢試

(註：本公開試題在競賽時得約有百分之三十之調整)

一、題目：電器線路圖施工與檢試

二、說明：

- (一) 測試競賽者依據線路圖及利用標準接線實作手冊，進行電器線路接線、接點安裝、線束及測試等能力。
- (二) 飛機電路基本元件認識、基本原理、量測檢視
 1. 本試題以使用競賽場之電路系統模型為主要考試範圍。
 2. 依據現場裁判人員指定之系統線路圖如圖 1 接線圖、圖 2 電路板圖。
 3. 佈線、綁線及安裝方式如參考 1。
 4. 電器接頭(CONNECTOR)選用 MIL-DTL-26482 系列：MS-3472 壁置式擦座 + MS-3476 直式擦頭、電器接頭為 14-18P(如圖 3)；
端子(Contacts)為壓接式接頭如參考 2，並使用 DMC AF8 或 AFM8 工具進行壓接/退接端子(Contacts) (如參考 3)。
 5. 電器接頭固定安裝方式如參考 4；線束標示方式如參考 5。
 6. 安裝完成後，檢查測試電路的運作。
- (三) 操作完成後，將飛機電器系統或電器系統模型恢復關斷之原狀態，並將試題工 作單繳交裁判人員。
- (四) 清點清理具。

三、評審要點：

- (一) 競賽時間：90 分鐘
- (二) 技能標準：
 1. 應先執行工作前之「安全確認」養成良好工作習慣，以避免實際工作之危險。
 2. 拆裝工具選用適當，操作方法正確，並能正確進行拆裝工作。
 3. 可解讀基本之電路原理並製作電路。
 4. 可順利讀取線路圖並完成連接後，依現場裁判人員要求實施操作。
 5. 能運用三用電表進行量測。
 6. 依正確程序將系統或模型恢復原狀。

(三) 工作安全態度：

1. 量具、工具之使用是否熟練。
2. 工作安全是否注意。
3. 量具、工具使用前後之檢查清點。
4. 工作現場之環境清潔保持整理。
5. 工作態度認真良好。

第 53 屆全國技能競賽

職類名稱：飛機修護職類

第三站 電器線路圖施工與檢試 試題工作單

選手編號：_____選手姓名：_____

競賽時間：90 分鐘

開始時間：_____時_____分，結束時間：_____時_____分。

工作程序：

壹、接線圖示

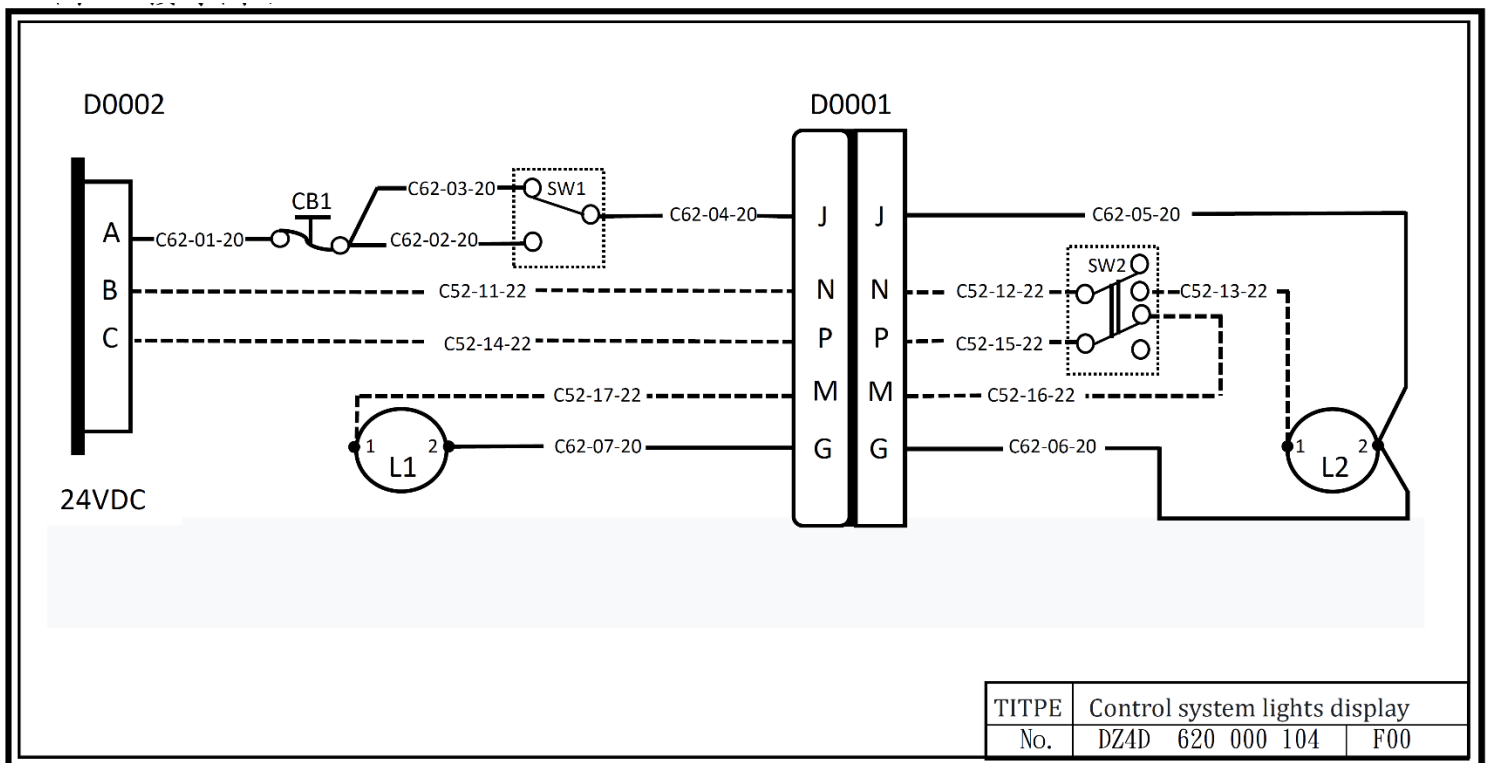


圖 1、接線圖

貳、電路版圖示。

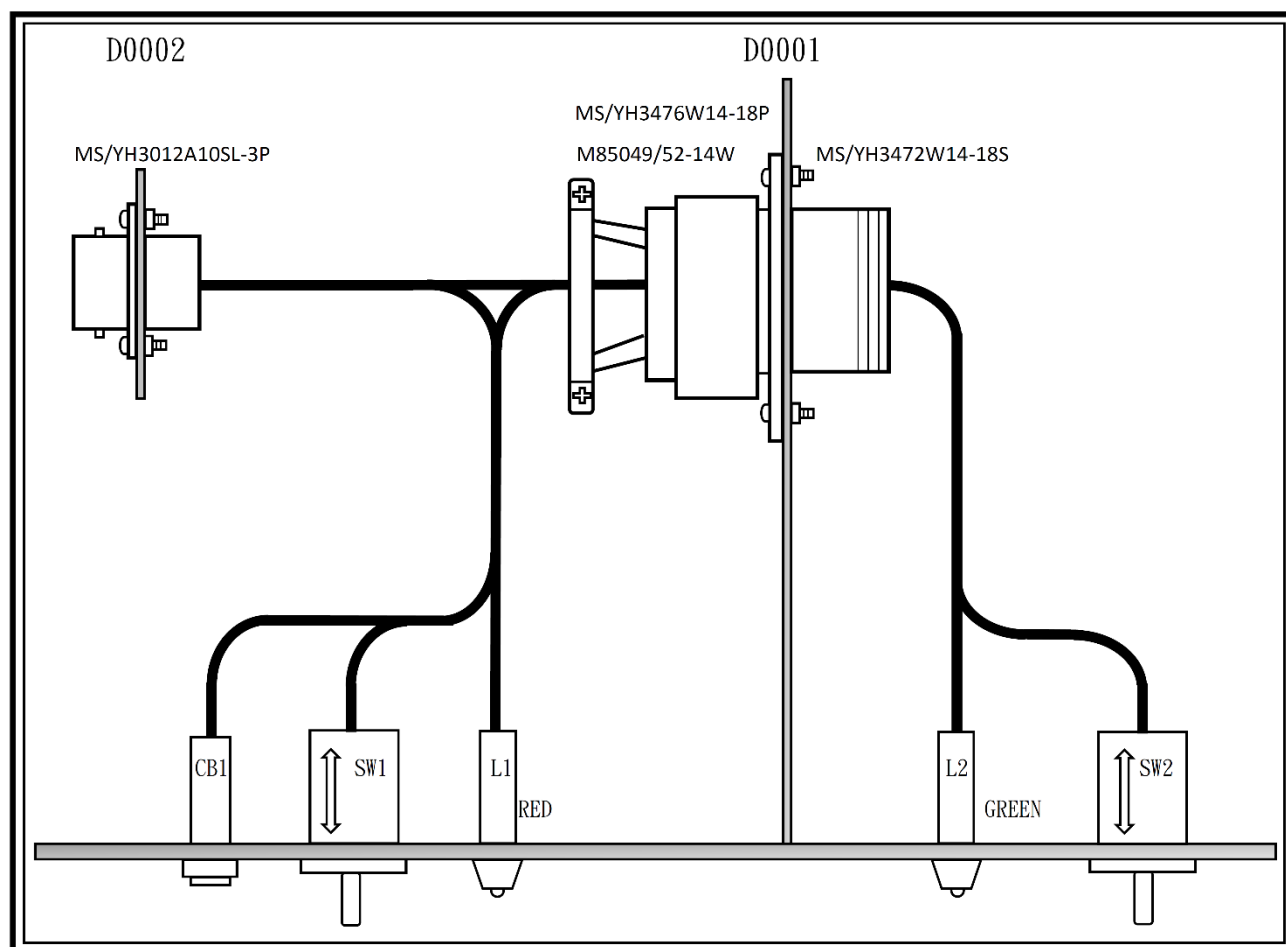
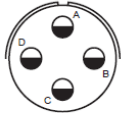
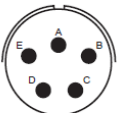
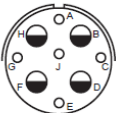
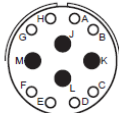
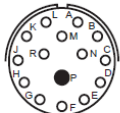


圖 2、電路版圖

					
Insert Arrangement	14-04	14-05	14-09	14-12	14-15
Service Rating	I	II	I	I	I
Number of Contacts	4	5	5 4	8 4	14 1
Contact Size	12	16	20 12	20 16	20 16

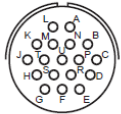
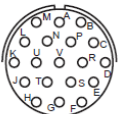
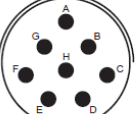
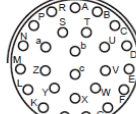
					
Insert Arrangement	14-18	14-19	16-08	16-23	16-26
Service Rating	I	I	II	I	I
Number of Contacts	18	19	8	22 1	26
Contact Size	20	20	16	20 16	20

圖 3、電器接頭圖

參考資料 1:

For a high vibration area, Vibration Level 2, these conditions are applicable:

- For the 737 model only, the lacing tape wire harness ties on a power feeder wire harness on the leading edge of the wing must be assembled at intervals of a maximum of 2 inches
- Lacing tape wire harness ties must be assembled at intervals between 6 inches and 8 inches
- The necessary number of lacing tape wire harness ties must be assembled on the wire harness to make sure that the wires harness does not bend between the wire harness ties; refer to Figure 3
- The necessary number of lacing tape wire harness ties must be assembled on the wire harness to make sure that the outer diameter of the wire harness does not become larger between the wire harness ties; refer to Figure 3



Not Acceptable



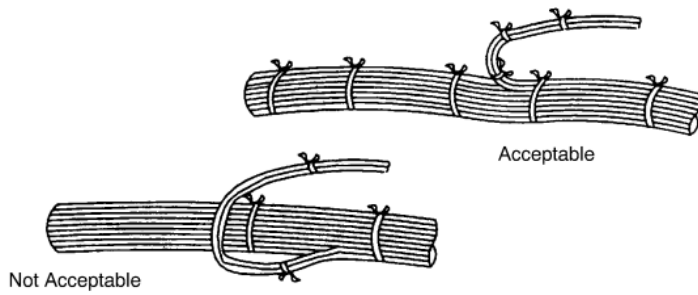
Acceptable

INTERVALS FOR WIRE HARNESS TIES
Figure 3

H. Wire Harness Branches

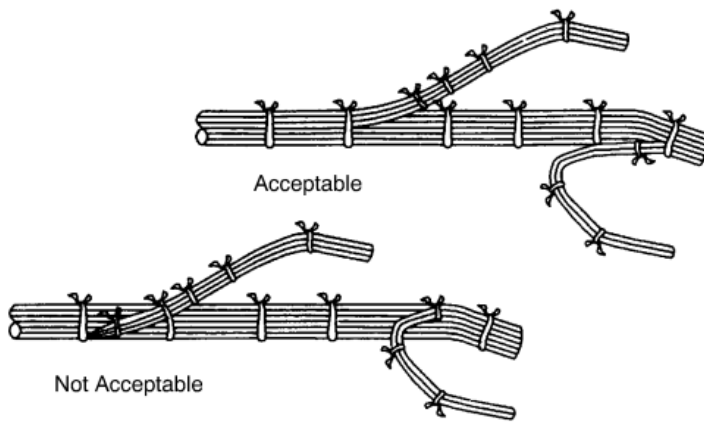
These conditions are applicable:

- If it is possible, a wire harness branch must make a smooth curve from the harness in the same plane as the centerline of the wire harness; refer to Figure 6
- If it is possible, all wires must be parallel and adjacent to each other and the wire harness before the wire harness branch is made
- If it is possible, a wire harness tie must be assembled or a plastic tie strap installed a maximum of 1 inch in front of the wire harness branch
- If it is possible, a wire harness tie must be assembled or a plastic tie strap installed a maximum of 1 inch behind the wire harness branch
- If it is possible, the wire harness branch must not go across other wires when it makes a curve from the wire harness; refer to Figure 7
- When a wire harness has a small number of wires that go to the branch point from opposite directions, a wire harness tie must be assembled or a plastic tie strap installed on the wire harness and the wires at the point of the branch; refer to Figure 8
- If the wire harness branch must go across the wire harness, the wire harness must have protection; refer to Figure 9 and Figure 10.
- Adhesive tape wire harness ties are not permitted on a wire harness branch.

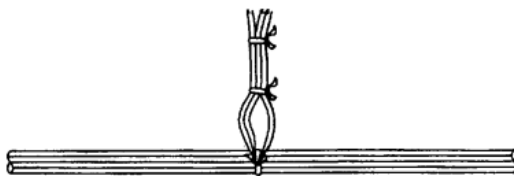


ONE BRANCH ON A WIRE HARNESS
Figure 6

WIRING ASSEMBLY AND INSTALLATION CONFIGURATION



MORE THAN ONE BRANCH ON A WIRE HARNESS
Figure 7

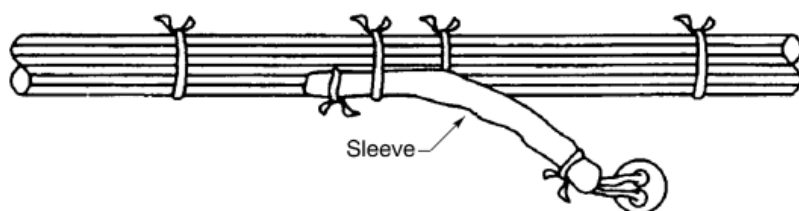


A BRANCH WITH WIRES THAT COME FROM OPPOSITE DIRECTIONS
Figure 8



WIRE HARNESS PROTECTION WITH TAPE
Figure 9

WIRING ASSEMBLY AND INSTALLATION CONFIGURATION



WIRE HARNESS PROTECTION WITH A SLEEVE
Figure 10

- (2) Make a clove hitch knot on the wire harness. Refer to Figure 18.

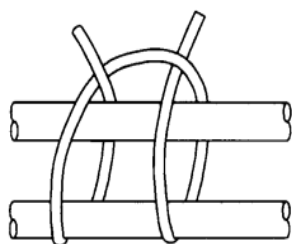
Make sure that:

- All of the wires are parallel
- The knot is tight.

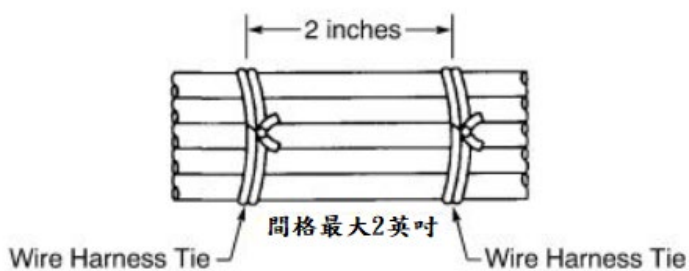
WIRING ASSEMBLY AND INSTALLATION CONFIGURATION

CAUTION: THE WIRES OR THE CABLES MUST NOT GO ACROSS EACH OTHER. DAMAGE TO THE WIRE OR THE CABLES CAN OCCUR.

CAUTION: DO NOT CAUSE DEFORMATION OF THE INSULATION OF THE WIRE OR THE CABLE DURING THE ASSEMBLY OF THE CLOVE HITCH. DAMAGE TO THE WIRE OR THE CABLE CAN OCCUR.



CLOVE HITCH KNOT
Figure 18



- (3) Make one of these knots on top of the clove hitch:

- A square knot; refer to Figure 16
- A surgical knot; refer to Figure 17.

- (4) Cut the free ends of the lacing tape.

參考資料 2:

Daniel's
MANUFACTURING
CORPORATION

POWER CONTACT
TOOLING GUIDE

www.dmctools.com • (407) 855-6161



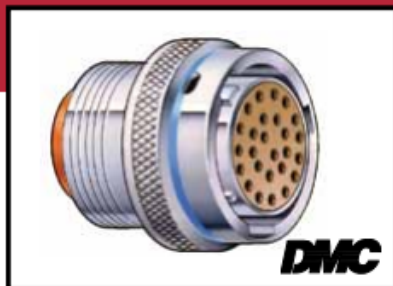
CONTACT COLOR CODE AND BIN*



BASIC IDENTIFICATION NUMBER

- Example shows: 360 Change, But **Block**
 Many features have the *optional* identifier contacts by changing the [RM] code on the dialler or the way to dial *6 and hence

CONNECTION IMAGE	CONTRACTS PART NUMBER	DESCRIPTION	SOURCES	CONTACTS	SIZE (AWG)	WIRE BUNDLE	ENV. BNC	PART NUMBER (CUMULATIVE)	PART NUMBER (SUB-ASSEMBLY)	WIRE GAUGE	COLOR CODE (EN)	APL	FRAME	WIRE	35-50	WAS POS	WAS	INSTALL	REACH	ASSEMBLY TOOLS
	MIL-DTL-22992	CIRCULAR CLASS I CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	6	6	6	M30500-18-217	M30500-11	6						WAS2-10	WAS2-3	By hand	DNK175-6A	REACH
	MIL-DTL-22992	CIRCULAR CLASS I CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	8	8	8	M30500-18-218	M30500-7	8						WAS2-10	WAS2-3	By hand	DNK175-8A	REACH
	MIL-DTL-22992	CIRCULAR CLASS I CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	10	10	10	M30500-18-219	M30500-6	10						WAS2-10	WAS2-3	By hand	DNK175-10A	REACH
	MIL-DTL-22992	CIRCULAR CLASS I CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-220	M30500-5	12						WAS2-12	WAS2-4	By hand	DNK175-12A	REACH
	MIL-DTL-22992	CIRCULAR CLASS I CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	14	14	14	M30500-18-221	M30500-4	14						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-24308	MINIATURE CIRCULAR CONTACT	AMPEREX CORP	STRAIGHT FLAT	40	4	4	M30500-18-331	M30500-9	4						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-24308	MINIATURE CIRCULAR CONTACT	AMPEREX CORP	STRAIGHT FLAT	40	4	4	M30500-18-332	M30500-9	4						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-24308	MINIATURE CIRCULAR CONTACT	AMPEREX CORP	STRAIGHT FLAT	40	4	4	M30500-18-333	M30500-9	4						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-24308	MINIATURE CIRCULAR CONTACT	AMPEREX CORP	STRAIGHT FLAT	40	4	4	M30500-18-334	M30500-9	4						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-24308	MINIATURE CIRCULAR CONTACT	AMPEREX CORP	STRAIGHT FLAT	40	4	4	M30500-18-335	M30500-9	4						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-26482	SERIES 1 CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	20	20	20	M30500-18-457	M30500-1	20						WAS2-18	WAS2-7	By hand	DNK175-14A	REACH
	MIL-DTL-26482	SERIES 1 CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	20	20	20	M30500-18-458	M30500-1	20						WAS2-18	WAS2-7	By hand	DNK175-14A	REACH
	MIL-DTL-26482	SERIES 1 CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	20	20	20	M30500-18-459	M30500-1	20						WAS2-18	WAS2-7	By hand	DNK175-14A	REACH
	MIL-DTL-26482	SERIES 1 CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	20	20	20	M30500-18-460	M30500-1	20						WAS2-18	WAS2-7	By hand	DNK175-14A	REACH
	MIL-DTL-26482	SERIES 1 CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	20	20	20	M30500-18-461	M30500-1	20						WAS2-18	WAS2-7	By hand	DNK175-14A	REACH
	MIL-DTL-26482	SERIES 2 CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-462	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-26482	SERIES 2 CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-463	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-26482	SERIES 2 CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-464	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-26482	SERIES 2 CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-465	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-26482	SERIES 2 CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-466	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-26500	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-467	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-26500	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-468	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-26500	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-469	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-26500	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-470	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-26500	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-471	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-83527	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-472	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-83527	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-473	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-83527	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-474	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-83527	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-475	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-83527	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-476	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28500	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-477	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28500	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-478	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28500	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-479	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28500	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-480	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28500	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-481	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28527	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-482	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28527	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-483	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28527	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-484	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28527	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-485	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28527	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-486	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28748	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-487	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28748	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-488	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28748	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-489	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28748	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-490	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH
	MIL-DTL-28748	CIRCULAR CONTACT	AMPEREX CORP	WALL MOUNT RECEPTACLE	12	12	12	M30500-18-491	M30500-1	12						WAS2-12	WAS2-4	By hand	DNK175-14A	REACH



MIL-DTL-26482 SERIES 2

CIRCULAR BAYONET COUPLING REAR RELEASE CONTACTS

For Backshell Torquing Tools, see page 65.

CONNECTOR P/N	DESCRIPTION	QPL SOURCES
MS3470	WALL MOUNT FLANGE RECEPTACLE	AERO ELECTRIC, AMPHENOL, DEUTSCH BURNDY, ITT CANNON, HERMETIC SEAL CORPORATION
MS3471	CABLE CONNECTING PLUG	
MS3472	WIDE FLANGE WALL MOUNT RECEPTACLE	
MS3474	JAM NUT REAR MOUNT RECEPTACLE	
MS3475	PLUG RFI	
MS3476	STRAIGHT PLUG	

CONTACTS	SIZE (AWG)		PIN/SOC.	PART NUMBER* (CURRENT)	PART NUMBER (SUPERSEDED)	WIRE RANGE
	MATING END	WIRE BARREL				
 TYPICAL CONTACT CONFIGURATION	12	12	P	M39029/4-113	M39029/4-12-12	12-14
	12	12	S	M39029/5-118	M39029/5-12-12	12-14
	12	16	P	M39029/4-114	M39029/4-12-16	16-20
	12	16	S	M39029/5-119	M39029/5-12-16	16-20
	16	16	P	M39029/4-111	M39029/4-16-16	16-20
	16	16	S	M39029/5-116	M39029/5-16-16	16-20
	16	20	P	M39029/4-112	M39029/4-16-20	20-24
	16	20	S	M39029/5-117	M39029/5-16-20	20-24
	20	20	P	M39029/4-110	M39029/4-20-20	20-24
	20	20	S	M39029/5-115	M39029/5-20-20	20-24

TOOL SELECTION		CRIMP TOOL AND ACCESSORY					ASSEMBLY TOOLS	
BIN*	COLOR	AF8	AFM8	MH860	WA23 (POS)	WA23 (DIE)	INSTALLING	REMOVAL
113	BROWN-BROWN-ORANGE	TH1A					DAK83-12B	DRK83-12B
118	BROWN-BROWN-GRAY	TH1A					DAK83-12B	DRK83-12B
114	BROWN-BROWN-YELLOW	TH1A		86-2			DAK83-12B	DRK83-12B
119	BROWN-BROWN-WHITE	TH1A		86-2			DAK83-12B	DRK83-12B
111	BROWN-BROWN-BROWN	TH1A		86-2			DAK83-16B	DRK83-16B
116	BROWN-BROWN-BLUE	TH1A		86-2			DAK83-16B	DRK83-16B
112	BROWN-BROWN-RED	TH1A		86-2			DAK83-16B	DRK83-16B
117	BROWN-BROWN-VIOLET	TH1A		86-2			DAK83-16B	DRK83-16B
110	BROWN-BROWN-BLACK	TH1A	K1S	86-1S			DAK83-20B	DRK83-20B
115	BROWN-BROWN-GREEN	TH1A	K1S	86-1S			DAK83-20B	DRK83-20B

*The three number suffix on M39029 series contacts is referred to as a "BIN" code. See page 22 for color stripe association.

Contact M39029/7-126 to 128 (Shielded Pin) #12 cavity, see page 78.

Contact M39029/8-129 to 131 (Shielded Socket) #12 cavity, see page 78.

Standard Adjustable Crimp Tool

UPPER RANGE CRIMP TOOL AF8 M22520/1-01

The DMC AF8, qualified to MIL-DTL-22520/1*, has virtually limitless application within the specified **wire range of 12 through 26 AWG**. Over a thousand turret heads are available to adapt the tool frame to your specific military or proprietary contact/wire combination. The 8 impression crimp, which is standard in the AF8, assures absolute maximum tensile strength with almost every closed barrel contact. Special indent configurations and gaging are available upon request.

For proper operation, the tool must be mated with one of the following optional accessories: a military standard or non-military turret head (TH-XXX Part No. Series), a military standard or non-military positioner (TP-XXX Part No. Series), or an adjustable head (Part No. UH2-5). This is done simply by orienting the head in the keyed position, and by tightening the hex socket screws provided as part of the head.

The precision ratchet controls cycling of the tool in both directions of handle movement. This assures the same accurate crimp every time. It's like having a quality control inspector at every work station.

Positive crimp depth is controlled by an 8 position selector knob conveniently located on the tool frame. The operator simply dials the desired step for the wire being used. This setting can be secured by use of a locking pin or safety wire.

The carefully engineered design achieves the absolute maximum mechanical advantage and the tool's light weight helps minimize operator fatigue.

A permanent dataplate is affixed to all turret heads and positioners. This plate lists specific contact part numbers, the corresponding position color code (for 3 position turret heads), and suggested selector depth settings for the wire size being used.

The adjustable head (P/N UH2-5) is ideally suited for lab work and prototype production applications. This head is attached in the same manner as explained above. The selected contact is inserted through the entry hole on the opposite side of the tool frame from the head. The height adjusting screw is then rotated until the contact is in the proper position for crimping. The screw can be secured with the locknut provided. Some testing will be necessary to determine the optimum selector setting for your contact/wire combination.

The AF8 is approximately 9¼" x 2½" x 1¼" and weighs 15 oz.

* Change to SAE AS22520 in process consult DMC for status.



Miniature Adjustable Crimp Tools

LOWER RANGE CRIMP TOOL AFM8 M22520/2-01

Qualified to MIL-DTL-22520/2*, the DMC AFM8 is designed for most of the miniature and sub-miniature connector types that are so widely used in electronic systems. The AFM8 meets the need for a miniature tool accommodating wire sizes 20 through 32 AWG.

The AFM8 gives a Mil-Standard 8 impression crimp, which assures maximum tensile strength. The cycle controlled precision ratchet assures consistently accurate crimps every time. The tool frame has a built-in 8 step selector knob for ease in dialing the correct crimp depth setting for the wire being used.

Positioners adapt the tool frame to a particular application. The data plate on each positioner designates which contacts the positioner accommodates for its wire size and indicates selector position. The positioner is easily removed and changed.

Periodic gaging is recommended to insure accurate calibration. This is easily accomplished with the M22520/3-1 "GO/NO-GO" gage (DMC part no. G125) on SEL setting #8. The AFM8 is 6 3/4" in length and weighs approximately 10 oz.

Other than keeping the tool clean and properly stored when not in use, no operator maintenance is required. *Pneumatic versions of this tool are found on page 12.*



The DMC274 tool kit contains the AFM8 tool frame, tool gage, and all mil-spec positioners. Also included in the DMC274 are tool instruction sheets and a tool selection chart.

* Change to SAE AS22520 in process consult DMC for status.



MILITARY P/N	DMC P/N	DESCRIPTION	NSN
M22520/2-01	AFM8	TOOL FRAME	5120-01-335-8572
M22520/2-02	K1S	POSITIONER	5120-01-335-8592
M22520/2-03	K60S	POSITIONER	5120-01-335-8593
M22520/2-04	K151	POSITIONER	5120-01-335-8594
M22520/2-05	K3	POSITIONER	5120-01-335-8595
M22520/2-06	K41	POSITIONER	5120-01-335-8624
M22520/2-07	K40	POSITIONER	5120-01-335-8625
M22520/2-08	K13-1	POSITIONER	5120-01-335-8626
M22520/2-09	K42	POSITIONER	5120-01-335-8627
M22520/2-10	K43	POSITIONER	5120-01-335-8628
M22520/2-11	K287	POSITIONER	5120-01-335-8629
M22520/2-12	K286	POSITIONER	5120-01-335-8630
M22520/2-13	K338	POSITIONER	5120-01-335-8631
M22520/2-14	K340	POSITIONER	5120-01-335-8632
M22520/2-15	K341	POSITIONER	5120-01-335-8633
M22520/2-16	K339	POSITIONER	5120-01-335-8634
M22520/2-17	K342	POSITIONER	5120-01-335-8635
M22520/2-18	K343	POSITIONER	5120-01-335-8636
M22520/2-19	K330-2	POSITIONER	5120-01-335-8637
M22520/2-20	K331-2	POSITIONER	5120-01-335-8638
M22520/2-21	K332-2	POSITIONER	5120-01-335-8609
M22520/2-22	K212	POSITIONER	5120-01-335-8610
M22520/2-23	K267-1	POSITIONER	5120-01-335-8611
M22520/2-24	K75S-1	POSITIONER	5120-01-335-8612
M22520/2-25	K261-1	POSITIONER	5120-01-335-8613
M22520/2-26	K262-1	POSITIONER	5120-01-335-8614
M22520/2-27	K269-1	POSITIONER	5120-01-335-8615
M22520/2-28	K373-1	POSITIONER	5120-01-335-8616
M22520/2-29	K372-1	POSITIONER	5120-01-335-8617
M22520/2-30	K404	POSITIONER	5120-01-335-8618
M22520/2-31	K406	POSITIONER	5120-01-335-8619
M22520/2-32	K496	POSITIONER	5120-01-335-8620
M22520/2-33	K74S	POSITIONER	5120-01-335-8621
M22520/2-34	K323	POSITIONER	5120-01-335-8622
M22520/2-35	K532-1	POSITIONER	5120-01-335-8623
M22520/2-36	K473	POSITIONER	5120-01-335-8596
M22520/2-37	K709	POSITIONER	5120-01-361-9666
M22520/3-1	G125	GAGE	5220-01-016-6002
	SK2/2	ADJUSTABLE POSITIONER	5120-01-171-1569
	DMC274	M22520/2 TOOL KIT	5180-01-259-0512

參考資料 3:

Other than keeping the unit clean and properly stored when not in service, no operator maintenance is required. DMC offers complete factory service by knowledgeable technicians within a reasonable turnaround time. Complete instructions concerning the use, care and warranty are supplied with each tool. Additional copies are available on request.

Pneumatic versions of this tool are found on page 12.

The battery powered versions of this tool are found on page 10.



The DMC1186 tool kit contains the AF8 tool frame, tool gage, and all mil-spec positioners and turret heads. Also included in the DMC1186 are tool instruction sheets and a tool selection chart.

Periodic gaging is recommended to insure accurate calibration. This can be done easily by setting the tool selector knob to position #4, and checking indenter closure with the M22520/3-1 "GO/NO-GO" gage (DMC part no. G125).



MILITARY P/N	DMC P/N	DESCRIPTION	NSN
M22520/1-01	AF8	TOOL FRAME	5120-01-335-8571
M22520/1-02	TH1A	TURRET	5120-01-335-8834
M22520/1-03	TH4	TURRET	5120-01-335-8835
M22520/1-04	TH163	TURRET	5120-01-335-8836
M22520/1-05	UH2-5	ADJUSTABLE POSITIONER	5120-01-335-8583
M22520/1-06	TP45	POSITIONER	5120-01-335-8584
M22520/1-07	TP85	POSITIONER	5120-01-335-8585
M22520/1-08	TH199S	TURRET	5120-00-016-7654
M22520/1-09	TP360	POSITIONER	5120-01-335-8586
M22520/1-10	TP365	POSITIONER	5120-01-335-8587
M22520/1-11	TP465	POSITIONER	5120-01-335-8588
M22520/1-12	TH270	TURRET	5120-01-335-8838
M22520/1-13	TH285	TURRET	5120-01-036-9221
M22520/1-14	TH286	TURRET	5120-01-036-9222
M22520/1-15	TP485	POSITIONER	5120-01-335-8589
M22520/1-16	TP513	POSITIONER	5120-01-335-8590
M22520/1-17	TP651	POSITIONER	5120-01-335-8591
M22520/3-1	G125	GAGE	5220-01-016-6002
	DMC1186	M22520/1 Tool Kit	



INSERT CONTACT



INSERT PRE-STRIPPED WIRE



CLOSE / OPEN HANDLE



REMOVE TERMINATED WIRE ASSEMBLY

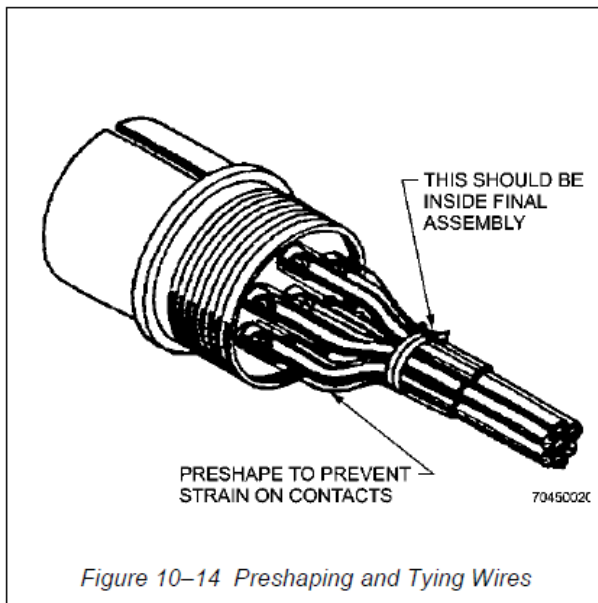
參考資料 4:

Preshaping Wires

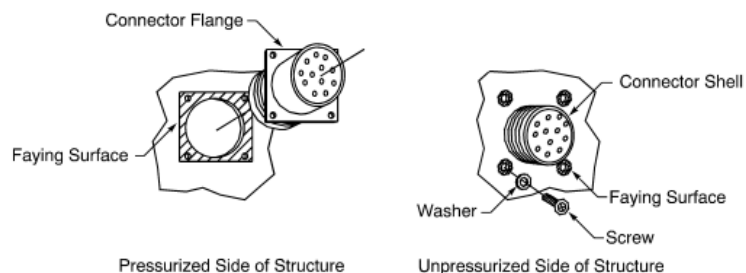
25. Preshape large diameter wires (No. 14 and larger) before soldering to contacts. This will avoid strain on soldered connection when cable clamp is installed. See Figure 10-14.

CAUTION

Preshaping is a necessity for connectors using resilient inserts. Side strain on the contacts will cause contact splaying and prevent proper mating of pin and socket contacts.



INSTALLATION OF ELECTRICAL CONNECTORS



LOCATION OF THE FAYING SURFACES
Figure 5

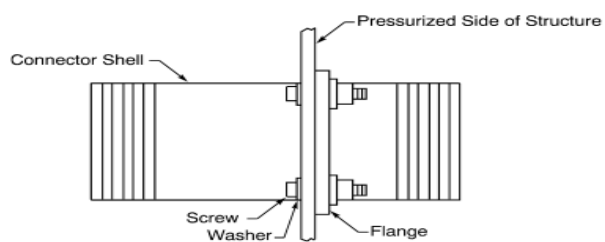


Figure 6

參考資料 5:

SPACING OF WIRE IDENTIFICATION

31. Mark wires and cables at intervals of not more than 38cm along their entire lengths (refer Figure 2–2).

In addition, mark wires within 75mm of each junction (except permanent splices), and at each terminating point. Wires less than 15cm long need not be marked.

LOCATION OF SLEEVE MARKING

32. When wire or cable cannot be marked directly, install a sleeve, (refer Figure 2–3) marked with the identification number, over the outer covering at each terminating end and at not more than 90cm intervals along the entire length of the wire or cable.

NOTE

Do not use sleeves to change the identification of wire or cable that has already been marked, except in the case of spare wires in potted connectors.

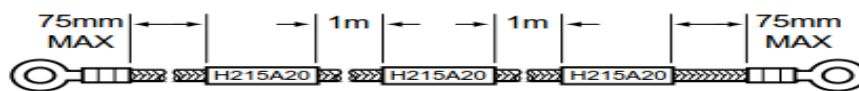


Figure 2–3 Location of Identification Sleeve

WIRE IDENTIFICATION AT TERMINAL BOARDS AND ENCLOSURES

37. If possible, mark wires attached to terminal boards and equipment terminals between termination and the point where wire enters the wire bundle (refer Figure 2–6). Identify wires terminating within an enclosure, inside the enclosure, if space permits.

SELECTION OF IDENTIFICATION SLEEVING

38. For general airframe wiring, in most applications, heat-shrinkable polyethylene tubing should be used to identify wire that cannot be marked directly. Available sizes are given in Section 2, Chapter 4.

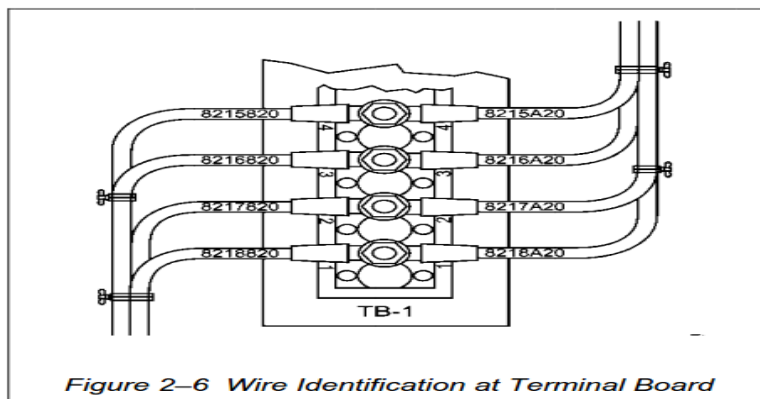


Figure 2–6 Wire Identification at Terminal Board

第 53 屆全國技能競賽

競賽試題及說明

職類名稱：飛機修護職類

共 7 頁第 1 頁

第四站 機體結構補片成型與應用

(註：本公開試題在競賽時得約有百分之三十之調整)

一、題目：機體結構補片成型與應用

二、說明：

- (一)結構件在搭配到飛機前必須現場整形配合，此過程叫成型。
 - (二)本題型測試競賽者詮釋圖說，以高度精準彎曲金屬薄片，依據提供之圖說來佈設扣件與安裝實心鉚釘的能力為競賽範圍。
 - (三)使用板金折摺機(折床)，依試題所給定之金屬補片大小尺寸執行彎折成型。
 - (四)使用氣動工具，依試題所給定之金屬補片大小尺寸與鉚釘型號，執行正確選取鉚釘型式與板材之鉚合。
 - (五)工作完成後，將工件繳交裁判評分。
 - (六)經裁判確認無誤並獲得同意後，將工具恢復原狀、清點工具並清理工作現場。
- 附註：本試題將各類型鉚釘置於盒內，選手須自行於鉚釘盒內選取正確型式之鉚釘。

三、評審要點：

- (一)競賽時間：90 分鐘。
- (二)技能標準：
 - 1.計算展開加工圖尺寸是否正確。
 - 2.彎折尺寸是否合乎題型尺寸。
 - 3.鉚接前，預先計算鉚釘數、確認鉚釘型式及尺寸。
 - 4.以正確程序進行鑽孔與裝置鉚釘，並注意裝置時與裝置後，鉚釘與板材之尺寸與情況是否合乎規範。
- (三)工作安全態度：
 - 1.工具之使用是否熟練。
 - 2.工作安全是否注意。
 - 3.量具、工具使用前後之檢查與清點。
 - 4.工作現場之環境清潔保持與整理。
 - 5.工作態度認真良好。

第 53 屆全國技能競賽

試題工作單

職類名稱：飛機修護職類

第四站 機體結構補片成型與應用

題目：機體結構補片成型與應用

選手編號：_____ 選手姓名：_____

競賽時間：90 分鐘 開始時間：_____時_____分，結束時間：_____時_____分

工作程序

一、依金屬補片計畫依據圖 1 工作圖執行以下作業。

二、計算展開加工圖尺寸並計算寫出數據(附圖 2)，請計算至小數點第三位。

三、將領到之兩片 5 吋×5 吋×0.040 吋鋁合金材料，依工作圖執行彎折作業。

四、依工作圖(附圖 1)兩鋁板兩端各彎折 90^0 ，施以疊層鉚接。

長邊組合完工長度為 5.0"並以 3 排平行列距鉚接，中排施以 MS20426AD4-X 沉頭鉚釘鉚接，上、下排施以 MS20470AD4-X 圓頭鉚釘鉚接。

兩片以疊層鉚接，上邊寬為 0.5"、下邊寬為 1.0"，依圖所需之鉚釘類別與大小安排鉚接位置、畫線、鑽孔。

五、鑽孔後將板材修毛邊。

六、以正確之鉚釘規格與手工具，進行鋁合金板之固定與鉚合。

七、完工後請在工件上簽名，並向裁判報告，同時將工作單繳交裁判人員。

八、經裁判委員確認無誤並獲得同意後，將工具恢復原狀、清點工具並清理工作現場。

九、附圖所示之圖示，僅供參考，請依維修手冊之條件自行計算正確數據及安排鉚釘間距，並執行鋁合金板之接合作業。

附圖 1

材料厚度：0.040"

彎折半徑：0.125"(R3)

彎曲角度：90°

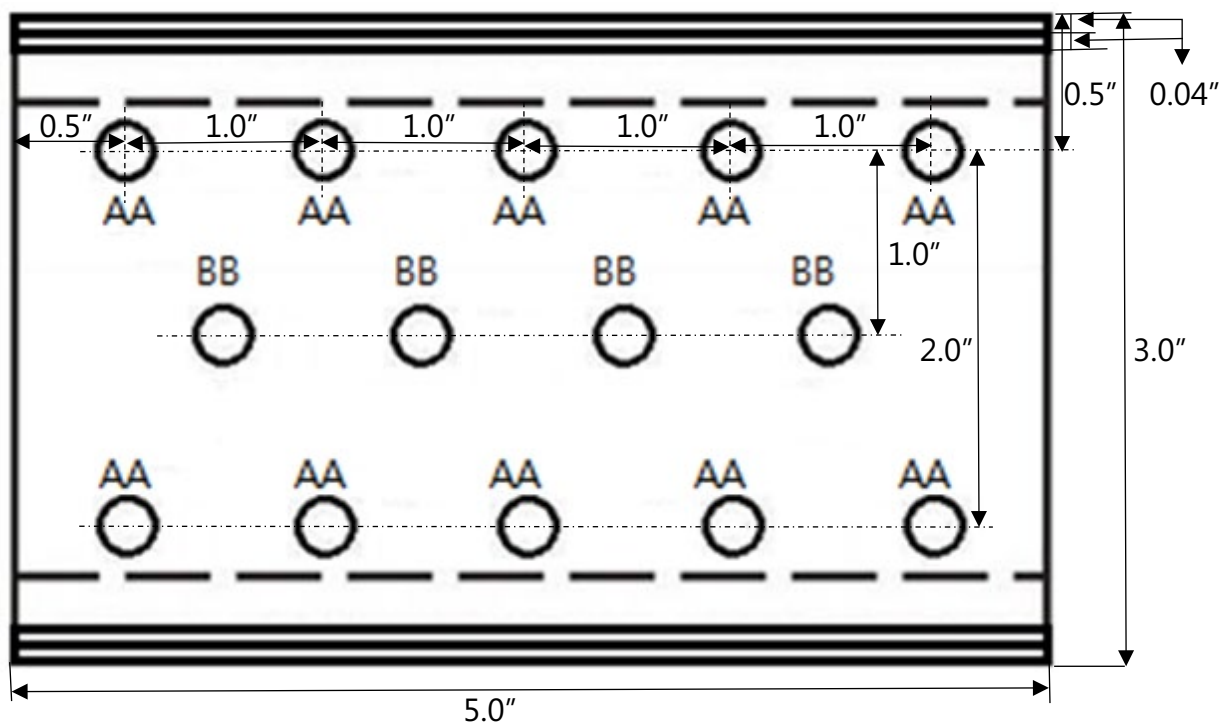
鑽孔：1/8"

鉚釘：

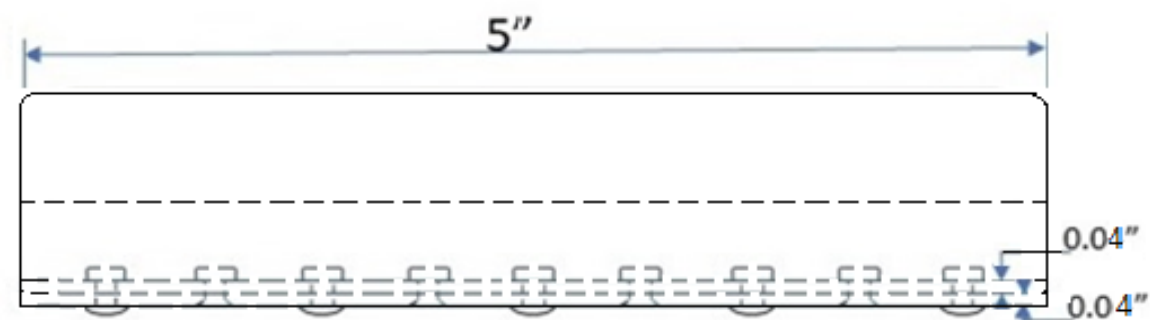
AA: MS20470AD4-X

BB: MS20426AD4-X

上視圖



正視圖：



左側視圖：

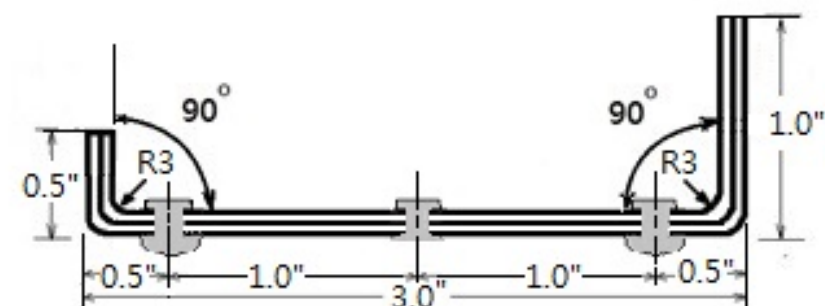


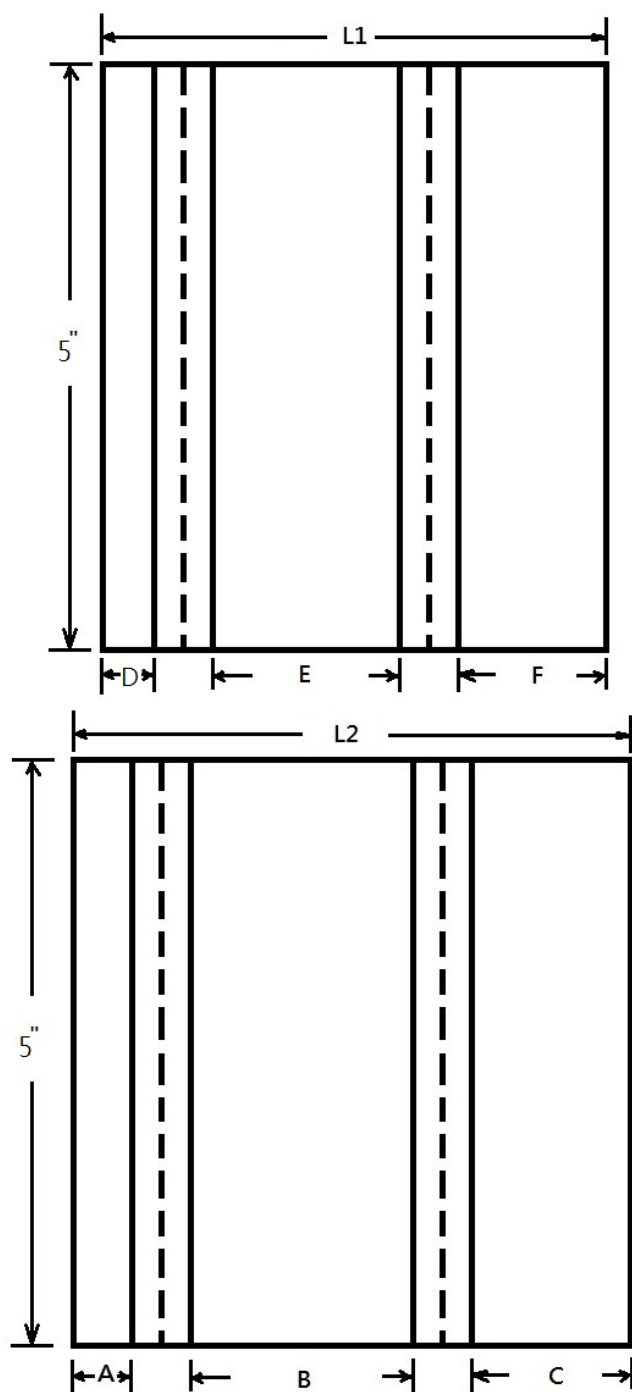
圖 1 金屬補片三視圖

展開加工圖計算

材料厚度：0.040"

彎折半徑：0.125"(R3)

彎曲角度：90°



平面佈置計算：

鉚釘最小長度：_____吋 施工之鉚釘長度為 AD4-_____

外側邊長 A:_____吋 外側中邊長 B:_____吋 外側邊長 C:_____吋 外側 L2 總長:_____吋

內側邊長 D:_____吋 內側中邊長 E:_____吋 內側邊長 F:_____吋 內側 L1 總長: _____吋

圖二、平面佈置計算圖

彎折裕度表

折 彎 半 徑	材 料 厚 度							
	0.012	0.016	0.020	0.025	0.032	0.040	0.050	0.063
0.03125 (1/32)	0.00065	0.00068	0.00072	0.00076	0.00082	0.00089	0.00099	0.00110
0.0625 (1/16)	0.00120	0.00123	0.00126	0.00131	0.00137	0.00145	0.00153	0.00165
0.09375 (3/32)	0.00174	0.00178	0.00181	0.00185	0.00191	0.00198	0.00208	0.00219
0.125 (4/32)	0.00229	0.00232	0.00235	0.00240	0.00246	0.00253	0.00262	0.00274
0.15625 (5/32)	0.00283	0.00286	0.00290	0.00294	0.00300	0.00307	0.00317	0.00328
0.1875 (3/16)	0.00338	0.00341	0.00345	0.00349	0.00355	0.00362	0.00372	0.00383
0.200 (1/5)	0.00359	0.00363	0.00366	0.00371	0.00377	0.00384	0.00393	0.00404
0.21875 (7/32)	0.00392	0.00396	0.00400	0.00404	0.00410	0.00417	0.00426	0.00438
0.250 (1/4)	0.00447	0.00450	0.00454	0.00458	0.00464	0.00471	0.00481	0.00492
0.29125 (9/32)	0.00501	0.00505	0.00508	0.00513	0.00519	0.00526	0.00535	0.00547
0.3125 (5/16)	0.00556	0.00559	0.00563	0.00567	0.00573	0.00580	0.00590	0.00601
0.34375 (11/32)	0.00610	0.00614	0.00617	0.00622	0.00628	0.00635	0.00644	0.00656
0.375 (3/8)	0.00665	0.00669	0.00672	0.00677	0.00683	0.00690	0.00699	0.00711
0.40625 (13/32)	0.00719	0.00723	0.00726	0.00731	0.00737	0.00744	0.00753	0.00765
0.4375 (7/16)	0.00774	0.00778	0.00781	0.00786	0.00792	0.00799	0.00808	0.00820
0.46875 (15/32)	0.00828	0.00832	0.00835	0.00840	0.00846	0.00853	0.00862	0.00874
0.500 (1/2)	0.00883	0.00887	0.00890	0.00895	0.00901	0.00908	0.00917	0.00929
0.53125 (17/32)	0.00937	0.00941	0.00944	0.00949	0.00955	0.00962	0.00971	0.00983
0.5625 (9/16)	0.00992	0.00996	0.00999	0.01004	0.01010	0.01017	0.01026	0.01038
0.59375 (19/32)	0.01047	0.01051	0.01054	0.01059	0.01065	0.01072	0.01081	0.01093
0.625 (5/8)	0.01101	0.01105	0.01108	0.01113	0.01119	0.01126	0.01135	0.01147
0.65625 (21/32)	0.01156	0.01160	0.01163	0.01168	0.01174	0.01181	0.01190	0.01202
0.6875 (11/16)	0.01210	0.01214	0.01217	0.01222	0.01228	0.01235	0.01244	0.01256
0.71875 (23/32)	0.01264	0.01268	0.01271	0.01276	0.01282	0.01289	0.01298	0.01310
0.750 (3/4)	0.01320	0.01324	0.01327	0.01332	0.01338	0.01345	0.01354	0.01366
0.78125 (25/32)	0.01374	0.01378	0.01381	0.01386	0.01392	0.01399	0.01408	0.01420
0.8125 (13/16)	0.01428	0.01432	0.01435	0.01440	0.01446	0.01453	0.01462	0.01474
0.84375 (27/32)	0.01482	0.01486	0.01489	0.01494	0.01500	0.01507	0.01516	0.01528
0.875 (7/8)	0.01537	0.01541	0.01544	0.01549	0.01555	0.01562	0.01571	0.01583
0.90625 (29/32)	0.01592	0.01596	0.01599	0.01604	0.01610	0.01617	0.01626	0.01638
0.9375 (15/16)	0.01648	0.01652	0.01655	0.01660	0.01666	0.01673	0.01682	0.01694
0.96875 (31/32)	0.01701	0.01705	0.01708	0.01713	0.01719	0.01726	0.01735	0.01747
1.0	0.01757	0.01761	0.01764	0.01769	0.01775	0.01782	0.01791	0.01803

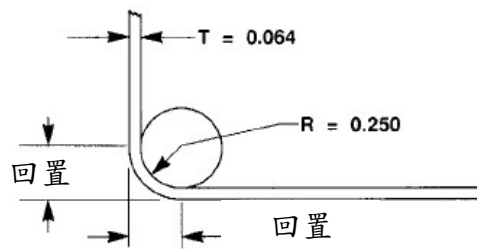
【僅供競賽參考】

K 係數表

角度[度]	K 值	角度[度]	K 值	角度[度]	K 值	角度[度]	K 值
1	0.00873	46	0.42447	91	1.0176	136	2.4751
2	0.01745	47	0.43481	92	1.0355	137	2.5386
3	0.02618	48	0.44523	93	1.0538	138	2.6051
4	0.03492	49	0.45573	94	1.0724	139	2.6746
5	0.04366	50	0.46631	95	1.0913	140	2.7475
6	0.05241	51	0.47697	96	1.1106	141	2.8239
7	0.06116	52	0.48773	97	1.1303	142	2.9042
8	0.06993	53	0.49858	98	1.1504	143	2.9887
9	0.07870	54	0.50952	99	1.1708	144	3.0777
10	0.08749	55	0.52057	100	1.1917	145	3.1716
11	0.09629	56	0.53171	101	1.2131	146	3.2708
12	0.10510	57	0.54295	102	1.2349	147	3.3759
13	0.11393	58	0.55431	103	1.2572	148	3.4874
14	0.12278	59	0.56577	104	1.2799	149	3.6059
15	0.13165	60	0.57735	105	1.3032	150	3.7320
16	0.14054	61	0.58904	106	1.3270	151	3.8667
17	0.14945	62	0.60086	107	1.3514	152	4.0108
18	0.15838	63	0.61280	108	1.3764	153	4.1653
19	0.16734	64	0.62487	109	1.4019	154	4.3315
20	0.17633	65	0.63707	110	1.4281	155	4.5107
21	0.18534	66	0.64941	111	1.4550	156	4.7046
22	0.19438	67	0.66188	112	1.4826	157	4.9151
23	0.20345	68	0.67451	113	1.5108	158	5.1455
24	0.21256	69	0.68728	114	1.5399	159	5.3995
25	0.22169	70	0.70021	115	1.5697	160	5.6713
26	0.23087	71	0.71329	116	1.6003	161	5.9758
27	0.24008	72	0.72654	117	1.6318	162	6.3137
28	0.24933	73	0.73996	118	1.6643	163	6.6911
29	0.25862	74	0.75355	119	1.6977	164	7.1154
30	0.26795	75	0.76733	120	1.7320	165	7.5957
31	0.27732	76	0.78128	121	1.7675	166	8.1443
32	0.28674	77	0.79543	122	1.8040	167	8.7769
33	0.29621	78	0.80978	123	1.8418	168	9.5144
34	0.30573	79	0.82434	124	1.8807	169	10.385
35	0.31530	80	0.83910	125	1.9210	170	11.430
36	0.32492	81	0.85408	126	1.9625	171	12.706
37	0.33459	82	0.86929	127	2.0057	172	14.301
38	0.34433	83	0.88472	128	2.0503	173	16.350
39	0.35412	84	0.90040	129	2.0965	174	19.081
40	0.36397	85	0.91633	130	2.1445	175	22.904
41	0.37388	86	0.93251	131	2.1943	176	26.636
42	0.38386	87	0.94890	132	2.2460	177	38.138
43	0.39391	88	0.96569	133	2.2998	178	57.290
44	0.40403	89	0.98270	134	2.3558	179	114.590
45	0.41421	90	1.0000	135	2.4142	180	無限

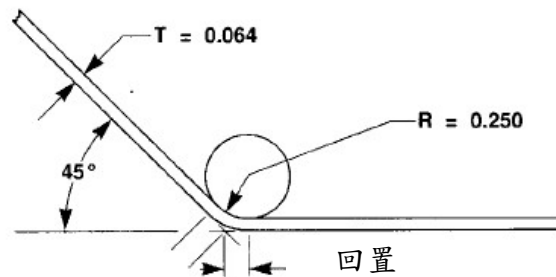
【僅供競賽參考】

彎曲半徑回置方法



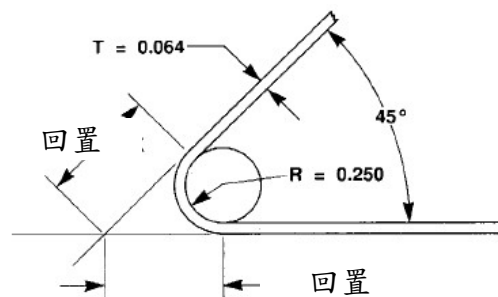
此為一 90 度角

$$\begin{aligned}\text{回置} &= (BR + MT) K \\ &= 0.250 + 0.064 \\ &= 0.314 \text{ 吋}\end{aligned}$$



此為一 135 度開口角，金屬僅彎曲 45 度

$$\begin{aligned}\text{回置} &= (BR + MT) K \\ &= (0.250 + 0.064) 0.41421 \\ &= 0.130 \text{ 吋}\end{aligned}$$



此為一 45 度閉合角

$$\begin{aligned}\text{回置} &= (BR + MT) K \\ &= (0.250 + 0.064) 2.4142 \\ &= 0.758 \text{ 吋}\end{aligned}$$

【僅供競賽參考】

第 53 屆全國技能競賽

競賽試題及說明

職類名稱：飛機修護職類

共 5 頁第 1 頁

第五站 飛機 360 度檢查

(註：本公開試題在競賽時得約有百分之三十之調整)

一、題目：飛機 360 度檢查

二、說明：飛機360度檢查【含排除故障點及滑油檢測】。

- 1.UH1-1H 飛機飛行前、中、後檢查之範圍包含廣泛規定詳細，以實際考場飛機為測試標準之通用 360 度檢查為主要實作測驗範圍，全程均以現場位置敘述列入評分標準。
- 2.參賽選手以實際現場飛機用正確程序進行飛機 360 度檢查之說明，裁判人員並設置檢查項目缺失四處，使參賽選手需具備故障排除之技能，並予以適當之評分。
- 3.飛機滑油檢查，以實作方式執行之。
- 4.依據現場裁判人員給定之資料進行答題。
- 5.工作完畢，清點裝備並清理工作現場。

三、評審要點：

(一)競賽時間：30分鐘。

(二)技能標準：

- 1.飛機360度檢查前之準備動作，應先執行工作前之「安全確認」。
- 2.依檢查卡選擇適當裝備，以正確方法操作，並能準確進行各項檢查工作。
- 3.能正確執行各項工作並確實執行各項安全注意事項及防護措施。
- 4.按技令規定詳加檢視飛機滑油檢查，以確定是否有不正常之滑油存量。

(三)工作安全與態度：

- 1.裝備使用是否熟練。
- 2.工作安全是否注意。
- 3.裝備使用前後之檢查與清點。
- 4.工作現場之環境清潔保持與整理。
- 5.工作態度認真良好。

第 53 屆全國技能競賽

試題工作單

職類名稱：飛機修護職類

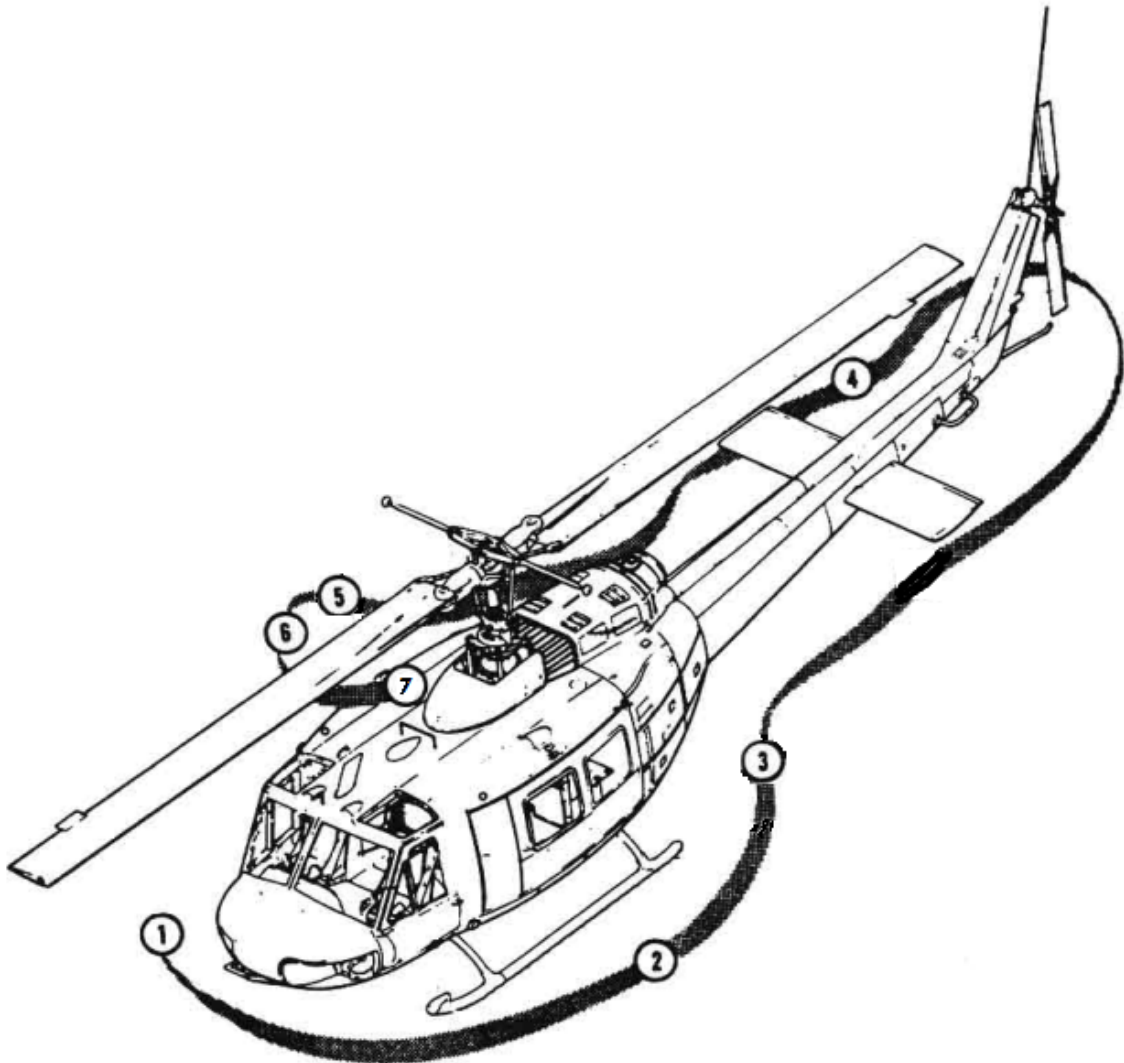
第五站 飛機 360 度檢查

題目：飛機 360 度檢查

選手編號：_____ 選手姓名：_____

競賽時間：30 分鐘 開始時間：____ 時____ 分， 結束時間：____ 時____ 分

說明：一、飛機360度檢查，如下圖範例(依檢查卡項目全機逐項檢查)



圖二、飛機檢查流程圖

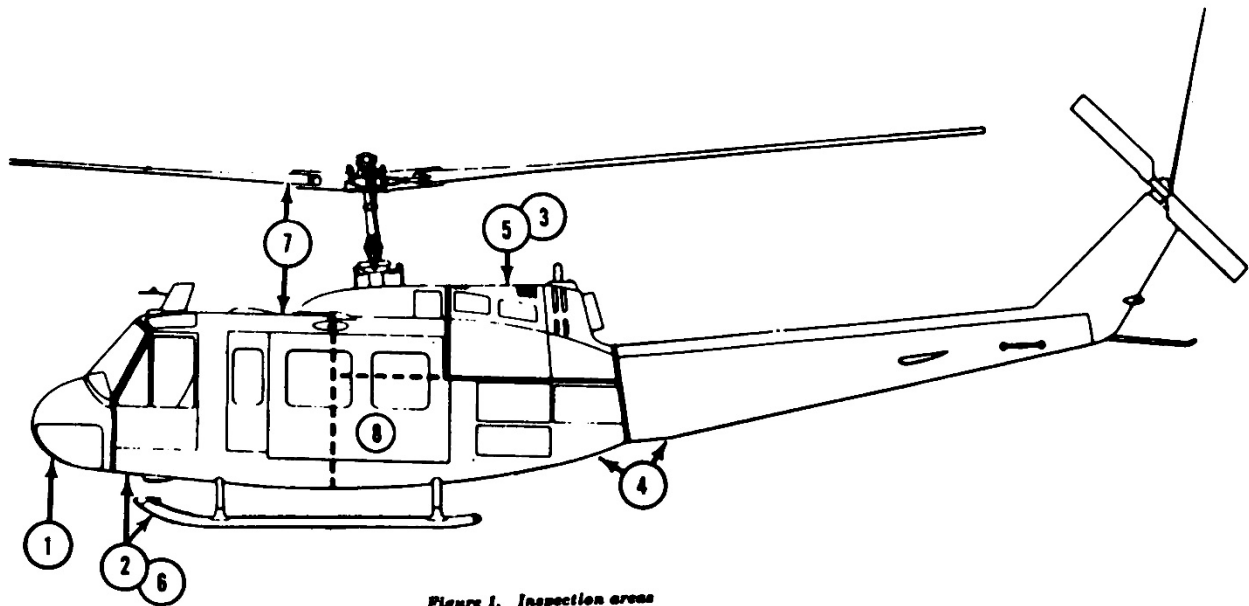


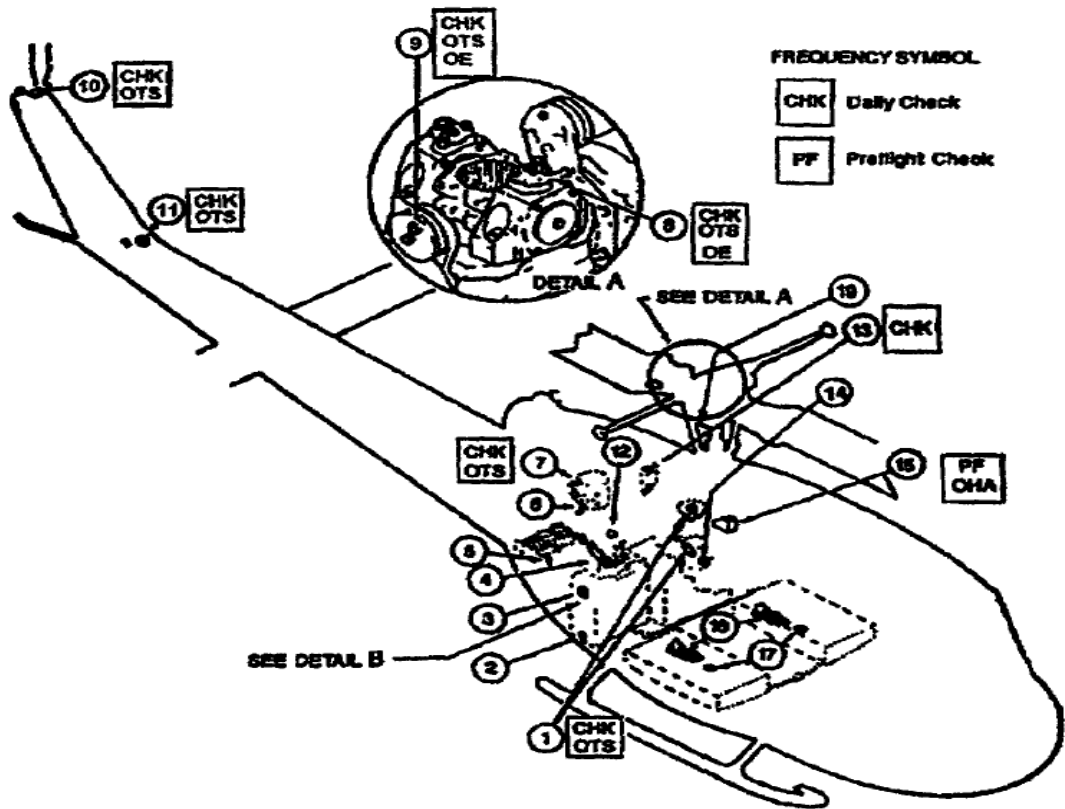
Figure 1. Inspection areas

TM 55-1520-210-PMD

Area No. 1	Nose Area	All surfaces, components, and equipment in nose compartment and on exterior ahead of crew doors.
Area No. 2	Cabin Exterior and Landing Gear Left Side	All surfaces, components, and equipment on cabin exterior and underside between forward sides of crew doors and aft cabin walls. Includes landing gear, and forward fuel cell sump on cabin underside. Includes compartment in pylon island below main transmission.
Area No. 3	Engine Area Left Side	All surfaces, components, and equipment associated with engine installation, located above engine work deck and within engine cowling, tailpipe fairing and intake fairing.
Area No. 4	Tailboom Area	All surfaces, components and equipment located in or on the tailboom and vertical fin. Including access compartments below engine work deck and aft of cabin walls.
Area No. 5	Engine Area Right Side	All surfaces, components, and equipment associated with engine installation, located above engine work deck and within engine cowling, tailpipe fairing and intake fairing.
Area No. 6	Cabin Exterior and Landing Gear Right Side	All surfaces, components, and equipment on cabin exterior and underside between forward sides of crew doors and aft cabin walls. Includes landing gear, and forward fuel cell sumps on cabin underside. Includes compartment in pylon island below main transmission.
Area No. 7	Upper Pylon Area	All surfaces, components, and equipment of the main rotor pylon group, from top of mast to the bottom of the transmission mounts. Includes main rotor, mast and rotating controls, transmission with accessories and mounts, and main (input) drive shaft. Includes top of cabin surface and components.

圖二、飛機檢查站位對照圖

二、 依據 TM 55-1520-210-23-1 手冊圖表，執行 UH-1H 飛機滑油每日檢查。



LUBRICANT - TEMPERATURE REQUIREMENTS

LUBRICANT - TEMPERATURE REQUIREMENTS

Symbol	Specification	Ambient Temperature
OTS	MIL-L-23699 (C166)	-25°F and above
	MIL-L-7808 (C168)	0°F and below
	DOD-L-85734 (C166A)	0°F and above
NOTE		
OTS oil, DOD-L-85734 (C166A) should be used only in transmission and not in the engine.		
OHA	MIL-H-83282 (C131)	-30°F (-35°C) and above
NOTE		
Changing to fire resistant hydraulic fluid requires system draining. Refer to TB 55-1500-344-25.		
	MIL-H-5606 (C130)	-31°F (-36°C) and below
OE		
NOTE		
OE oil is used only in main rotor hub P/N 204-012-101-31. Do not mix OE and OTS oil.		
	MIL-L-2104 Grade 40 (C172)	40°F (5°C) and above
	MIL-L-2104 Grade 30 (C173)	0°F (-18°C) to 39°F (4°C)
	or	
	MIL-L-46152 Grade 30 (C170)	
	MIL-L-2104 Grade 10 (C174)	-20°F (-29°C) to -1°F (-19°C)
	or	
	MIL-L-46152 Grade 10W30 (C171)	
	MIL-L-46167 (C132)	-65°F (-54°C) to -21°F (-30°C)

圖三、 飛機滑油檢查位置圖

第 53 屆全國技能競賽

試題工作單

職類名稱：飛機修護職類

第五站飛機360度檢查工作單

一、飛機 360度檢查項目部分: (20 分)

二、請列出飛機360度檢查發現之故障處：(30 分)

1. _____。
2. _____。
3. _____。
4. _____。

三、查閱TM 55-1520-210-23-1手冊圖表，執行UH-1H飛機勤務作業：

1. 要執行飛機主旋翼集體桿變矩套軸承(Collective sleeve bearings)潤滑時，請問其滑油種類及料號為何？潤滑週期？潤滑方式? (16 分)
2. 當飛機主旋翼轉速超速後，轉速小於 356 rpm 時，要執行哪些檢查(14 分)

四、工作安全措施，工作完畢報告裁判，並將工作單交回，清點工具及工作區域。(10 分)

第 53 屆全國技能競賽

競賽試題及說明

職類名稱：飛機修護職類

共 5 頁第 1 頁

第六站 發動機主燃油噴嘴拆裝及內視鏡檢查

(註：本公開試題在競賽時得約有百分之三十之調整)

一、題目：發動機主燃油噴嘴拆裝及內視鏡檢查

二、說明：飛機發動機主燃油噴嘴拆裝及內視鏡檢查。

(一)本試題以使用競賽場地提供之發動機及內視鏡檢查為主要考試範圍。

(二)選用適當工具，並能正確將主燃油噴嘴及燃油歧管拆開。

(三)執行主燃油噴嘴及燃油歧管檢查。

(四)執行燃燒室內視鏡檢查時，現場將提供內視鏡及備妥相關工具，選手應正確使用內視鏡，深入燃燒室至指定位置並檢查損傷情況，並將結果填入工作單中。

(五)是否能口述正確使用扭力扳手上磅與完成保險。

(六)工作完畢，清點現場工具並清理工作場地。

三、評審要點：

(一)競賽時間：50分鐘。

(二)技能標準：

- 1.執行發動機主燃油噴嘴拆裝前，應先執行工作前之「安全確認」，養成良好工作習慣，以避免實際工作時之危險性。
- 2.選用適當工具，將發動機主燃油噴嘴拆卸。
- 3.注意內視鏡操作限制，並正確執行內視鏡操作前檢查。
- 4.正確操作內視鏡檢視燃燒室。
- 5.將檢視結果填入工作單內。
- 6.使用適當工具裝回發動機主燃油噴嘴，並正確使用扭力扳手上磅與完成保險。

(三)工作安全與態度：

- 1.裝備使用是否熟練。
- 2.工作安全是否注意。
- 3.裝備使用前後之檢查與清點。
- 4.工作現場之環境清潔保持與整理。
- 5.工作態度認真良好。

第 53 屆全國技能競賽

競賽試題及說明

第六站 發動機主燃油噴嘴拆裝及內視鏡檢查

工作單

題目：發動機主燃油噴嘴拆裝及內視鏡檢查。

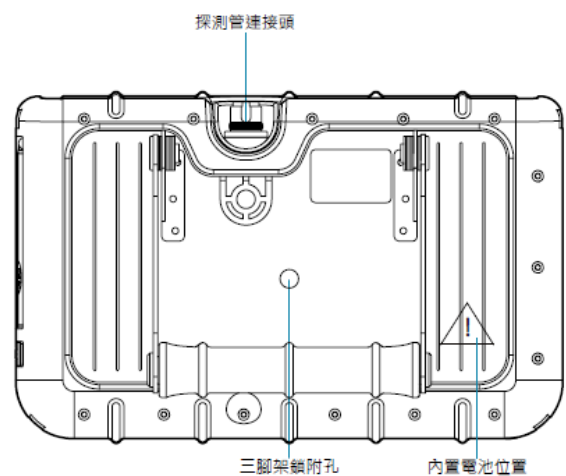
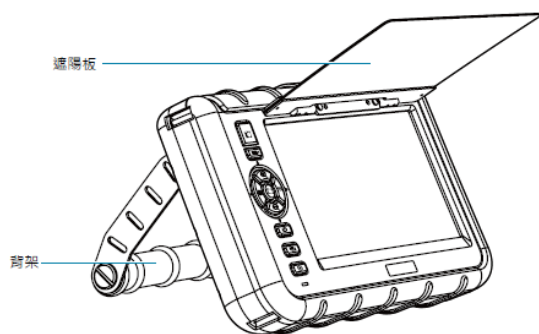
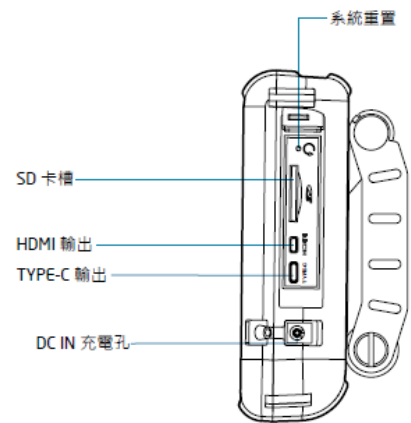
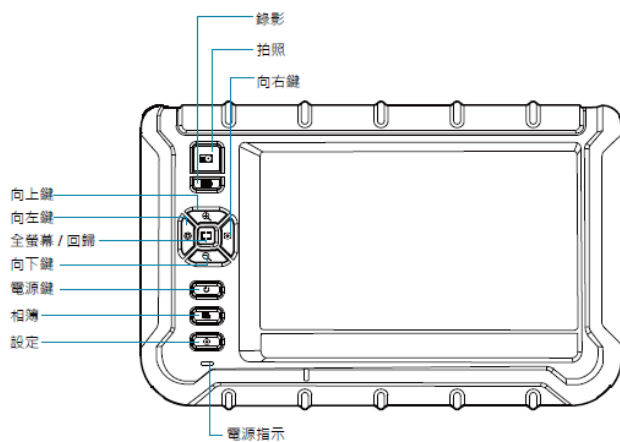
選手編號：_____ 選手姓名：_____

競賽時間：50 分鐘 開始時間：_____ 時 _____ 分；結束時間：_____ 時 _____ 分

- 一、口述檢查發動機燃油系統供應發動機增壓泵在關斷位置與「掛上禁止」操作掛籤。
- 二、口述拉開火警關斷瓣，並掛上「禁止操作」掛籤。
- 三、自燃油噴嘴拆開燃油歧管接頭，及拆下主燃油噴嘴上四顆固定螺栓，並拆下燃油噴嘴。
- 四、口述檢查噴嘴本體及分流器外殼有無裂紋、刻痕、凹痕及燃油進口接頭有無損壞，並需判斷是否更換新的燃油噴嘴組件。
- 五、在使用內視鏡前，必須查閱廠家手冊。
- 六、使用內視鏡(如圖 1)伸入燃燒室指定位置
 - 1.拍攝燃燒室外層底部 1 顆固定螺桿放大圖(如圖 2-1)後存檔。
 - 2.拍攝燃燒室內部至多 5 片渦輪葉片全圖(如圖 2-2)後存檔。
- 七、戴上 PVC 手套將燃油噴嘴之固定螺栓塗上防鎖死油膏後裝回，裝回時應先以手力上至 4-5 牙，再使用工具上至適當緊度。
- 八、使用扭力扳手上緊螺栓(扭力值 15~17 吋磅，此題規範僅適用於此次競賽，實際工作請參照各維護手冊規定)，並執行保險。
- 九、安裝燃油歧管接頭於燃油噴嘴上，須先以手力上至 4-5 牙，再使用工具及鴨掌上緊至適當緊度，並以扭力扳手上至規定磅數(40~50 吋磅)。
- 十、清點裝備及手工具，並清潔工作區域。

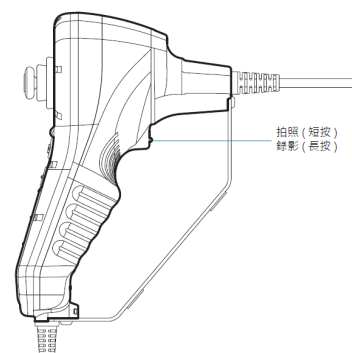
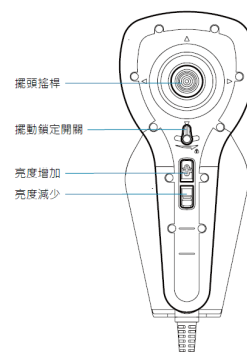
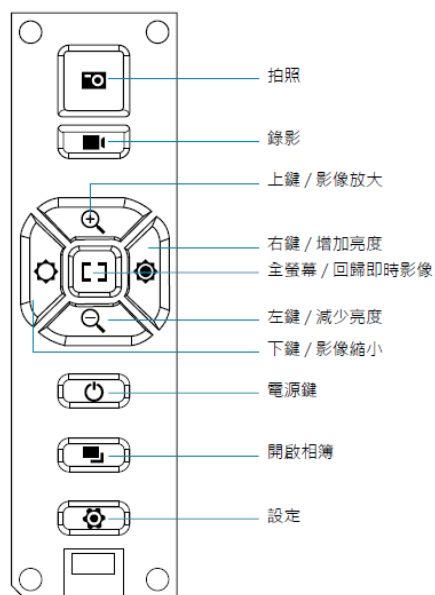
內視鏡外觀

• 1.1 X2000 主機



Part II 主要按鍵

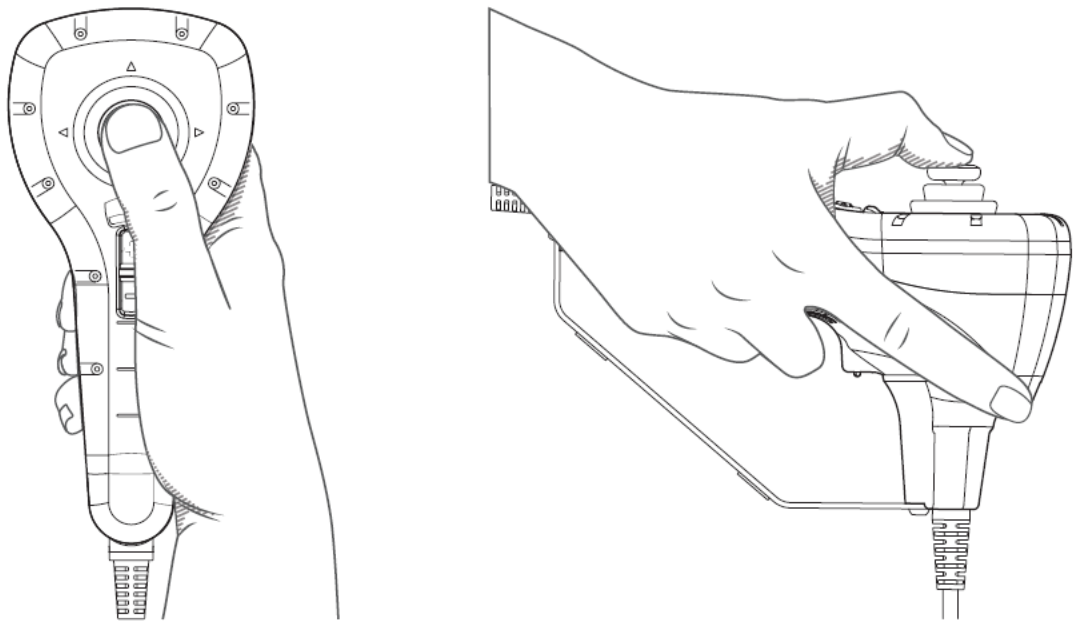
• 2.1 實體按鍵介面



圖一 內視鏡外觀及按鍵說明

基本操作

通常手持抓握手把，使用拇指操控擺頭搖桿。



操縱桿操作



鎖定模式：當擺動鎖定鈕往右撥，擺動位置可隨搖桿控制任意動作 / 停止。

擷取影像

- 短按  拍攝影像。
- 長按  (2 秒) 開始錄影，欲停止錄影，再長按 2 秒即可。錄影中可短按按鍵拍照，擷取即時影像。

調整亮度

- 按  增加亮度。
- 按  減少亮度。

內視鏡基本操作說明

合格照片



不合格照片

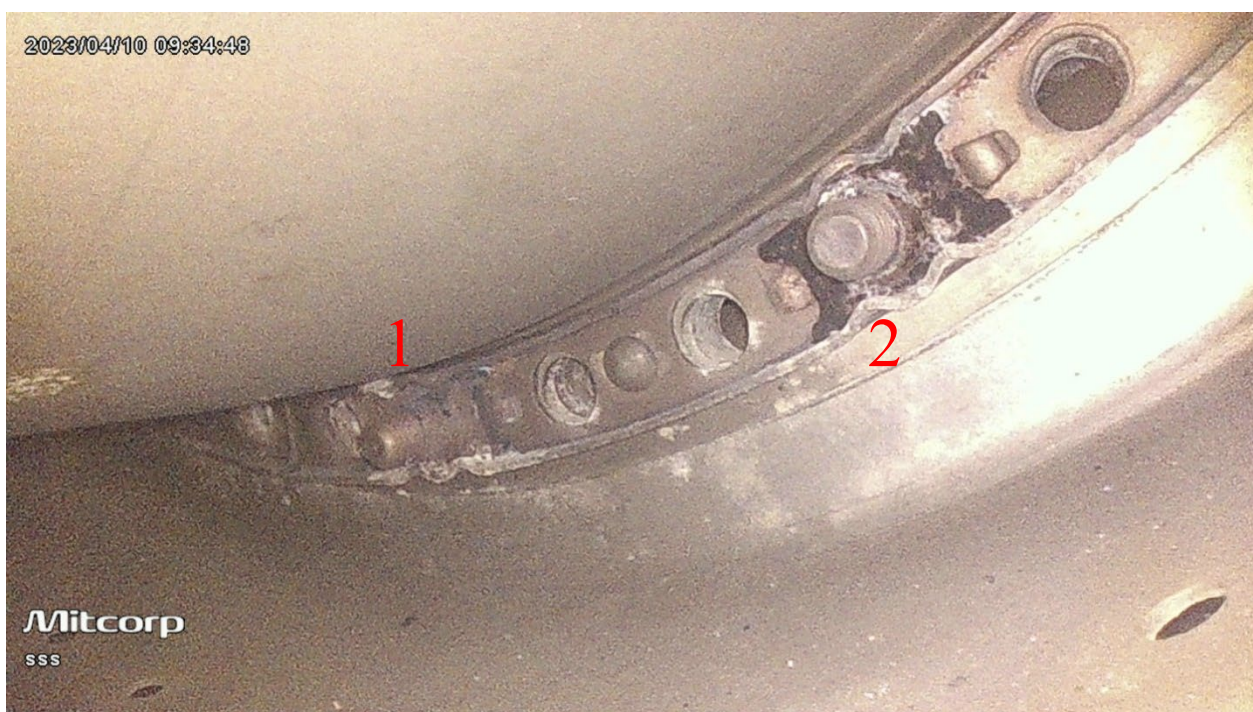
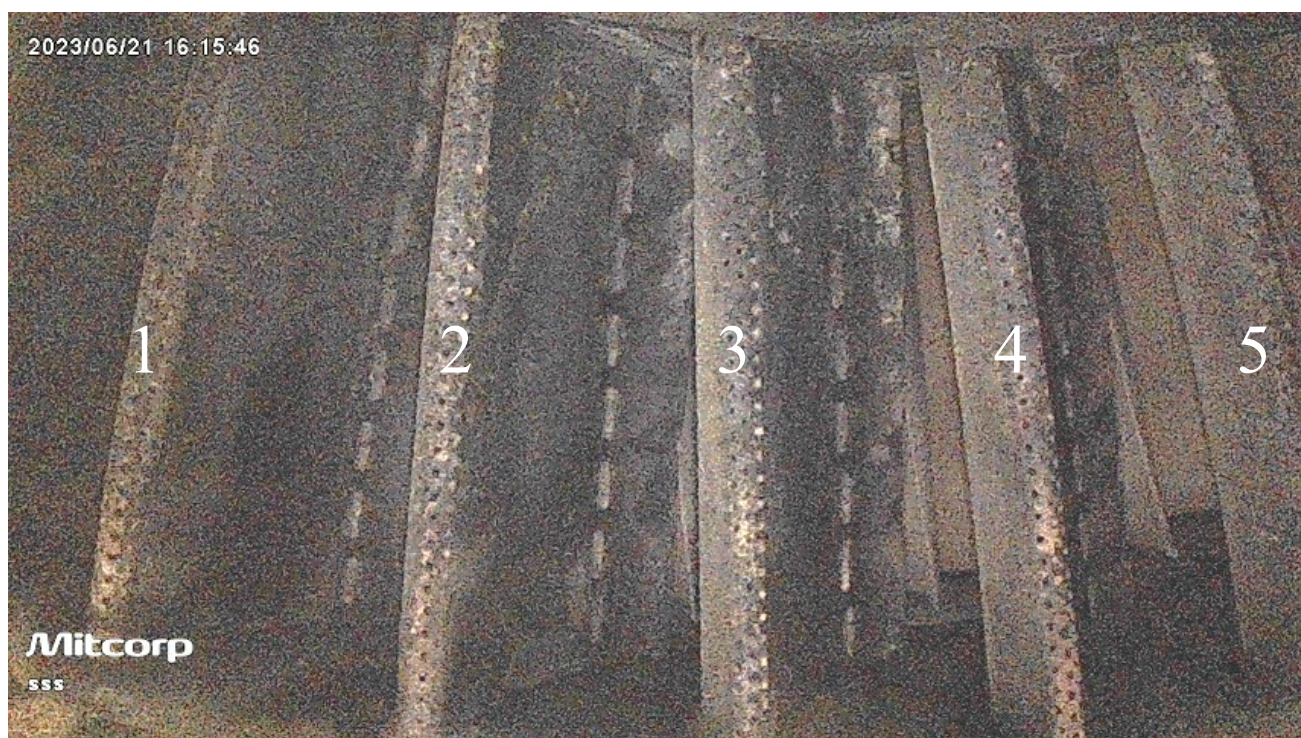


圖 2-1 燃燒室固定螺桿放大圖

合格



不合格

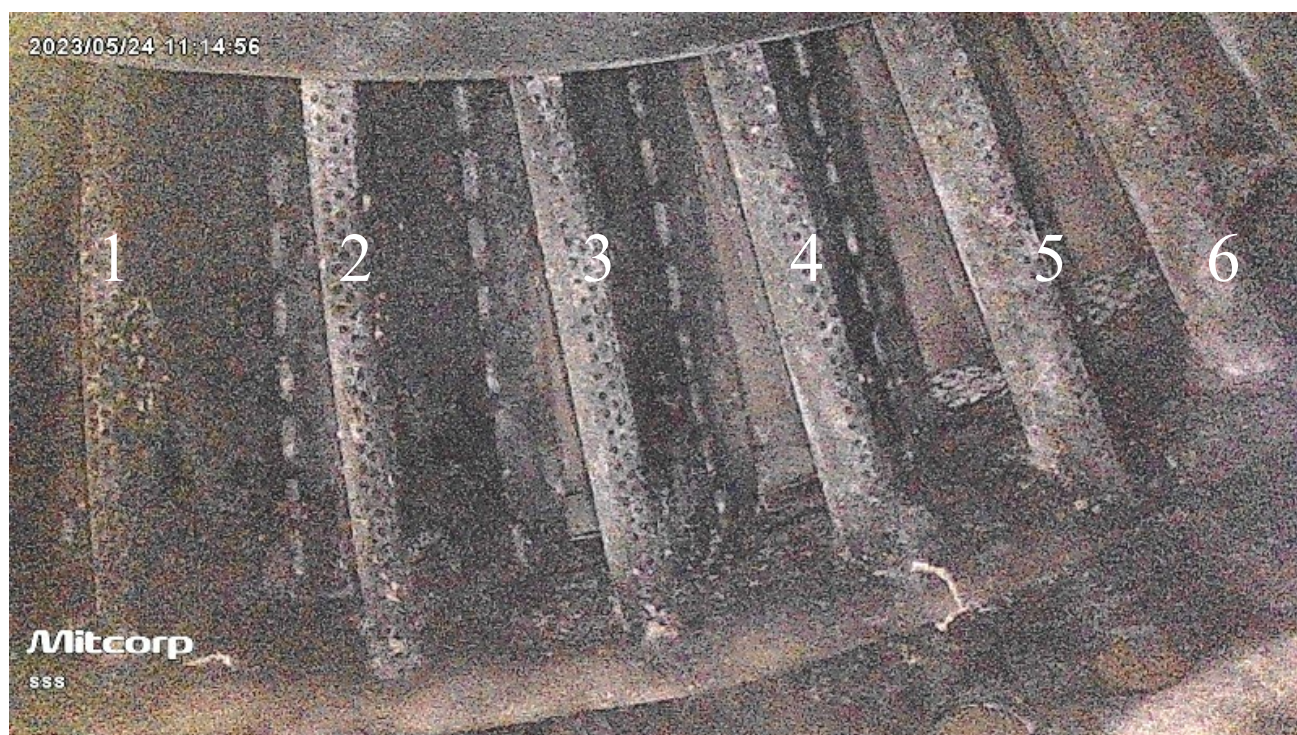


圖 2-2 燃燒室內至多 5 片渦輪葉片圖