第7章 HCU (Hydraulic Cylinder Unit) Function Test

每次吊完缸、换排氣閥、換油頭後,都必需執行該缸的 CCU(Cylinder Control Unit) Function Test.執行這項工作前,請先做放空氣的動作後,再執行 Function test.

首先請選擇如下: MOP→Maintenance→Function→ HCU→Cyl.1

- 一. Preparation of HCU Test (HCU 測試準備工作)
 - 按 Start,畫面會自動跳到下一格 1.Hydraulic & Fuel Pressure are Present(液壓油及燃油壓力是否已建立?) 確認顯示壓力後,請按右下方的 Done,這時在 Test Value 會出現 OK
 - (2) 畫面會自動跳到下一格 2.An assistant is standing by for listening to listening to fuel injection & shockwave?(是否有人在現場聽燃油噴射的 聲音?)確認都有人,請按右下方的 Done,這時在 Test Value 會出現 OK.

| Maintenar | ce 🕽 Function Test | 2012-10-10 | 07:24:21 | Alarms |
|-----------|---|----------------|---------------|----------------------|
| нс | U Tacho HPS | | | |
| Cylind | er: 1 2 3 4 5 6 7 8 | 9 10 | 11 12 | Engine |
| Prepara | ation of HCU Test | | <u>^</u> | |
| Start | Action/Message | Reference | Test Value | Auxiliaries |
| 1 | Hydraulic and Fuel Pressure are present | - | OK. | |
| 2 | An assistant is standing by for listening to fuel injection and shockwave | - | OK. | Maintenance) |
| Test of | FIVA-valve and calibration of Fuel Plunger | | | System View |
| Start | Action/Message | Reference | Test Value = | I/O Test |
| | Set CCU in test mode | Test | | Invalidated |
| | Make an injection and evaluate sound | - | | Inputs |
| | Verify Fiva position (CH-30) | 3.5 - 6.5 mA | | Network |
| | Verify fuel plunger position (CH-31) | 7.5 - 20.5 mA | | Status |
| | Verify Exhaust valve (CH-34) | 3.5 - 11.5 mA | | Function |
| | Open Exhaust valve and Evaluate sound | - | | Test |
| | Verify Fiva position (CH-30) | 17.5 - 20.5 mA | | Trouble- |
| | Verify fuel plunger position (CH-31) | 3.5 - 7.5 mA | | shoung |
| | Verify Exhaust valve (CH-34) | 12.5 - 20.5 mA | | Admin |
| | Save fuel plunger sensor calibration | - | ~ | |
| | | | | Power Off ① |
| | | Done | Abort Test | Access Chief |

二. Test of FIVA-valve & calibration of Fuel Plunger (測試油頭噴油)

- 按 Start 畫面會自動跳到下一格:1.Set CCU in test mode,此時在 Test Value 上顯示 Normal 模式,我們需要把它更改為 Test 模式.
- (2) 按右下方的 Reboot(這時會先出現 Slow down 警報)同時系統開始跑務等 一下後,這時 Test Value 位置會變成 Unknown,待系統跑完後在 Test Value 會出現 Test 模式
- (3) 畫面會自動跳到下一格:2.Make an injection & Exhaust Sound 按右下方的 Done,在 Test Value 會出現 OK 現場人員也會聽到油頭噴射的聲音.
- (4) 等系統跑完後,下列三格的 Test Value 位置,會出現電流值,需在參考值的 的範圍內.

| | Action Message | Reference | Test Value |
|---|-------------------------------------|-------------|----------------------|
| 3 | Verify FIVA position (CH-30) | 3.5-6.5 mA | <mark>4.7 mA</mark> |
| | Verify fuel plunger position(CH-31) | 7.5-20.5 mA | <mark>11.1 mA</mark> |
| | Verify Exhaust valve(CH-34) | 3.5-11.5mA | <mark>5.9 mA</mark> |

| Maintenar | nce 🕨 Function | Test | | | | | | | | | 201 | 2-10-10 | 07:24: | 21 | | Alarms |
|---|----------------|--------------|--------------------------|---------------|-----------|--------|---------|-------|---|---|---------|-----------------------|---------------|------------------|---------|-----------------------|
| нс | CU | Tacho | | HPS | | | | | | | | | | | | |
| Cylind | ler: 1 | 2 | 3 | 4 | 5 | ſ | | 7 | T | 8 | 9 | 10 | 11 | 1 | 2 | Engine |
| Prepar | ation of HCI | J Test | | | | | | | | | | | | | | |
| Start | | | | Action/M | essage | | | | | | Refe | rence | Test Va | lue | | Auxiliaries |
| 1 Hydraulic and Fuel Pressure are present | | | | | | | | | | | | - | OF | ب2 | | |
| | An assistant | is standing | g <mark>by for</mark> li | stening to fi | iel injec | tion a | nd shoc | kwave | | | | - | | | | Maintenance ▶ |
| Test of | FIVA-valve | and calik | oration | of Fuel Pl | unger | | | | | | | | | | | System View |
| Start | | | | Action/M | essage | | | | | | Refe | rence | Test Va | lue | = | no rest |
| - 8 | Set CCU in t | est mode | | | | | | | | | Т | est | Tes | <mark>t</mark> ∉ | | Invalidated |
| 2 | Make an inje | ction and e | evaluate | sound | | | | | | | · OK- | | | ter | | inputs |
| | Verify Fiva p | osition (CH | I-30) | | | | | | | | 3.5 - | 6.5 mA | 4.7 mA | | Network | |
| 3 | Verify fuel pl | unger posi | tion (CH | -31) | | | | | | | 7.5 - 2 | 0.5 mA | 11.1 (| <mark>mA.</mark> | | Status |
| | Verify Exhau | st valve (C | H-34) | | | | | | | | 3.5 - 1 | 3.5-11.5 mA 5.9 mA | | | | Function |
| | Open Exhaus | st valve and | d Evaluat | te sound | | | | | | | | 2 | | | | Test |
| | Verify Fiva p | osition (CH | l -30) | | | | | | | | 17.5- | 20.5 mA | | | | Trouble- |
| | Verify fuel pl | unger posi | tion (CH | -31) | | | | | | | 3.5 - | 7.5 mA | | | | shoung |
| | Verify Exhau | st valve (C | H-34) | | | | | | | | 12.5 - | 20.5 m <mark>A</mark> | | | | Admin |
| | Save fuel plu | inger senso | or calibra | ation | | | | | | | | - | | | ~ | |
| | | | | | | | / | | • | 6 | | _ (| | | | Power Off ① |
| | | | | | | | 1 | | Ì | | Done | | Abo | rt | | Access |
| | | | | | | | ` | | / | C | | | Tes | t |) | Chief |

- (5) 畫面會自動跳到下一格,4.Open Exhaust valve exhaust sound(聽排氣 關開啟的聲音)
- (6) 按右下方的 Reboot 請現場人員聽是否有排氣閥作動的聲音?
- (7) 待系統跑完後,下列三格的 Test Value 位置,會自動顯示電流值,需在 参考值的範圍內.

| | Action Message | Reference | Test Value |
|---|-------------------------------------|--------------|----------------------|
| 5 | Verify FIVA position (CH-30) | 17.5-20.5 mA | <mark>19.3 mA</mark> |
| | Verify fuel plunger position(CH-31) | 3.5-7.5 mA | <mark>6.0 mA</mark> |
| | Verify Exhaust valve(CH-34) | 12.5-20.5mA | <mark>13.9 mA</mark> |

- (8) 自動跳到下一格:6.Save fuel plunger sensor calibration(儲存資料)
- (9) 請在右下方按下 Save, 系統開始跑, 等跑完後, 在 Test Value 會顯示 OK.

| Maintenar | nce 🕨 Function | n Test | | | | | | | | | | | 201 | 2-10-10 | 07 | 1:24: | 21 | | Alarms |
|-----------|----------------|--------------|----------|---------|------------|----------|--------|--------|------|-----|---|----|---------|-----------------------|----|--------------------|-------------|---|----------------------|
| нс | CU I | Tacho | | | HPS | | | | | | | | | | | | | | |
| Cylind | ler: 1 | 2 | 3 | | 4 | ſ | 5 | 6 | T | 7 | 8 | | 9 | 10 | ſ | 11 | 1 | 2 | Engine |
| Prepara | ation of HCI | U Test | | | | | | | | | | | | | | | | | |
| Start | | | | A | ction/M | essag | e | | | | | | Refe | rence | | <mark>ok</mark> | . | | Auxiliaries |
| | Hydraulic an | nd Fuel Pre | ssure a | are pr | esent | | | | | | | | | - | | OK | . | | |
| | An assistant | is standing | g by for | lister | ning to fi | iel inje | ection | and sh | ockw | ave | | | | - | | | | | Maintenance) |
| Test of | FIVA-valve | and calik | oratio | n of l | Fuel Pl | unge | r | | | | | | | | | | | | System View |
| Start | | | | A | ction/M | essag | е | | | | | | Refe | rence | Т | est Va | lue | = | I/O Test |
| | Set CCU in t | est mode | | | | | | | | | | | Т | est | | <mark>Tes</mark> | t⊷ | | Invalidated |
| | Make an inje | ction and e | evaluat | e sou | nd | | | | | | | | | - | | oĸ | e. | | Inputs |
| | Verify Fiva p | osition (CH | I-30) | | | | | | | | | | 3.5 - | 6. <mark>5 mA</mark> | 4 | .7 <u>m</u> | A | | Network |
| | Verify fuel pl | unger posi | tion (C | H-31) | | | | | | | | | 7.5-2 | 0.5 mA | 1 | <mark>1.1 g</mark> | nA | | Status |
| | Verify Exhau | ist valve (C | H-34) | | | | | | | | | | 3.5 - 1 | 1.5 mA | 5 | .9 <u>m</u> | IA. | | Function |
| 4 | Open Exhaus | st valve and | d Evalu | iate so | ound | | | | | | | | | - | | <mark>ok</mark> | | | Test |
| | Verify Fiva p | osition (CH | I-30) | | | | | | | | | | 17.5 - | 20.5 mA | 1 | 9.3 <u>n</u> | ıA. | | Trouble- |
| 5 | Verify fuel pl | unger posi | tion (C | H-31) | | | | | | | | | 3.5 - | 7.5 mA | 6 | 5.0 <u>n</u> | <u>1A</u> . | | shooting |
| | Verify Exhau | ist valve (C | H-34) | | | | | | | | | | 12.5 - | 20.5 m <mark>A</mark> | 1 | <mark>3.9 n</mark> | nA. | | Admin |
| 6 | Save fuel plu | inger senso | or calil | oratio | n | | | | | | | | | - | | OK | 5 42 | ~ | |
| | | | | | | | | / | _ | - | _ | | | | | | | | Power Off ① |
| | | | | | | | | / | | | | Re | boo | t | ł | Abor | ·t | | Access |
| | | | | | | | | 1 | _ | -' | C | | | | _ | Test | t | J | Chief |

- **Ξ**. Cyclic test of Exh. valve and/or make single fuel injections
 - (1) 畫面會自動跳到下一格 1.Set CCU in test mode,此時在 Test Value 上 顯示 Normal 模式,我們需要把它更改為 Test 模式.按一下 Start
 - (2) 再按右下方的 Reboot, 數秒後 Test Value 顯示 Test 模式
 - (3) 畫面會自動跳到下一格 2. Start / Stop cyclic test of Exh. Valve & make single injections 這時可在左下方按 Start Exh. Valve 此時現場可聽到 排氣閥連續不斷的作動.這時再按下 Stop Exh. Valve,現場人員會回報, 排氣閥作動停止.
 - (4) 這時如按 Single injection,可問現場人員,油管是否震動一次,每按一次 噴油一次,確認油頭噴油正常後,可按右下方的 Done,這時在 Test Value 就會顯示 OK.

(因無適當之圖檔可擷取,下圖自行繪製)

| нс | U | Ta | cho | H | PS | | | | | | |
|----------|-------------|--------------|------------|--------------|-------------|---------------|----------|-------|-----------|-----|------------|
| Cyl. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| Cyclic | test of | f Exh. ` | Valve a | nd/or 1 | nake si | ngle fu | el injec | tions | | | |
| Start | | | Refer | ence | Test Value | | | | | | |
| 1 | Set (| CCU ir | ı test m | Te | st | Test | | | | | |
| 2 | Start | / Stop c | yclic test | | | OK | | | | | |
| End test | | | | | | | | | | | |
| Start | | | | Action | Messag | ge | | | Reference | | Test Value |
| 1 | Set (| CCU ir | n norma | al mod | e | | | | Nor | mal | |
| End | | | | | | | | | | | |
| | Sta Exh. | art valve | St Exh. | top valve | Sir Inje | ngle ction | | | Reboot | | Done |

四. End Test

- 以上動作完成後,畫面會自動跳到下一格 1.Set CCU in normal mode,此
 時在 Test Value 上顯示 Test 模式我們需要把它更改為 Normal 模式.
- (2) 按一下 Start 再按右下方的 Reboot,(又會出現 Slow down 警報) 這時 Test Value 位置會顯示 Unknown, 待系統跑完後在 Test Value 會顯示 Normal 模式.(測試完畢)

| НС | U | Ta | cho | H | PS | | | | | | |
|--------|---|--------------|-----------|---------------|-------------|---------------|---|---|-----------|-----|------------|
| Cyl. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| Cyclic | Cyclic test of Exh. Valve and/or make single fuel injections | | | | | | | | | | |
| Start | Start Action Message | | | | | | | | | | Test Value |
| 1 | Set (| CCU ir | ı test m | Te | st | Test | | | | | |
| 2 | Start / Stop cyclic test of Exh. Valve & make single injections | | | | | | | | | | ОК |
| End to | est | | | | | | | | | | |
| Start | | | | Action | Messag | ge | | | Reference | | Test Value |
| 1 | Set (| CCU ir | ı norma | al mod | e | | | | Nor | mal | Normal |
| End | | | | | | | | | | | |
| | St. Exh. | art valve | St Exh | top .valve | Siı Inje | ngle ction | | | Reb | oot | |

五. 完成以上的測試後, 請選擇如下畫面 Maintenance → Troubleshooting →
 Insulation 這時可發現剛才所做的第一缸 CCU1, 其 Noise Pulse Counter 歸
 零, 每個 CCU 做完 Function Test 其 Noise Pulse Counter 都會歸零.

| | Line | - | 2013-08-20 01:25:43 | | | | | | | |
|---------|-------------------|---------------------|---------------------|-------------------|---------------------|-------------|--|--|--|--|
| | nrs . | HCU Events | HPS Events | Insulation | | | | | | |
| Unit ID | Insulation [kOhm] | Noise Pulse Counter | Unit ID | Insulation (hOhm) | | - | | | | |
| ACU1 | Disabled | N/A | 0000 | msulation (konm) | Noise Pulse Counter | Engine | | | | |
| ACU2 | Disabled | NA | CCUI | Disabled | 0 | | | | | |
| ACU3 | Disabled | 10 | CCU2 | Disabled | 0 | Auxiliaries | | | | |
| ECUA | Disability | N/A | CCU3 | Disabled | 1644 | | | | | |
| FOUR | Disabled | N/A | CCU4 | Disabled | 1797 | Maintenanc | | | | |
| ECOR | Disabled | N/A | CCU5 | Disabled | 4155 | Surtan Vian | | | | |
| EICUA | Disabled | N/A | CCU6 | Disabled | 2556 | 1/0 Test | | | | |
| EICUB | Disabled | NA | CCU7 | Disabled | | | | | | |
| SCU1 | Disabled | N/A | CCU8 | Disabled | 4572 | Invalidated | | | | |
| | | | CCU9 | Disabled | 1079 | | | | | |