## 出國報告(出國類別:開會)

# 汰換臺北飛航情報區儀降系統案 107 年工廠驗收測試出國報告書

服務機關:飛航服務總臺

姓名職稱:劉建宏(工程司)、

彭文均(幫工程司)、

林偉翔(工務員)

派赴國家/地區:美國/堪薩斯

出國期間:107/04/28~107/05/09

報告日期:107/07/03

# 目錄

壹、	目的	1
〕〕	過 程	2
參、	工廠測試程序與結果	3
<u> </u>	LOCALIZER 2100 性能測試: (金門 06LOC 測試結果)	3
二、	GLIDESLOPE 2110 性能測試: (金門 06GP 測試結果)	43
Ξ·	DME 1118A 性能測試: (金門 06DME 測試結果)	65
肆、	心得及建議	84
伍、	附錄:花蓮 21LDA/DME 工廠測試文件	86
<u> </u>	花蓮 LOCALIZER 測試文件	
二、	花蓮 DME 測試文件	

## 壹、 目的

近年來飛航服務總臺所屬各機場的助導航設備 ILS/DME,已陸陸續續接近使用年限,總臺有鑑於過去各臺設備因汰換時間不同數量不一,採購得標廠商不同而有各式各樣型號的裝備,因而造成各臺無法技術交流及備份組件無法共用之窘境,也造成更多公帑的支出,為了確保各儀降設備工作正常,所以總臺為改善此一現象,計畫將目前逐年汰換之採購方式改成"一次採購,分年執行"來汰換各機場的 ILS/DME 設備,本年度供應商 SELEX 公司需架設嘉義機場 18 ILS/DME、金門機場 06 ILS/DME、及花蓮機場 21 LDA/DME,總臺在架裝前,將派員前往 SELEX 工廠進行裝備測試。

本次工廠測試目的在檢測將於 107 年度交貨的 LOC、GP、DME 之性能做詳細的測 試檢驗與觀察,以期架設時能夠順利與快速在合約所規定的範圍內經由嚴密的測試步 驟,詳加檢視每一個項目的結果並做紀錄,來為各臺所需之裝備把關,以免因誤差太 大而影響 ILS 性能,來確保本年度的合約能順利完成。

## 貳、 過 程

一、參與人員:

劉建宏/民用航空局飛航服務總臺/嘉義助航臺/工程司 彭文均/民用航空局飛航服務總臺/花蓮助航臺/幫工程司 林偉翔/民用航空局飛航服務總臺/金門助航臺/工務員

二、日期:民國一百零七年四月二十八日至一百零七年五月九日,共計十二日。 三、行程:

107年4月28日:搭乘長榮航空班機,由桃園國際機場飛往美國舊金山機場。

107年4月29日:抵達美國舊金山機場。

107年4月29日:搭乘美國聯合航空班機由舊金山機場至芝加哥機場,。

107年4月29日:搭乘美國聯合航空班機由芝加哥機場至堪薩斯機場。

107年4月30日~5月6日:開始於SELEX ES INC.進行工廠測試。

107年5月7日:搭乘美國聯合航空班機由堪薩斯機場至舊金山機場。

107年5月8日:搭乘長榮航空班機由舊金山機場至桃園國際機場。

107年5月9日:返抵桃園國際機場。



## 工廠測試程序與結果

#### -、 LOCALIZER 2100 性能測試: (金門06LOC測試結果)

- 1. Maintenance Alerts:檢視系統電壓電流值。
  - (1). On the PMDT select [RMS/Configuration/A/D Limits] and verify limits in the table provided below:

Parameter	Low Limit	High Limit
AC Input Volts	98 (196)	132 (264)
AC Input Current	1	7
TX#1-24V P.S. Volts	23.3	25.2
TX#1-24V P.S. Current	3	15
TX#2-24V P.S. Volts	23.3	25.2
TX#2-24V P.S. Current	3	15
Battery 1 Volts	21.5	30
Battery 1 Current	-6	10
Battery 2 Volts	21.5	30
Battery 2 Current	-6	10
+ 5V DC	4.80	5.20
+12V DC	11.75	13.25
- 12 V DC	-13.25	-11.75

(2). On the PMDT select [RMS/Data/A/D Data] and verify that there are no maintenance alerts. Record nominal value.

	Ins Data					Next (F5)	) Close (F	ADDIN 1971 (Reset 178)	
	lantenance Alets/Alen	A/D Da	to Digital	Inputs Ante	rma Faults				
Transmittere	05/02/18 07:59:57	Lo Lunit	Volts	H Lint		Lo Lmi	t Volts	Hilmi	
Tat Ta2	Spare A/D 1	-5.00	0.00	5.00					
B Man	Spare A/D 2	-5.00	0.00	5.00					
G Anterna	Spare A/D 3	-5.00	0.00		SUPC Montor 1	4 80	LASE	5.20	
Load in	Spare A/D 4	-5.00	0.00		12 VIIC Monitor 1	51 75	[1253]	12.25	
OF THE OF	Spare A/D 5	-5.00	0.00		UNIX Monthly 1	11/25	10.42	11.3	
Manada	Spare A/D 6	-5.00	0.00		JAVOC Meriter 1	22.3	24.0	26.3	
Integral Standby	Spare A/D 7	-5.00	0.00	5.00	+> VDC Monitor 2	4.80	485	520	
IG Nomel ID	Spare A/D 8	-5.00	0.00	5.00	+12 VDC Monitor 2	1175	112.50	13.05	
Alerty	Spare A/D 9	-5.00	0.00	5.00	12 VDC Maritor 2	-13.25	112.44	1175	
Bypass	Spare A/D 10	-5.00	0.00	5.00	+24 VDC Monitor 2	233	23.8	252	
		Lo Limit	Deg C	Hilimit		Inlint	Decc		
	Inside Temp	0	28	40	Outside Terrer				
		Lo Liest	Volta	Himt			hankak		
	AC Inout	58.0	[111.9	132.0		LD LITE	Amps	Hi Livit	
Int CRS Post R 000	OB Light		0.0			1.0	138	20	
In CRS Width 0155	Tx 1 - 24 V PS	23.3	24.D	25.2		3.0	180	20.0	
INKELR 1 0230	Tx 2 - 24 V PS	23.3	24.0	25.2		3.0	181	150	
Int ELB 2 0,255	Battery 1	21.5	29.6	30.0		-60	100	10.0	
	Bettery 2	21.5	29.6	30.0		-6.0	100	10.0	
					D				
									H
Ready					CAP NUM Level	3 52 C3		05/02/18 07:59-57	

(2)

Parameter	Low Limit	High Limit	Nominal Value
AC Input Volts	98 (196)	132 (264)	115.6
AC Input Current	1	7	3.6
TX #1 - 24 V P.S. Volts	23.3	25.2	24.
TX #1 - 24 V P.S. Current	3	15	8.0
TX #2 - 24 V P.S. Volts	23.3	25.2	24.0
TX #2 - 24 V P.S. Current	3	15	7.6
Battery 1 Volts	21.5	30	>7:8
Battery 1 Current	-6	10	0.0
Battery 2 Volts	21.5	30	28.1
Battery 2 Current	-6	10	0
+ 5V DC Monitor #1	4.80	5.20	4.86
+12V DC Monitor #1	11.75	13.25	12,52
- 12 V DC Monitor #1	-13.25	-11.75	-12.44
+24V DC Monitor #1	23.3	25.2	23.9
+ 5V DC Monitor #2	4.80	5.20	4.88
+12V DC Monitor #2	11.75	13.25	12,50
-12V DC Monitor #2	-13.25	-11.75	-12.49
+24V DC Monitor #2	23.3	25.2	24.1

#### 2. Power On/Off Indications: 檢視AC、DC電源開關狀態。

Observe the Localizer front panel for correct indications of:

- (1). TX #1 AC power Indication on/off. Check if OK.
- (2). TX #1 DC power indication on/off. Check if OK.
- (3). TX #2 AC power indication on/off. Check if OK.
- (4). TX #2 DC power indication on/off. Check if OK.



- (1) TX #1 AC Power Indicator
- (2) TX #1 DC Power Indicator
- (3) TX #2 AC Power Indicator
- (4) TX #2 DC Power Indicator

✓ Check if OK
 ✓ Check if OK
 ✓ Check if OK
 ✓ Check if OK

#### 3. Transmitter RF Control: 確認CRS和CLR發射機控制功能。

- (1). Log on to the PMDT with level 3 security password in Local Control Mode. Enter the amplifier assembly number for each corresponding amplifier that is installed on the system under the dropdown box in thePMDT/Transmitter/Configuration/Transmitter\_ screen. Save the configuration under PMDT/RMS/ConfigBackup.
- (2). Using the PMDT transmitter control window, turn the Course and Clearance RF on and off and observe Wattmeter. Check if OK.

System RMS Monitors	Monitor 1 Monitor 2 Transmitters Diagnostics	rer - LEONARDO PMDT Info	propatibility Mode) - Micro.	
	Concerting in a sector of the sector of	Prest29 Denergy result () result ()     Prest29 Denergy      Prest2		
	Free Colores and C	AP TOM Levit ICI		

(3). Repeat steps 1 and 2 for Transmitter 2.

TX1TX2(2)Course Transmitter On/Off Control✓✓(2)Clearance Transmitter On/Off Control✓✓(2)Clearance Transmitter On/Off Control✓✓

#### 4. Radio Frequency and RF Frequency Control:檢視CRS RF及CLR RF頻率正確性。

**SETUP**: Connect Frequency Counter to the course/clearance test points of assembly 012106 (TRU), **TP5** CLR LO and TRU, **TP13** CRS LO. Place transmitter 1 on standby.

- (1). Record Localizer channel frequency.
- (2). Measure the frequency of the Course channel RF and record.
- (3). Measure the frequency of the Clearance channel RF and record.
- (4). Record frequency difference.
- (5). Read frequency difference from the transmitter screen and record.
- (6). Repeat steps 3 thru 6 for Transmitter 2 with transmitter 2 placed on standby.



- (1) S1 Switch Setting: (6 5 4 3 2 1): Enter Setting
- (2) Localizer Channel Frequency
- (3) Meas. CRS Freq. (Channel +4 kHz) A15A3 J4
- (4) Meas. CLR Freq. (Channel -4 kHz) A15A3 J1
- (5) Measured Frequency Difference
- (6) Indicated Frequency Difference
- (3) Meas. CRS Freq. (Channel +4 kHz) A15A3 J4
- (4) Meas. CLR Freq. (Channel -4 kHz) A15A3 J1
- (5) Measured Frequency Difference
- (6) Indicated Frequency Difference

00/000 108.9 MHz

TX1  $108.90380\pm 0.001\%$   $108.893805\pm 0.001\%$  8070 (7500Hz to 8500Hz) 8070 (7500Hz to 8500Hz)

TX2  $1 \otimes \underline{9375} (\pm 0.001 \%)$   $1 \otimes \underline{89575} (\pm 0.001\%)$   $\underline{8000} (7500 \text{Hz to 8500 \text{Hz}})$  $\underline{8000} (7500 \text{Hz to 8500 \text{Hz}})$ 

# 5. CRS CSB Reflected Power and VSWR:檢視CRS CSB順向功率及反相功率,並計算VSWR。

- (1). Read CRS CSB Forward Power on Wattmeter and record.
- (2). Read CRS CSB Reflected Power on Wattmeter and record.
- (3). Calculate VSWR using VSWR formula and record.
- (4). Repeat steps 1 thru 3 for Transmitter 2.



		TX1	TX2
(1)	CRS CSB forward power	15.0	15.º Record
(2)	CRS CSB reflected power	0-0	0.0 Record
(3)	CRS CSB VSWR (calculated)	1.00:1	1.00 :/ Record

- 6. CRS SBO Reflected Power and VSWR: 檢視CRS SBO順向功率及反相功率,並 計算VSWR。
  - (1). Read CRS SBO Forward Power on Wattmeter and record.
  - (2). Read CRS SBO Reflected Power on Wattmeter and record.
  - (3). Calculate VSWR using VSWR formula and record.
  - (4). Repeat steps 1 thru 3 for Transmitter 2.



- (1)CRS SBO forward powerTX1TX2(2)CRS SBO reflected power0, 20, 2Record0000Record
- (3) CRS SBO VSWR (calculated)
  - 7. CLR CSB Reflected Power and VSWR: 檢視CLR CSB順向功率及反相功率,並計算VSWR。

1=1

12

0

1=

/= / Record

12

0

1:

Record

Record

Record

- (1). Read CLR CSB Forward Power on Wattmeter and record.
- (2). Read CLR CSB Reflected Power on Wattmeter and record.
- (3). Calculate VSWR using VSWR formula and record.
- (4). Repeat steps 1 thru 3 for Transmitter 2.



## CLR CSB forward power CLR CSB reflected power

- (3) CLR CSB VSWR (calculated)
  - 8. CLR SBO Reflected Power and VSWR: 檢視CLR SBO順向功率及反相功率,並計算VSWR。
    - (1). Read CLR SBO Forward Power on Wattmeter and record.
    - (2). Read CLR SBO Reflected Power on Wattmeter and record.
    - (3). Calculate VSWR using VSWR formula and record.
    - (4). Repeat steps 1 thru 3 for Transmitter 2.



		TX1	TX2
(1)	CLR SBO forward power	0.2	0.2 Record
(2)	CLR SBO reflected power	0	Record
(3)	CLR SBO VSWR (calculated)	1=1	1:1 Record

- **9. RF Power Metering**:檢視面板量測功率與PMDT顯示功率之誤差值及波形正確性。
  - (1). Measure the Main Course CSB Forward power reading on the Wattmeter Display and record.
  - (2). On the PMDT, select [Transmitters / Data / Wattmeter Data] and record the internal CSB forward power reading. Verify the reading is within ± 4 % of the Wattmeter reading.
  - (3). Verify the Course CSB waveform is available at the front panel Wattmeter Test jack. Check if OK.
  - (4). Repeat steps 1 thru 3 for the remainder of the readings requested on the data sheets.







Wattmeter Functions:

	CRS Transmitter		
(1.2)	Main CSB F Pwr Reading Accuracy	Wm 15	Int $15 (Wm + 40/2)$
(3)	Main CSB F Pwr Select and Waveform		$\frac{1}{1000} (\text{win} \pm 470)$
(1,2)	Main CSB R Pwr Reading Accuracy	Wm Q	Int $O$ (Wm + 40%)
(3)	Main CSB R Pwr Select and Waveform		$\frac{1}{1000} \frac{1}{1000} \frac{1}{1000$
(1.2)	Main SBO F Pwr Reading Accuracy	Wm 0.2	Int $\rho_{c} \geq \rho_{c}^{2}$ (Wm + 4%)
(3)	Main SBO F Pwr Select and Waveform		$\frac{1}{10000000000000000000000000000000000$
(1.2)	Main SBO R Pwr Reading Accuracy	Wm D	Int $\mathcal{O}$ (Wm + 4%)
(3)	Main SBO R Pwr Select and Waveform	<u>.</u>	$\boxed{M} Check if OK$
(1.2)	Stby CSB Pwr Reading Accuracy	Wm 15	Int $15$ (Wm + 4%)
(3)	Stby CSB Pwr Select and Waveform		$\overline{\mathbf{M}}$ Check if OK
(1,2)	Stby SBO Pwr Reading Accuracy	Wm 0.2	Int $0.204$ (Wm + 4%)
(3)	Stby SBO Pwr Select and Waveform		Check if OK
	CLR Transmitter		
(1.2)	Main CSB F Pwr Reading Accuracy	Wm 1>	Int $1 \ge (Wm + 4\%)$
(3)	Main CSB F Pwr Select and Waveform		$\mathbb{M}$ Check if OK
(1,2)	Main CSB R Pwr Reading Accuracy	Wm O	Int $\mathcal{O}$ (Wm $\pm 4\%$ )
(3)	Main CSB R Pwr Select and Waveform		Check if OK
(1,2)	Main SBO F Pwr Reading Accuracy	Wm 0.~	Int $0.207$ (Wm $\pm 4\%$ )
(3)	Main SBO F Pwr Select and Waveform		Check if OK
(1,2)	Main SBO R Pwr Reading Accuracy	Wm O	Int $O$ (Wm $\pm 4\%$ )
(3)	Main SBO R Pwr Select and Waveform		Check if OK
(1,2)	Stby CSB Pwr Reading Accuracy	Wm 1>	Int $\boxed{12}$ (Wm ± 4%)
(3)	Stby CSB Pwr Select and Waveform		Check if OK
(1,2)	Stby SBO Pwr Reading Accuracy	Wm_0.2	Int $0.205$ (Wm ± 4%)
(3)	Stby SBO Pwr Select and Waveform		Check if OK
1(	CPS System Spurious Emissions · E	影测CPC 脑室2 尔默波马·	3. 办 抛 油 早 不 符 今 栖

#### 10. CRS System Spurious Emissions:量測CRS頻率2次諧波及3次諧波是否符合標 準。

SETUP : Connect a Spectrum Analyzer to the output of the CRS CSB attenuator.

- (1). Set CRS 90 and 150 Hz modulation off.
- (2). Set CRS keying off.
- (3). Set spectrum analyzer to carrier signal. Note level in dBm. Set span to 1MHz, step to manual and

enter center frequency.

(4). Measure and compare the second and third harmonics to the carrier frequency. Record the frequency and amplitude difference, with respect to the carrier level in dB (dBc), of each harmonic.



(5). Verify with the spectrum analyzer that from 0 Hz to 500 MHZ, no spurs are larger than -60dBC. Check if OK.



(6). Remove spectrum analyzer from system.

- (7). Set 90/150 Hz modulation and keyer on to return system to normal.
- (8). Repeat steps 1 thru 7 for Transmitter 2.

	TX1	Frequency	Level
(3)	Fundamental	108.9 MHz	Record
(4)	Second Harmonic	217.8 MHz	$-7^{2} < -60  dBC$
	Third Harmonic	3-6.7 MHz	-82 < -60  dBC
(5)	No spurious output greater than -60 dBC	/	Check if OK
	TX2	Frequency	Level
(3)	Fundamental	108.9 MHz	Record
(4)	Second Harmonic	217.8 MHz	-7 > < -60  dBC
	Third Harmonic	326.7 MHz	-82 < -60  dBC
(5)	No spurious output greater than -60 dBC		Check if OK

11. CLR System Spurious Emissions:量測CLR頻率2次諧波及3次諧波是否符合標準。

**SETUP** : Connect a Spectrum Analyzer to the output of the CLR CSB attenuator.

- (1). Set CLR 90 and 150 Hz modulation off.
- (2). Set CLR keying off.
- (3). Set spectrum analyzer to carrier signal. Note level in dBm. Set span to 1MHz step to manual and enter center frequency.
- (4). Measure and compare the second and third harmonics to the carrier frequency. Record the frequency and amplitude difference, with respect to the carrier level in dB (dBc), of each harmonic.
- (5). Verify with the spectrum analyzer that from 0 Hz to 500 MHZ, no spurs are larger than -60dBC. Check if OK.
- (6). Remove spectrum analyzer from system.
- (7). Set 90/150 Hz modulation and keyer on to return system to normal.
- (8). Repeat steps 1 thru 7 for Transmitter 2.

	TX1	Frequency	Level
(3)	Fundamental	108.9 MHz	O Record
(4)	Second Harmonic	217.8 MHz	-73.2<-60 dBC
	Third Harmonic	326-7 MHz	-8 ~~ -60 dBC
(5)	No spurious output greater than -60 dBC		Check if OK
	TX2	Frequency	Level
(3)	Fundamental	108.9 MHz	Record
(4)	Second Harmonic	217.8 MHz	-73 < -60  dBC
	Third Harmonic	326.7 MHz	-80.1<-60 dBC
(5)	No spurious output greater than -60 dBC		Check if OK

- **12.** CRS Carrier Signal at Sideband Output: 用頻譜分析儀量測CRS CSB及CRS SBO 於carrier level之差是否符合標準。
- SETUP : 1. Disable transmission and disconnect the CRS CSB feed cable and connect Spectrum Analyzer to CRS

CSB output using a 30-dB attenuator.

- 2. Find Station Frequency.
- 3. Set Center Frequency.
- 4. Adjust Spectrum Analyzer to the following settings:

Span 2 KHz	RBW 30 Hz
VBW 30 Hz	SWP 2.5 Sec
Atten 10dB	



(1). Measure the CRS CSB carrier level and set marker on spectrum analyzer to marker zero.



(2). Disable transmission, place the CRS CSB feed cable back to the normal position, and place the 30 dB attenuator and spectrum analyzer on the CRS SBO output. Measure and record the reading.





- (3). Repeat steps 1 and 2 for Transmitter 2.
- (4). Place the system back to the normal state.
- (2) CRS carrier signal at sideband output
  - **13.** CLR Carrier Signal at Sideband Output: 用頻譜分析儀量測 CLR CSB 及 CLR SBO 於 carrier level 之差是否符合標準。

TX1 -78.4 TX2 -7/5<-30 dBC

- **SETUP**: 1. Disable transmission and disconnect the CLR CSB feed cable and connect Spectrum Analyzer to CLR CSB output using a 30-dB attenuator.
  - 2. Find Station Frequency.
  - 3. Set Center Frequency.
  - 4. Adjust Spectrum Analyzer to the following settings:

Span 2 KHz	<i>RBW 30 Hz</i>
VBW 30 Hz	SWP 2.5 Sec





(1). Measure the CLR CSB carrier level and set marker on spectrum analyzer to marker zero.



(2). Disable transmission, place the CLR CSB feed cable back to the normal position, and place the 30 dB attenuator and spectrum analyzer on the CLR SBO output. Measure and record the reading.



- (3). Repeat steps 1 and 2 for Transmitter 2.
- (4). Place the system back to the normal state.

(2) CLR carrier signal at sideband output





#### 14. LO Outputs:量測CRS LO及CLR LO的輸出功率。

- (1). Connect Power Meter to the cable feeding into J4 on the TRU.
- (2). Measure and record the CRS LO output power.
- (3). Connect Power Meter to the cable feeding into J1 on the TRU.
- (4). Measure and record the CLR LO output power.
- (5). Repeat steps 1 thru 4 for Transmitter 2.



- TX1TX2(2)CRS LO Output Power $\frac{8.6}{8.6}$  $\frac{8.7}{8.6} \ge 6.3 \text{ mW}$  but  $\le 63.1 \text{ mW}$ (4)CLR LO Output Power $\frac{8.6}{8.6}$  $\frac{8.7}{8.6} \ge 6.3 \text{ mW}$  but  $\le 63.1 \text{ mW}$ 
  - **15.** CRS Modulation Balance Adjustment: 調整CRS Modulation Balance, 並確認外部 PMDT與內部PIR監測的Centerline DDM 是否在標準內。
- SETUP : Connect PIR to the RF Sample port located on the front panel of the RF Monitor. Select CRS CSB on the LCU wattmeter. Turn off CRS SBO Power.
  - (1). On the PMDT, select [Transmitter / Waveforms / Waveform 1] to change the DDM settings.

(2). Adjust the Course CSB Carrier Power Level to 15 Watts, SDM to 40%, and DDM to 0.000 and Apply.



(3). On the PMDT, select [Monitor 1 / Data / Integral] and record the external Course Centerline DDM reading for each of the DDM settings.



(4). On the PIR, record the internal DDM reading for each of the DDM settings.



(5). Repeat steps 1 thru 4 for Transmitter 2.

DDM setting	External	Internal	Tolerance
0.000	0	0	S (standard)
0.015	0.015	0-015	$S + 0.015 \pm 0.002$
0.030	0.030	0.030	$S + 0.030 \pm 0.004$
-0.015	-0.016	-0.016	$S - 0.015 \pm 0.002$
-0.030	- 0.03	-0.031	$S - 0.030 \pm 0.004$
At 40% SDM (Nom	inal Modulation Setting)		
At 40% SDM (Nom DDM setting	inal Modulation Setting) External	Internal	Tolerance
At 40% SDM (Nom DDM setting 0.000	inal Modulation Setting) External	Internal Ø	Tolerance S (standard)
<u>At 40% SDM (Nom</u> DDM setting 0.000 0.015	$\frac{\text{Inal Modulation Setting}}{\frac{\wp}{\wp - \wp i \zeta}}$	Internal 0 0.015	$\frac{\text{Tolerance}}{S \text{ (standard)}}$ $\frac{S + 0.015 \pm 0.002}{S + 0.015 \pm 0.002}$
At 40% SDM (Nom DDM setting 0.000 0.015 0.030	$\frac{\text{External}}{\frac{0}{0.030}}$	<u>Internal</u> 0 0.075 0.030	$\frac{\text{Tolerance}}{\text{S (standard)}}$ S + 0.015 ± 0.002 S + 0.030 ± 0.004
At 40% SDM (Nom DDM setting 0.000 0.015 0.030 -0.015	$\frac{\text{Inal Modulation Setting}}{\frac{0}{0.030}}$	<u>Internal</u> 0 0.075 0.030 -0.016	$\frac{\text{Tolerance}}{\text{S (standard)}} \\ \text{S + 0.015 \pm 0.002} \\ \text{S + 0.030 \pm 0.004} \\ \text{S - 0.015 \pm 0.002} \\ \end{array}$

# 16. CRS Nav Tones Audio Frequency:用計頻器量測CRS音頻90Hz及150Hz是否正確。

#### SETUP : 1. Connect frequency counter to the Detected port located on the front panel of the RF Monitor. 2. Select CRS CSB on the LCU wattmeter.





- (1). Turn only 90 Hz modulation on.
- (2). Record external reading from frequency counter.



- (3). Turn only 150 Hz modulation on.
- (4). Record external reading from frequency counter.



(5). Repeat steps 1 thru 4 for Transmitter 2.

		TX1	TX2	External
(2)	90 Hz frequency	90	90	$90 \pm 1\% (0.90 \text{ Hz})$
(4)	150 Hz frequency	150	150	$150 \pm 1\% (1.50 \text{Hz})$

- 17. CLR Nav Tones Audio Frequency:用計頻器量測CLR音頻90Hz及150Hz是否正確。
- **SETUP**: 1. Connect frequency counter to the Detected port located on the front panel of the RF Monitor.

2. Select CLR CSB on the LCU wattmeter.

<image>



- (1). Turn only 90 Hz modulation on.
- (2). Record external reading from frequency counter.



- (3). Turn only 150 Hz modulation on.
- (4). Record external reading from frequency counter.



(5). Repeat steps 1 thru 4 for Transmitter 2.

(2) (4)	<ul> <li>90 Hz frequency 150 Hz frequency</li> <li>18. Integral Monitor Voting Logic : 常。</li> </ul>		TX1 90 150	TX2 90 150	<u>External</u> 90 ± 1% (0.90 Hz) 150 ±1% (1.50 Hz)
			驗證監視邏輯放	除AND及OR	狀態下是否運作正

SETUP : Station Operating Normally

1. On the PMDT, select [Monitors/Configuration/Integral] and set the alarm limits as shown in the

following table:

Integral Alarm Limits					
Parameter Alarm Low	Alarm High				
Course					
Centerline RF Level	80%	85%	115%	120%	
Centerline DDM	-0.004	-0.003	0.003	0.004	
Centerline SDM	36%	37%	43%	44%	
Ident Mod Percent	6.0%	6.5%	9.5%	10.0%	
Width DDM	0.140	0.144	0.166	0.170	

Cont/Lack Ident	dent 17 N/A N/A		N/A	N/A	
Clearance					
Centerline RF Level	80%	85%	115%	120%	
CLR 1 DDM	0.235 (*)	0.240 (*)	0.280 (*)	0.285 (*)	
Centerline SDM	36%	37%	43%	44%	
Ident Mod Percent	6.0%	6.5%	9.5%	10.0%	
CLR 2 DDM	0.280 (*)	0.285 (*)	0.325 (*)	0.330 (*)	

\* If connected to a DU/CU the values should CLR 1 and 2 alarm values should be  $\pm$  0.025 DDM from the nominal and prealarm values should be  $\pm$  0.020 DDM from the nominal.

2. On the PMDT, in the [RMS / Configuration/General] screen, verify the Monitor Voting Logic is set to the AND configuration.

- On the PMDT, select [Monitor 1/ Data / Status] and verify no alarms are shown for Monitor #1. Record.
- (2). On the PMDT, select [Monitor 2 / Data / Status] and verify no alarms are shown for Monitor #2. Record.
- (3). Set the Local/Remote switch on the transmitter front panel to the Remote position.
- (4). On the PMDT, select [Monitors / Commands / Integral Monitor Bypass / On] and verify a bypass indication is indicated for the Integral Monitor in the Monitors Status group at the left of the PMDT screen. Also verify the transmitter front panel Bypass light illuminates for the Integral Monitor.
- (5). Set the Local/Remote switch on the front panel to the Local position. Press the Integral Monitor Bypass button on the transmitter front panel and verify the Bypass is removed.
- (6). Remove all monitor bypass conditions.
- (7). On the PMDT, select [Monitor 1 / Offsets and Scale Factors / Integral] and set the CRS Centerline SDM Scale Factor to 0. This should result in an alarm condition for Monitor 1.



- (8). Verify the transmitter front panel Integral Monitor 1 alarm light is illuminated.
- (9). On the PMDT, select [RMS /Status/Monitor/Transmitter Status] and verify an Integral Monitor Mismatch indication.
- (10). Verify the station continues to operate in this condition.



- (11). On the PMDT, select [Monitor 2 / Offsets and Scale Factors / Integral] and set the Path SDM Scale Factor to 0. This should result in an alarm condition for Monitor 2.
- (12). Verify the transmitter front panel Integral Monitor 2 alarm light is illuminated and the station transfers and shuts down. This confirms the Monitor AND function.
- (13). Place the Integral Monitor in Bypass and reset the Offset for Monitor 2 to the normal condition. Restart the station. This should result in a normal indication for Monitor 2. Monitor 1 should remain in alarm.
- (14). On the PMDT, in the [RMS / Configuration / General] screen, set the Monitor Voting Logic to the OR configuration.
- (15). Remove the Integral Monitor Bypass. The station should immediately transfer and shut down. This confirms the Monitor OR function.
- (16). Bypass the Integral Monitor and reset the SDM Scale Factors for Monitors 1 and 2 to their normal values.
- (17). On the PMDT, in the [RMS / Configuration / General] screen, reset the Monitor Voting Logic to the AND configuration.
- (18). Restart the station. Normal operation with no monitor alarms should be indicated.

(1)	Monitor #1 Normal Indication	Check if OK
(2)	Monitor #2 Normal Indication	Check if OK
(4)	Integral Monitor Bypass Function	Check if OK
	Integral Monitor bypass light	Check if OK
(5)	Integral monitor bypass removed	Check if OK
(8)	Integral monitor 1 alarm	Check if OK
(9)	Integral Monitor Mismatch indication	Check if OK
(10)	Station operational w/mon 1 alarm	Check if OK
(12)	Integral monitor 2 alarm/station transfer/	
	Shut down (monitor "and" function)	Check if OK
(15)	Station transfer /shut down (Monitor	
	"OR" Function)	Check if OK

19. Integral and Standby Monitor Alarms: 驗證Monitor各參數於超過High Alarm與

Low Alarm上時,是否正常顯示告警。

SETUP : System Operating Normal Place all Bypass switches to ON.

- (1). On the PMDT, select [Monitor 1 / Data / Integral] and verify no alarms are shown for Monitor #1 and that the CRS Centerline DDM Value is 0.000 + 0.001. Check if OK.
- (2). On the PMDT, select [Monitor 1 / Data / Standby] and verify no alarms are shown for Monitor #1 and that the CRS and CLR Centerline DDM Value is 0.000 + 0.001. Check if OK.
- (3). On the PMDT, select [Monitor 2 / Data / Integral] and verify no alarms are shown for Monitor #2 and that the CRS Centerline DDM Value is 0.000 +0.001. Check if OK.
- (4). On the PMDT, select [Monitor 2 / Data / Standby] and verify no alarms are shown for Monitor #2 and that the CRS and CLR Centerline DDM Value is 0.000 +0.001. Check if OK.
- (5). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS and CLR CSB RF Levels down to cause the integral monitor to go into alarm.
- (6). On the PMDT, select [Monitor 1 / Data / Integral] and confirm a low alarm condition for the CRS and CLR RF Levels.
- (7). On the PMDT, select [Monitor 1 / Data / Standby] and confirm a low alarm condition for the CRS and CLR RF Levels.
- (8). Repeat Steps 6 and 7 for Monitor 2.
- (9). On the PMDT, select [Transmitters/Waveform/Waveform1]and adjust the CRS and CLR CSB RF Levels up to cause the integral monitor to go into alarm.
- (10). On the PMDT, select [Monitor 1 / Data / Integral] and confirm a high alarm condition for the CRS and CLR RF Levels.
- (11). On the PMDT, select [Monitor 1 / Data / Standby] and confirm a high alarm condition for the CRS and CLR RF Levels.
- (12). Repeat Steps 10 and 11 for Monitor 2.
- (13). Return CRS and CLR RF Levels to normal power.
- (14). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS and CLR CSB Mod Percent Values down to cause the integral monitor to go into alarm.
- (15). On the PMDT, select [Monitor1/Data/Integral] and confirm a low alarm condition for the CRS Centerline SDM.
- (16). On the PMDT, select [Monitor1/Data/Standby] and confirm a low alarm condition for the CRS Centerline SDM.
- (17). Repeat Steps 15 and 16 for Monitor 2.
- (18). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS and CLR CSB Mod Percent up to cause the integral monitor to go into alarm.
- (19). On the PMDT, select [Monitor1/Data/Integral] and confirm a high alarm condition for the CRS Centerline SDM.
- (20). On the PMDT, select [Monitor1/Data/Standby] and confirm a high alarm condition for the CRS Centerline SDM.

- (21). Repeat Steps 19 and 20 for Monitor 2.
- (22). Return the CRS and CLR CSB Mod Percent Values to nominal.
- (23). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS CSB Mod Balance Values down to cause the integral monitor to go into alarm.
- (24). On the PMDT, select [Monitor1/Data/Integral] and confirm a low alarm condition for the CRS Centerline DDM.
- (25). On the PMDT, select [Monitor1/Data/Standby] and confirm a low alarm condition for the CRS Centerline DDM.
- (26). Repeat Steps 24 and 25 for Monitor 2.
- (27). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS CSB Mod Balance Values up to cause the integral monitor to go into alarm.
- (28). On the PMDT, select [Monitor1/Data/Integral] and confirm a high alarm condition for the CRS Centerline DDM.
- (29). On the PMDT, select [Monitor1/Data/Standby] and confirm a high alarm condition for the CRS Centerline DDM.
- (30). Repeat Steps 28 and 29 for Monitor 2.
- (31). Return the CRS CSB Mod Balance Values to nominal.
- (32). 32. On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS and CLR SBO RF Level Values down to cause the integral monitor to go into alarm.
- (33). On the PMDT, select [Monitor1/Data/Integral] and confirm a low alarm condition for the CRS and CLR Width DDM.
- (34). On the PMDT, select [Monitor1/Data/Standby] and confirm a low alarm condition for the CRS and CLR Width DDM.
- (35). Repeat Steps 33 and 34 for Monitor 2.
- (36). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS and CLR SBO RF Level Values up to cause the integral monitor to go into alarm.
- (37). On the PMDT, select [Monitor1/Data/Integral] and confirm a high alarm condition for the CRS and CLR Width DDM.
- (38). On the PMDT, select [Monitor1/Data/Standby] and confirm a high alarm condition for the CRS and CLR Width DDM.
- (39). Repeat Steps 37 and 38 for Monitor 2.
- (40). Return the CRS and CLR SBO RF Level Values to Nominal.
- (41). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS and CLR Ident Mod Level Values down to cause the integral monitor to go into alarm.
- (42). On the PMDT, select [Transmitters, Commands, Loc Ident, Normal]. Select[Monitor1/Data/Integral] and confirm a low alarm condition for the CRS and CLR Ident Mod Level.
- (43). On the PMDT, select [Monitor1/Data/Standby] and confirm a low alarm condition for the CRS and

CLR Ident Mod Level.

- (44). Repeat Steps 42 and 43 for Monitor 2.
- (45). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS and CLR Ident Mod Level Values up to cause the integral monitor to go into alarm.
- (46). On the PMDT, select [Monitor1/Data/Integral] and confirm a high alarm condition for the CRS and CLR Ident Mod Level.
- (47). On the PMDT, select [Monitor1/Data/Standby] and confirm a high alarm condition for the CRS and CLR Ident Mod Level.
- (48). Repeat Steps 46 and 47 for Monitor 2.
- (49). Return the CRS and CLR Ident Mod Level Values to Nominal.
- (50). On the PMDT, select [Transmitters/Commands/Localizer Ident/Continuous].
- (51). On the PMDT, select [Monitor1/Data/Integral] and confirm that a continuous ident alarm appears.
- (52). On the PMDT, select [Monitor1/Data/Standby] and confirm that a continuous ident alarm appears.
- (53). Repeat Steps 51 and 52 for Monitor 2.
- (54). On the PMDT, select [Transmitters/Commands/Localizer Ident/Normal].
- (55). On the PMDT, select [Transmitters/Commands/Localizer Ident/Off].
- (56). On the PMDT, select [Monitor1/Data/Integral] and confirm that No Ident appears.
- (57). On the PMDT, select [Monitor1/Data/Standby] and confirm that No Ident appears.
- (58). Repeat Steps 56 and 57 for Monitor 2.
- (59). On the PMDT, select [Transmitters/Commands/Localizer Ident/Normal].
- (60). Restart the station. Normal operation with no monitor alarms should be indicated.



TAIWAN, KINAM	N RWY OF SDE SO MIN	Model	100 Dual CE	ciculizer a l	LONARDO PM	tor	
System HMS MON	North Address 1 Code		and the second	日前	Next (FS) (Occur)		
Construction of the second sec	Langer (Barrier Lange	and the Part St	and Maintenan	a Airda   Sun			
The set allow	Conversion from	Cause II	net Statum n Synthesizer Lock n Roverse Server Nachiner Lock	No Meet Food Status	Character Mert 9 October 5 per October 18 ct	tatus 500 Benarer Lock I mas Seran	n ident and Datus
Lost R	Course	-	L'and		And the second second	- Horen Inde	1
	Carteriore Di Levil	Lincola	1 80 10		1100	1.000	
ananges Storette	Contention SIDM	E MO	1 72.0		1.000	10004	CUM
ET North	Most Next Percent	6.0	45	0.0	1 26	10.0	-
Alam B	Weth DOM	0.140	0144	E 0,134	0.006	8170	DEM
11 SUL 0 SU	Chinese						
	FiF Lavid	1 40.0	10.0	1000	[ NIM P	[ I SHOW	
	Oestance 1 D.D.M	0.210	[ 0,215	Carpiel .	10.00	1.009	-
STATISTICS.	SCIM	36.0	2 10		438	0.2992	DOM
INCOME DISC.	Next Had Percent	611	65	0.0	96	10.0	-
MILLEI DZB	Odamice 2 DDM	19240	0.245	-	0.265	00	-
MAR1 1 6286	The state of the s			-	- Andrews	1 4 200	DDM
	Sur and Physics	7000	7710	220	1000	T-mann T-	

- (1) Integral Mon 1 CRS Centerline DDM Value
- (2) Standby Mon 1 CRS Centerline DDM Value
- Standby Mon 1 CLR Centerline DDM ValueIntegral Mon 2 CRS Centerline DDM Value
- (4) Standby Mon 2 CRS Centerline DDM Value Standby Mon 2 CLR Centerline DDM Value

V	Check	if OK
V	Check	if OK
V	Check	if OK
6	Check	if OK
V	Check	if OK
V	Check	if OK

Test Sten	Alarm	CRS/CLR -	Monitor Test (Check If OK)			
Test Step			INT 1	INT 2	STBY 1	STBY 2
(6,7,8)	RF Alarm Low	CRS				V
		CLR	V	~		
(10,11,12)	RF Alarm High	CRS				V
		CLR	$\checkmark$	V	V	V
(15,16,17)	Centerline SDM Alarm Low	CRS	V	V		V
		CLR	V			V
(19,20,21)	Centerline SDM Alarm High	CRS		V		V
		CLR		V		
(24,25,26)	Centerline DDM Alarm Low	CRS	$\checkmark$	V		V
		CLR	N/A	N/A	N/A	N/A
(28,29,30)	Centerline DDM Alarm High	CRS	V		V	~
		CLR	N/A	N/A	N/A	N/A
(33,34,35)	Width DDM Alarm Low	CRS	$\checkmark$		M	
		CLR	$\checkmark$		V	V
(37,38,39)	Width DDM Alarm High	CRS				
		CLR	V			
(42,43,44)	Ident Mod Alarm Low	CRS	Y		V	
		CLR			M	V
(46,47,48)	Ident Mod Alarm High	CRS	$\checkmark$		V	
		CLR	V		М	
(51,52,53)	Continuous Ident Timeout	1. Sec. 1997. 23				V
(56,57,58)	No Ident Timeout		V			

#### **20.** Integral Monitor Reverse Sensing Alarms:於CRS CSB及CLR CSB加入180度線, 並檢視Monitor Width DDM使否發生反相。

SETUP : System operation normal

(1). Remove the Integral CRS CSB feed line and add 180 deg. Line section and reconnect.



(2). Observe on the PMDT the CRS width monitor reads approx. -0.155 DDM 90Hz.



- (3). Confirm the monitor shows a reverse sensing alarm.
- (4). Remove system from bypass and confirm a hard shutdown.
- (5). Confirm there is an alarm on monitor 2.
- (6). Return the system to normal.
- (7). Remove the Integral CLR CSB feed line and add 180 deg. Line section and reconnect.



(8). Observe on the PMDT the CLR 1 width monitor reads approx. -0.260 DDM.



	Integral Standby			
Alert Y Local	04	/30/18 14:07:33	04/30/18 14:07:34	
Transmitters	Course .	- Monitor 1-	Monitor 2	
Tx1 Tx2	Centerline RF Level	100.6	100.4	
G Antenna	Centerline DDM	10.000	0.001	
Load 6	Centerline SDM	140.01	40.0	
Off	Ident Mod Percent	0.0	0.01	
Monitors	Width DDM	0.1154	0,154	
Normal 15	Ident Status	No Ident	No Ident	
Alarm	Synth Lock / Rev Sense		ГГ	
Y Bypass M	Clearance			
	RF Level			
	Clearance 1 DDN	-0.224	-0.224	
	SDM			
Int CBS Pos	Ident Mod Percent	100 marilin		
Int CRS Width 0.15	Gearance 2 DD1	-0,244	-0.245	
Int CLR 1 -0.22	dent Status	No Ident	No Ident	
Int CLR 2 -0.24	44 Synth Lock / Rev Sens	e 🗍 🖪		

- (10). Confirm the monitor shows a reverse sensing alarm.
- (11). Remove system from bypass and confirm a hard shutdown.
- (12). Confirm there is an alarm on monitor 2.
- (13). Return the system to normal.

#### CRS TX

- (2) CRS Width DDM
- (3) Monitor indicates reverse sensing alarm
- (4) Hard shutdown
- (5) Alarm on monitor 2

#### CLR TX

- (7) CLR 1 Width DDM
- (8) CLR 2 Width DDM
- (9) Monitor indicates reverse sensing alarm
- (10) Hard shutdown
- (11) Alarm on monitor 2

- $v_e 156$  Approx -0.155 DDM Check if OK Check if OK Check if OK

-0,734 Approx -0.260 DDM Check if OK Check if OK Check if OK

#### 21. Monitors Certification and Certification Limits: 测試監視自我驗證功能是否正常。

#### SETUP : System Operation Normal

- (1). On the PMDT, log-on at Level 3 Password. Select the [RMS / Configuration / General].
- (2). Disable Monitor Certification.
- (3). On the PMDT, select [Monitor 1 / Data /] and verify the Certification Test Results tab does not appear.



- (4). On the PMDT, select [RMS / Configuration / General].
- (5). Enable Monitor Certification.
- (6). On the PMDT, select [Monitor 1 / Data / Certification Test Results] and verify the monitor certification interval is less than or equal to ≤ two minutes.
- (7). On the PMDT, select [Monitor 1/ Monitor Offsets and Scale Factors/Certification].
- (8). Change the SDM Scale to 0% Mod.
- (9). On the PMDT, select [Monitor 1 / Data / Certification Test Results].
- (10). Verify that an out-of-tolerance condition exists for Centerline SDM.



- (11). On the PMDT, select [RMS / Status / Monitor/Transmitter Status] and verify the Monitor 2 Indicator is Green and Monitor 1 Indicator is not Green. This indicates the Monitor is disabled from voting.
- (12). Verify Monitor 1 is in an alarm condition for Integral, Standby Transmitter and Near Field Monitor (if configured present) on the LCU.
- (13). On the PMDT, select [Monitor 1 / Offsets and Scale Factors/Certification] and change the Centerline SDM Scale to 100% Mod.
- (14). On the PMDT, select [Monitor 2 / Offsets and Scale Factors/Certification].
- (15). Change the Centerline SDM Scale to 0 % Mod.
- (16). On the PMDT, select [Monitor 2 / Data / Certification Test Results].
- (17). Verify an out-of-tolerance condition exists for Centerline SDM.



(18). On the PMDT, select [RMS / Status / Monitor/Transmitter Status] and verify the Monitor 1 Indicator is Green and the Monitor 2 indicator is not Green. This indicates Monitor 2 is disabled from voting.



- (19). On the PMDT, select [Monitor 2 / Offsets and Scale Factors/Certification] and change the Centerline SDM Scale to 100 % Mod.
- (20). On the PMDT, select [Monitor 1 / Data / Certification Test Results] and verify the Certification Results are in tolerance for all parameters.
- (21). On the PMDT, select [Monitor 2 / Data / Certification Test Results] and verify the Certification Results are in tolerance for all parameters.



- (2) Monitor Certification On/Off Control
- (3) No monitor certification tab
- (6) Monitor Certification Interval
- (10) Mon. 1 centerline SDM out of tolerance
- (11) Mon. 1 voting disabled
- (12) Mon. 1 alarm for integral, standby tx and nfm
- (17) Mon. 2 centerline SDM out of tolerance
- (18) Mon. 2 voting disabled
- (20) Certification results in tolerance for all parameters for monitor #1
- (21) Certification results in tolerance for all parameters for monitor #2

#### 22. Transmitter Selection and Indications:檢視發射機切換和指示正常。

#### SETUP : System Operation Normal

Operate the system to observe the following indications are normal:

- (1). Transfer TX #1 and TX #2 as main and observe the indicator lamps.
- (2). Transfer TX #1 and TX #2 and observe the on- antenna indicator lamps.
- (3). Make standby TX hot and observe correct indications of load lamps.
- (4). Turn TX #1 then #2 off and observe the correct indication of off lamps.
- (1) Main Transmitter Select and Indication
- (2) Transmitter Antenna Select and Indication
- (3) Transmitter Load Select and Indication
- (4) Transmitter OFF Select and Indication

#### 23. Power Supply Functions: 測試備用電池電源運作正常。

#### SETUP : System Operation Normal

Operate the system to observe the following indications and functions are normal:

(1). Remove AC power from system and observe the AC fail indication.

V	Check	if OK
V	Check	if OK
V	Check	if OK
V	Check	if OK

Check if OK

Check if OK

Check if OK

V Check if OK

V Check if OK

Check if OK

V

Check if OK

Check if OK

Check if OK

1min 325062 min.

(2). With AC removed observe the on-batteries indication.



(3). With AC back on disconnect batteries and observe battery fault indication.



- (4). With the system normal observe the DC-DC converter indication.
- (5). Shut system down by turning off AC inputs. Turn on AC input only and observe the system returns to normal no alarm operation without a reset command.
- (6). Remove AC input and turn on DC (battery) input and observe that the system does not restart.
- (7). Press both BCPS reset buttons and observe the station returns to normal (with no alarm) operation.

(1)	AC Line Fail Indication		Check if OK
(2)	Station On-Battery Indication	$\checkmark$	Check if OK
(3)	Battery Fault Indication		Check if OK
(4)	DC - DC Convertor OK Indication		Check if OK
(5)	Automatic Station Power-Up on AC power restoration (No Batteries)		Check if OK
(6)	System does not restart	$\checkmark$	Check if OK
(7)	Station On/Off Control on Batteries only - (No AC Power Present)		Check if OK

- **24.** Station Transfer Action: Main-to-Standby; Hot Standby Operation: Hot Standby下檢 視告警觸發時,於標準時間內正常執行切換機。
- SETUP : Dual System Operating in Hot Standby Configuration with Both Transmitters On.

Operate the system to observe the following indications and functions are normal:

(1). Disconnect the CRS system SBO Feed Line From main Transmitter output (Relay K3-J4).



- (2). Start stopwatch.
- (3). Observe the transfer to Standby Transmitter occurs in 1.0 second or less.
- (4). Observe the visual and aural alarms on the Localizer system upon transfer.
- (5). Observe the system stays on line after transfer (no alarms).
- (6). Disconnect the SBO feed cable to the antenna simulator.



- (7). Observe the system shuts down the Standby transmitter, and is in the OFF condition.
- (8). Observe the visual and aural alarms on the Localizer system.


- (3) Station Transfer Action: Main to Stby
- (4) Local Aural + Visual Alarms
- (5) Continued Operation on Stby
- (7) Station Shutdown: Main and Stby to Off
- (8) Local Aural + Visual Alarms
  - **25.** CRS CSB Power Range: 檢視當CRS CSB RF輸出功率調至20W及8W時,各參數 是否正確,且兩者相差值於標準內。

**SETUP**: Connect Oscilloscope to the Detected port located on the front panel of the RF Monitor. Select CRS CSB on the LCU wattmeter to see the "Kissing" pattern.

(1). Adjust Course CSB RF output to 20 watts.

Connected	ansmitter Data	State State State	6	Next (F5) Close	(F6) Apply (	[F7] [Reset (F8]]
Transmitters	05/02/18 10:54:54 Course Transmitter Parameters	Mithesizer and PA	(Data   II	CRS	CSB F	RF調至2
IG Main	CSB Forward Power	20,200	Watts	CSB Forward Power	20.200	) Watts
G Antenna	CSB Reflected Power	0.000	Watts	CSB Reflected Power	0.000	Watts
Load G	SBO Forward Power	0.264	Watts	SBO Forward Power	0.358	Watts
Off _	SBO Reflected Power	0.000	Watts	SBO Reflected Power	0.001	Watts
Monikors Integral Standby	Standby Course Transmitter	Parameters		Standby Clearance Transmitter	Parameters	
Normal	CSR Forward Power	20.300	Watts	CSB Forward Power	20.500	Watts
Y Bypass Y	SBO Forward Power	0.264	Watts	SBO Forward Power	0.358	Watts

- (2). Connect a PIR to the RF sample port located on the front panel of the RF Monitor and select CRS CSB on the LCU wattmeter, measure Mod Bal and record.
- (3). Measure CSB SDM with PIR and record.

- (4). Using the Monitor Data Window read CSB width and record.
- (5). Adjust CRS CSB to 8 watts.

Connected	Transmitter Data	3		Next (F5) Clos	e.(F6) Apply (F7) Reset (F8)	
L	Wattmeter Data Transmitter 1 S	ynthesizer and P	A Data	Trans		
Transmitters Tx1 Tx2	05/02/18 10:55:43 Course Transmitter Parameters	8		CRS	CSB RF 調至	5 8W
G Main	CSB Forward Power	8.080	Watts	CSB Forward Power	7950 Wate	
G Antenna	CSB Reflected Power	0.000	Watts	CSB Reflected Power	0.000 Watts	
Load G	SBO Forward Power	0.103	Watts	SBO Forward Power	0.138 Watts	
0#	SBO Reflected Power	0.000	Watts	SBO Reflected Power	0.000 Watts	
Integral Standby	Standby Course Transmitter P	arameters		Standby Clearance Transmitte	r Parameters	
	00000	1.2.620	567.46	CCD Exercised Dener	7,600 With	
Alam R	CSB Forward Power	1.230	watts	Cabirdiwald rower	1.000 weats	

- (6). Measure Mod Bal with PIR and record.
- (7). Measure SDM with PIR and record.



- (8). Using the Monitor Data window read CSB width and record.
- (9). Calculate Step 6 minus Step 2 and record.
- (10). Calculate Step 8 minus Step 4 and record.
- (11). Calculate Step 7 minus Step 3 and record.
- (12). Reset to Nominal Power.
- (13). Repeat steps 1 thru 12 for Transmitter 2.

		1 X 1	1X2
(2)	Mod Bal at 20 Watts CSB	0	DDM
(3)	SDM at 20 W CSB	40-4	40-3 %
(4)	Course Width at 20 W CSB	0.155	0.154 DDM
(6)	Mod Bal at 8 Watts (40% CSB)	-0.00/	-0-00 DDM
(7)	SDM at 8 Watts (40% CSB)	39.3	39,5 %
(8)	Course Width at 8 W (40% CSB)	0.155	OILLEF DDM
(9)	Modulation balance difference	200/	Ø ≤ 0.002 DDM
(10)	Course width difference	0.001	$\circ$ $\pm$ 2% of step 4
(11)	SDM difference	0.8	0<0 ± 1%

**26.** CLR CSB Power Range: 檢視當CLR CSB RF輸出功率調至20W及8W時,各參數 是否正確,且兩者相差值於標準內。

**SETUP**: Connect Oscilloscope to the Detected port located on the front panel of the RF Monitor. Select CLR CSB on the LCU wattmeter to see the "Kissing" pattern.

(1). Adjust CLR CSB RF output to 20W.

Lonnected	Transmitter Data Wattmeter Data Transmitter 1.9	untherizer and D	(	Next (F5) Clo	te (F6) (Apply (F7))	[Reset (F8)]
Alert Y Local Transmitters	05/02/18 10:58:42 Course Transmitter Parameters	Jini ICS201 drid F		Concerns Transmitter Room	A Data /	CSB RF 調至 20V
Main	CSB Forward Power	20 300	Matte	CSP Ennord Prom		and Characteria and
G Antenna	CSB Reflected Power	0.000	Watte	CSB Reflected Power	20.200 WZ	dats
Load 🐻	SBO Forward Power	0.264	Watts	SBO Forward Power	0.343 Wat	the line line line line line line line lin
	SBO Reflected Power	0.000	Watts	SBO Reflected Power	0.001 Wat	#s
Integral Standby	Standby Course Transmitter P	arameters		Standby Clearance Transmitte	r Parameters	
	CSB Forward Power	20.300	Watts	CSB Forward Power	20.500 Watts	5 DDD1(
Y Bypass Y	SBO Forward Power	0.264	Watts	SBO Forward Power	0.343 Watts	of step 4
Int CRS Pos 0.00						

- (2). Connect a PIR to the RF sample port located on the front panel of the RF Monitor and select CLR CSB on the LCU wattmeter, measure Mod Bal and record.
- (3). Measure CLR CSB SDM with PIR and record.



- (4). Using the Monitor Data Window read CLR 1 DDM and record.
- (5). Adjust CLR CSB to 8 watts.

Transmitters         05/02/18 10 57:17           Tx1         Tx2         Course Transmitter Parameters		
	Clearance Transmitter Parameters	CSB RF 調至 8W
Main G CSB Forward Power 8:180 Watts	CSB Forward Power S 000 Wette	
CSB Reflected Power 0.000 Watts	CSB Reflected Power 0.000 Watts	
Diff SBO Forward Power 0.105 Watts	SBO Forward Power 0.136 Watts	
SBO Reflected Power 0.000 Watts	SBO Reflected Power 0.000 Watts	
Integral Standby Standby Course Transmitter Parameters	Standby Clearance Transmitter Parameters	
Alarm G CSB Forward Power 7.430 Watts	CSB Forward Power 7.300 Watts	
Bypass Y SBO Forward Power 0.107 Watts	SBO Forward Power 0.197 Watts	

- (6). Measure Mod Bal with PIR and record.
- (7). Measure SDM with PIR and record.



- (8). Using the Monitor Data window read CLR 1 DDM and record.
- (9). Calculate Step 6 minus Step 2 and record.
- (10). Calculate Step 8 minus Step 4 and record.
- (11). Calculate Step 7 minus Step 3 and record.
- (12). Reset to Nominal Power.
- (13). Repeat steps 1 thru 12 for Transmitter 2.

		IAI	177
(2)	Mod Bal at 20 Watts CSB	0	0 DDM
(3)	SDM at 20 W CSB	40.7	40.6 %
(4)	CLR 1 DDM at 20 W CSB	0.736	0.735 DDM
(6)	Mod Bal at 8 Watts (40% CSB)	-0-000	DDM
(7)	SDM at 8 Watts (40% CSB)	39.8	39.8 %
(8)	CLR 1 DDM at 8 W (40% CSB)	0.235	0.735 DDM
(9)	Modulation balance difference	0	
(10)	CLR 1 DDM difference	0.00/	$\circ$ $\pm 2\%$ of step 4
(11)	SDM difference	0.9	0.8 ± 1%

### 27. Identification Signal and Modulation Range: 量測ID頻率及Code是否正確。

**SETUP**: Connect Frequency Counter to the Detected port located on the front panel of the RF Monitor. Select CRS CSB on the LCU wattmeter.

- (1). Turn off 90/150 Hz tone modulation.
- (2). Set Ident to continuous tone.
- (3). Measure and record the Ident tone frequency.



- (4). Set Ident to keyed.
- (5). Select CRS Ident to Speaker and verify that the Ident code is the same as the Monitor Configuration Screen.
- (6). Select CLR Ident to Speaker and verify that the Ident code is the same as the Monitor Configuration Screen.

Cornecte Data Confid Com	puration binday			ext (F5) Close	(F6) Apply (F7
Alert X LOCal Transmitters x1 Tx2	04/27/18 10/19/23 Ident Code Executive Nams	E ME Ce	tification Category	CAT III 🔹 🥅 W Standb	Indowed DME K
		Course	Clearance	Course	Clearance
I Load	Centerline RF Level	12			
011	Centerline SDM	1991	<b>N</b>		
Monitors	Adent Mod Percent	U	<b>1</b>		
Integral Standby	Width DDM	121	<b>I</b>		
IG Normal IG	Actorn	12	100	0	
Alam Alam Bypass Y	Synthesizer Lock Fault	12			V
	RF Frequency Error		101	R.	1
	Antenna Fault				

(7). Repeat steps 1 thru 6 for Transmitter 2.

## TX1

- (3) Audio Frequency
- (5) CRS Identification Coding verification
- (6) CLR Identification Coding verification

### TX2

- (3) Audio Frequency
- (5) CRS Identification Coding verification
- (6) CLR Identification Coding verification

### $1020 \pm 0.1\% (1.02 \text{ Hz})$ 1151 "T" + 3 Letters 1751 "T" + 3 Letters

 $\frac{1020}{1020 \pm 0.1\% (1.02 \text{ Hz})}$ "I" + 3 Letters "I" + 3 Letters

## 28. Antenna Fault Alarms: 測試DU/CU箱之Antenna Fault卡板功能運作正常。

SETUP : Transmitter off, Antenna series resistor emulator in antenna feed lines

- (1). Select antenna # (8, 14, 16, or 20) in RMS Configuration.
- (2). Display antenna fault screen.
- (3). Cause antenna feed line open, monitor line short, and feed line short faults on each cable and verify the faults are displayed on the antenna fault screen. Check the appropriate boxes on the test data sheet.



Convoted B	M5 Data					Nex #5	Close (F6)	Apply (F7)	Receit (FOU)
Ĩ	Annievance Alena/Rom	ADDA	Tight to	AL ALS	ma fasta				
Traventiers	64/30/18 15 21 25			-	Benert	Vota	Condition	Nom	
Text Har	Scores	3.64	Normal		IR	3.44	Normal		
Autenna		3.66	Normal		28	8.99	Man Short		
		344	Normal	1	R	344	Normal	T	
Monitors	-	144	Normal	I	48	3.45	Normal		
Normal H		3.45	Nicenusi	1	5R	3.44	Normal		
Alarm Y Byans Y		3.44	Normal	-	68	344	Normal	1	
	71.	3.45	Nomal	T IT	78	3.45	Normal		
	81.	3.45	Normal		BR	245	Nomul	E	
	DL.	145	Normal	I	*	145	Piternal		
Stee Crits Have 1 0.007	10	3.45	(Ayrmal		107	16	Normal		
INCLAN DIS	A Avenue Mariage	NOT 389	Paloonusi	Phillippine			4		
Indicase 1 uz	5 <b>4</b> .								

KINMEN RW	Y 06 108.90 MHZ - I	Model	2100 Dual	CELOG	alizer - SELEX ES	Inc. PM	DT		D D
VIS Monitors	Monitor 1 Monitor		smaters D	iag o M	36	Next (F5)	Close #61	Acoly (F7) Beck	e (FB)
	Industance Aletta (Name	ADDA	a Dota ho	to Acto	mifeuts				
YLocal	04/30/38 15 20 58								
numitiess Tu2			Conterna		in the second	w.e.	Contern	Alama	
Man	n.	3.45	Normal		IR	1.64	Feed Short		
Lost 0	7.	3.45	Normal		293	3.45	Normal	<b>F</b>	
01	2	345	Normal		3R	2.45	Normal	The second	
Monitors ral Standby	4	3/44	Notted	I	4R	3.45	Normal	1	
Nonnal HG	9.	3.45	Nomal	E	58	3.44	Normal		
Sypass Y	R.	3.45	Normal	F	59	144	Nomal	E	
	7	3.46	Normal		Æ	3.46	Nomul		
	8.	3.46	Normal		<b>B</b> 1	3.45	Normal	The second	
PS Par T Toron		3.46	Normal	11	9R	3,46	Norral	THE STORE	
Chi with 0.163	HIL.	3.46	Normal		10A	346	Nomal	1 Alexandre	
CUR2 DICH	Artenna Madig men	3.85	Nomue						

- (4). Restore system to normal operation and verify normal condition is displayed for all antennas.
- (5). Disconnect the jumper on the misalignment switch input to the Localizer. Verify that the misalignment fault detector is displayed.



(6). On the PMDT, select [RMS/Data/Maintenance Alerts/Alarms] and verify an Antenna

Misalignment Maintenance Alert.

- (7). Reconnect the Jumper and place system in normal operation.
- (8). Disconnect in-line antenna feed cable.
- (9). Verify system shuts down. Check if OK.
- (10). Verify that no restart on #2 Transmitter occurs. Check if OK.
- (11). Reconnect in-line antenna feed cable.
- (3) Individual Antenna Indications

Antenna #	Normal	Open	Mon. Short	Feed Short
lL	$\checkmark$			V
2L	4	$\checkmark$		V
3L		V	$\checkmark$	
4L	V		$\checkmark$	V
5L	V	$\checkmark$	V	
6L	$\checkmark$		V	$\checkmark$
7L	$\checkmark$	~		
8L		$\mathbf{\Lambda}$	V	
9L	V	V	$\checkmark$	
10L	$\checkmark$			
1R				
2R	V		$\checkmark$	
3R	$\checkmark$	$\checkmark$	V	V
4R	V		$\overline{\mathbf{A}}$	V
5R	$\checkmark$	$\checkmark$		
6R	M		V	N.
7R		$\checkmark$		
8R	$\checkmark$		V	
9R	V			$\square$
10R	V		V	

Check

Check

Check

Check

(5) Antenna Misalignment is Displayed

(6) Antenna Misalignment Causes Maint. Alert

(9) Antenna Fault Causes System Shutdown

(10) No restart on #2 Transmitter

29. Final System Settings:列印最終系統參數設定。

(1). Print the Final System settings by selecting System/ Configuration Print and put with the test data sheets.

## 二、 GLIDESLOPE 2110性能測試: (金門06GP測試結果)

## 1. Maintenance Alerts:檢視系統電壓電流值。

SETUP : Station operation normal

(1). On the PMDT select [RMS/Configuration/A/D Limits] and verify limits in the table provided below:

Parameter	Low Limit	High Limit
AC Input Volts	98 (196)	132 (264)
AC Input Current	1	7
TX#1-24V P.S. Volts	23.3	25.2
TX#1-24V P.S. Current	3	15
TX#2-24V P.S. Volts	23.3	25.2
TX#2-24V P.S. Current	3	15
Battery 1 Volts	21.5	30
Battery 1 Current	-6	10
Battery 2 Volts	21.5	30
Battery 2 Current	-6	10
+ 5V DC	4.80	5.20
+12V DC	11.75	13.25
- 12 V DC	-13.25	-11.75

(2). On the PMDT select [RMS/Data/A/D Data] and verify that there are no maintenance alerts. Record nominal value and Check if OK.

	Alert Y Local	Martenance Alets/Ala	ms A/D	Data Dig	tal Inputs	86	Next (P	A Close	FEI (Apply (F7)	(Bezor (FO)
Dasar Habri Vesaue Nes Subellie Nes Subellie Nes Subellie Nes Subellie Nes Subellie Nes Subellie Nes Subellie Nes Subellie Subell	Transmitter Teal Men- Lead DB Mentral Hegal Standby Bysac M Bysac M Hegal Standby Bysac M Hegal Standby Bysac M	IPA01/03085712           Spare A/01           Spare A/01 <t< th=""><th>Lo Lam 5.00 -5</th><th><ul> <li>Volts</li> <li>0.00</li> <l< th=""><th>H Linet           5.00</th><th>55 VDC: Montes 1 +12 VDC Montes 1 12 VDC Montes 1 +24 VDC Montes 2 +24 VDC Montes 2 +12 VDC Montes 2 +12 VDC Montes 2 +24 VDC Montes 2 +24 VDC Montes 2 Outside Temp</th><th>488 1175 -1325 233 489 1175 233 10 Lime 25 10 Lime 26 10 Lime 25 10 Lime 20 10 Lime 25 10 Lime 20 10 Lime 25 10 Lime 20 10 Lime 20 10 Lime 25 10 Lime 20 10 Lime 20 1</th><th>at Vol 1250 1250 1250 1243 1243 1248 1248 1248 1248 1248 1248 1248 1238 Deg C 25 Amps 24 0.0 52 50 0.0 0.0 0.0 0.0 0.0 0.0 0.0</th><th>Intermediate         Sale           5.520         13.25           13.25         25.7           3.26         25.7           3.26         3.27           13.75         7.0           2800         70           756         156           156         156           156         156           150         150</th><th>2</th></l<></ul></th></t<>	Lo Lam 5.00 -5	<ul> <li>Volts</li> <li>0.00</li> <l< th=""><th>H Linet           5.00</th><th>55 VDC: Montes 1 +12 VDC Montes 1 12 VDC Montes 1 +24 VDC Montes 2 +24 VDC Montes 2 +12 VDC Montes 2 +12 VDC Montes 2 +24 VDC Montes 2 +24 VDC Montes 2 Outside Temp</th><th>488 1175 -1325 233 489 1175 233 10 Lime 25 10 Lime 26 10 Lime 25 10 Lime 20 10 Lime 25 10 Lime 20 10 Lime 25 10 Lime 20 10 Lime 20 10 Lime 25 10 Lime 20 10 Lime 20 1</th><th>at Vol 1250 1250 1250 1243 1243 1248 1248 1248 1248 1248 1248 1248 1238 Deg C 25 Amps 24 0.0 52 50 0.0 0.0 0.0 0.0 0.0 0.0 0.0</th><th>Intermediate         Sale           5.520         13.25           13.25         25.7           3.26         25.7           3.26         3.27           13.75         7.0           2800         70           756         156           156         156           156         156           150         150</th><th>2</th></l<></ul>	H Linet           5.00	55 VDC: Montes 1 +12 VDC Montes 1 12 VDC Montes 1 +24 VDC Montes 2 +24 VDC Montes 2 +12 VDC Montes 2 +12 VDC Montes 2 +24 VDC Montes 2 +24 VDC Montes 2 Outside Temp	488 1175 -1325 233 489 1175 233 10 Lime 25 10 Lime 26 10 Lime 25 10 Lime 20 10 Lime 25 10 Lime 20 10 Lime 25 10 Lime 20 10 Lime 20 10 Lime 25 10 Lime 20 10 Lime 20 1	at Vol 1250 1250 1250 1243 1243 1248 1248 1248 1248 1248 1248 1248 1238 Deg C 25 Amps 24 0.0 52 50 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Intermediate         Sale           5.520         13.25           13.25         25.7           3.26         25.7           3.26         3.27           13.75         7.0           2800         70           756         156           156         156           156         156           150         150	2

Parameter	Low Limit	High Limit	Nominal Value
AC Input Volts	98 (196)	132 (264)	115.8
AC Input Current	1	7	2.4
TX #1 - 24 V P.S. Volts	23.3	25.2	24.1
TX #1 - 24 V P.S. Current	3	15	ちゃ
TX #2 - 24 V P.S. Volts	23.3	25.2	74:0
TX #2 - 24 V P.S. Current	3	15	4.9
Battery 1 Volts	21.5	30	\$7.6
Battery 1 Current	-6	10	0
Battery 2 Volts	21.5	30	21.9
Battery 2 Current	-6	10	0
+ 5V DC Monitor #1	4.80	5.20	4.88
+12V DC Monitor #1	11.75	13.25	12.52
- 12 V DC Monitor #1	-13.25	-11.75	-12,43
+24V DC Monitor #1	23.3	25.2	23.9
+ 5V DC Monitor #2	4.80	5.20	4.85
+12V DC Monitor #2	11.75	13.25	12.48
-12V DC Monitor #2	-13.25	-11.75	-12,43
+24V DC Monitor #2	23.3	25.2	73.8

### 2. Power On/Off Indications:檢視AC、DC電源開關狀態。

Observe the Glideslope front panel for correct indications of:

- (1). TX #1 AC power Indication on/off. Check if OK.
- (2). TX #1 DC power indication on/off. Check if OK.
- (3). TX #2 AC power indication on/off. Check if OK.
- (4). TX #2 DC power indication on/off. Check if OK.



- (1) TX #1 AC Power Indicator
- (2) TX #1 DC Power Indicator
- (3) TX #2 AC Power Indicator
  (4) TX #2 DC Power Indicator
- 4) 1X # 2 DC Power Indicato
  - 3. Transmitter RF Control: 確認CRS和CLR發射機控制功能。
    - (1). Log on to the PMDT with level 3 security password in Local Control Mode. Enter the amplifier assembly number for each corresponding amplifier that is installed on the system under the dropdown box in the PMDT/Transmitter/Configuration/Transmitter\_ screen. Save the configuration under PMDT/RMS/Config Backup.

 $\checkmark$ 

Check if OK

Check if OK

Check if OK

(2). Using the PMDT transmitter control window, turn the Course and Clearance RF on and off and

observe Wattmeter. Check if OK.

- (3). Repeat step 1 and 2 for transmitter 2.
- (2) Course Transmitter On/Off Control
  (2) Clearance Transmitter On/Off Control

### 4. Radio Frequency and RF Frequency Control:檢視CRS RF及CLR RF頻率正確性。

TXI P P

Check if OK

Check if OK

SETUP: Connect Frequency Counter to the course /clearance input of assembly 012106 (Recombiner), TP13 CRS LO and TP5 CLR LO.



- (1). Record Glideslope channel frequency.
- (2). Place Transmitter 1 on load. Measure the frequency of Transmitter 1 Course channel RF and record.



(3). Measure the frequency of the Clearance channel RF and record.

- (4). Record frequency difference.
- (5). Read frequency difference from the transmitter screen and record.
- (6). Place Transmitter 2 on load. Repeat steps 3 thru 6 for transmitter 2.

(1)	Glideslope Channel Frequency	327.3	MHz	
(2) (3) (4) (5)	Meas. CRS Freq. (Channel +4 kHz) Meas. CLR Freq. (Channel -4 kHz) Measured Frequency Difference Indicated Frequency Difference	TX1 329.303611 329.295600 8011 8009	± 0.001 % ± 0.001% (7500 Hz to 8500 Hz) (7500 Hz to 8500 Hz)	
		<u> </u>	(1000 112 10 0000 112)	
(2) (3) (4)	Meas. CRS Freq. (Channel +4 kHz) Meas. CLR Freq. (Channel -4 kHz) Measured Frequency Difference	TX2 329.303614 32 <u>9.29</u> 5604 <u>80/0</u>	± 0.001 % ± 0.001% (7500 Hz to 8500 Hz)	
(5)	Indicated Frequency Difference	8009	(7500 Hz to 8500 Hz)	

# 5. **RF Power Metering**:檢視面板量測功率與PMDT顯示功率之誤差值及波形正確性。

- (1). Measure the Main CSB Forward power reading on the Wattmeter Display and record.
- (2). On the PMDT, select [Transmitters / Data / Wattmeter Data] and record the internal CSB forward power reading. Verify the reading is within ±4 % of the Wattmeter reading.
- (3). Verify the CSB waveform is available at the front panel Wattmeter Test jack. Check if OK.
- (4). Repeat steps 1 thru 3 for the remainder of the readings requested on the data sheets.

## Wattmeter Functions:

CR3 I	Tansmitter			
(1,2)	Main CSB F Pwr Reading Accuracy	Wm 3	Int_3	$(Wm \pm 4\%)$
(3)	Main CSB F Pwr Select and Waveform	in the second second	M	Check if OK
(1,2)	Main CSB R Pwr Reading Accuracy	Wm_0.0/	Int 0.007	$(Wm \pm 4\%)$
(3)	Main CSB R Pwr Select and Waveform		V	Check if OK
(1,2)	Main SBO F Pwr Reading Accuracy	Wm 0-03	Int 0.03	$(Wm \pm 4\%)$
(3)	Main SBO F Pwr Select and Waveform		M	Check if OK
(1,2)	Main SBO R Pwr Reading Accuracy	Wm 🖉	Int O	$(Wm \pm 4\%)$
(3)	Main SBO R Pwr Select and Waveform	All and and	M	Check if OK
(1,2)	Stby CSB Pwr Reading Accuracy	Wm 2.0	Int 3.0	$(Wm \pm 4\%)$
(3)	Stby CSB Pwr Select and Waveform		M	Check if OK
(1,2)	Stby SBO Pwr Reading Accuracy	Wm 0.03	Int a 03	$(Wm \pm 4\%)$
(3)	Stby SBO Pwr Select and Waveform	1997 - 1997 -		Check if OK
CLR T	ransmitter			
(1,2)	Main CSB F Pwr Reading Accuracy	Wm 0.7	Int 0.304	$(Wm \pm 4\%)$
(3)	Main CSB F Pwr Select and Waveform			Check if OK
(1,2)	Main CSB R Pwr Reading Accuracy	Wm 🖉	Int O	$(Wm \pm 4\%)$
(3)	Main CSB R Pwr Select and Waveform	115		Check if OK
(1,2)	Stby CSB Pwr Reading Accuracy	Wm_0.3	Int 0.286	$(Wm \pm 4\%)$
(3)	Stby CSB Pwr Select and Waveform	Contraction and a second	TY I	Check if OK

# 6. CRS System Spurious Emissions:量測CRS頻率2次諧波及3次諧波是否符合標準。

SETUP : Connect Spectrum Analyzer to the CRS CSB cable, located at the APCU, using a 30 dB attenuator.



- (1). Set CRS 90 and 150 Hz modulation off (select Waveform RF ONLY).
- (2). Set spectrum analyzer to carrier signal. Note level in dBm.
- (3). Measure and compare the second and third harmonics to the carrier frequency. Record the frequency and amplitude difference, with respect to the carrier level in dB (dBC), of each harmonic.





(4). Verify with the spectrum analyzer that from 0 Hz to 1 GHz, no spurs are larger than -60 dBC. Check if OK.



(7). Repeat steps 1 thru 6 for transmitter 2.

	TX1	Frequency		Level		
(2)	Fundamental	329,3	MHz	0	Record	
(3)	Second Harmonic	658.6	MHz	-1=.47	< -60 dBC	
	Third Harmonic	187.9	MHz	-72,28	< -60 dBC	
(4)	No spurious output greater than -6	0 dBC			Check if OK	
	TX2	Frequency		Level		
(2)	Fundamental	329.3	MHz	0	Record	
(3)	Second Harmonic	658.6	MHz	-12.24	< -60 dBC	
	Third Harmonic	787.9	MHz	-13.05	< -60 dBC	
(4)	No spurious output greater than -6	0 dBC		Y	Check if OK	

# 7. CLR System Spurious Emissions:量測CLR頻率2次諧波及3次諧波是否符合標準。

SETUP : Connect Spectrum Analyzer to the CLR CSB cable, located at the APCU, using a 30 dB attenuator.



- (1). Set CLR 150 Hz modulation off.
- (2). Set spectrum analyzer to carrier signal. Note level in dBm.
- (3). Measure and compare the second and third harmonics to the carrier frequency. Record the frequency and amplitude difference, with respect to the carrier level in dB (dBC), of each harmonic.





(4). Verify with the spectrum analyzer that from 0 Hz to 1 GHz, no spurs are larger than -60 dBC. Check if OK.



- (5). Remove spectrum analyzer from system.
- (6). Set 150 Hz modulation and keyer on to return system to normal.
- (7). Repeat steps 1 thru 6 for transmitter 2.

	TX1	Frequency		Level		
(2)	Fundamental	3=9.3	MHz	0	Record	
(3)	Second Harmonic	658.6	MHz	-73.6	< -60 dBC	
	Third Harmonic	987.9	MHz	-73.15	< -60 dBC	
(4)	No spurious output greater than -	60 dBC			Check if OK	
	TX2	Frequency		Level		
(2)	Fundamental	329.3	MHz	0	Record	
(3)	Second Harmonic	658.6	MHz	-74.18	< -60 dBC	
	Third Harmonic	987.9	MHz	-74.62	< -60 dBC	
(4)	No spurious output greater than -	60 dBC		$\bigtriangledown$	Check if OK	
	8. CRS Carrier Signal at Si	deband Out	out:用想	頻譜分析儀量》	则CRS CSB及CRS SBC	)

於carrier level之差是否符合標準。

SETUP : 1. Place transmitter 1 to off.

- 2. Connect Spectrum Analyzer to the CRS CSB cable, located at the APCU, using a 30 dB attenuator.
- 3. Find Station Frequency.
- 4. Set Center Frequency.
- 5. Adjust Spectrum Analyzer to the following settings:

SWP 2.5 Sec Attenuation 10 dB



(1). Place transmitter to on. Measure the CSB carrier level.

ESA-E SERIES SPECTRUM	ANALYZER ANALYZER TARZE T	-
將C	SB carrier level 設定為0dB	CONTROL -
Ref 0 dbm Peak	Mkr1 & 0 Hz	Channel Chappen
	Select Marker	
Marker_b	Normal	MEASURE Main Register
0.0 Hz 0.23 dB H S	Delta Pair (Technig Ref)	Pestart Ness Control
	Span Pair Center	
Center 329.3 MHz	Off Off	4 5 6
Startey	•SHeep 2.5 s (401 pts)	1 2 3
Help Next Window Zoom	Image: Tab     • Return	0 . 4/2 Enter
Test & Robertsmert, Ter Kanger CALT: 70		

- (2). Place the transmitter to off.
- (3). Connect the Spectrum Analyzer and 30 dB attenuator to the CRS SBO cable located at the APCU. Measure and record difference in signal level.



- (4). Repeat steps 1 through 3 for transmitter 2.
- (5). Place the system back to normal operation.
- (3) CRS Carrier Signal at Sideband Output

TX1 -61.7

 $\frac{TX2}{-61.3}$  < -30 dBC

## 9. LO Outputs:量測CRS LO及CLR LO的輸出功率。

Note measuring transmitter on load.

- (1). Place transmitter 1 on Standby.
- (2). Connect Power Meter to the cable feeding into J4 on the TRU.



- (3). Measure and record the CRS LO output power.
- (4). Connect Power Meter to the cable feeding into J1 on the TRU.
- (5). Measure and record the CLR LO output power.
- (6). Repeat steps 1 through 5 for transmitter 2.



(3)CRS LO Output PowerTX1TX2(5)CLR LO Output Power $\frac{15}{13.5}$  $\frac{14.9}{14.5}$ >6.0 mW but  $\leq$  63.1mW(5)CLR LO Output Power $\frac{15}{13.5}$  $\frac{14.9}{14.5}$ >6.0 mW but  $\leq$  63.1mW

**10. CRS Modulation Balance Adjustment**: 調整CRS Modulation Balance, 並確認外部 PMDT與內部PIR監測的Centerline DDM 是否在標準內。

SETUP : Connect PIR to CRS CSB the RF Monitor sample port and select CRS CSB on the LCU wattmeter.

- (1). On the PMDT, select [Transmitter / Waveforms / Waveform 1].
- (2). Adjust the Course CSB Carrier Power Level to 3 Watts, SDM to 80%, and DDM to 0.000 and Apply.
- (3). On the PMDT, select [Monitor 1 / Data / Integral] and record the external path DDM reading.
- (4). On the PIR, record the internal DDM reading.
- (5). Repeat steps 1 thru 4 using the DDM settings and % Modulation shown on the data sheet and record.
- (6). Repeat steps 1 thru 5 for transmitter 2.





TX1 At 80% SDM (Nominal Modulation Setting)

(3,4)	DDM Setting	External	Internal	Tolerance
	0.000	0	0	S (standard)
	0.015	0.016	0.016	$S + 0.015 \pm 0.002$
	0.030	0.033	0.032	$S + 0.030 \pm 0.004$
	-0.015	-0.015	-0.015	$S - 0.015 \pm 0.002$
	-0.030	-0.031	-0.03	$S - 0.030 \pm 0.004$

TX2 At 80% SDM (Nominal Modulation Setting)

(3,4)	DDM Setting	External	Internal	Tolerance
	0.000	0.00/	0	S (standard)
	0.015	0,016	0.016	$S + 0.015 \pm 0.002$
	0.030	0.03/	0.032	$S + 0.030 \pm 0.004$
	-0.015	-0.015	-0.015	$S - 0.015 \pm 0.002$
	-0.030	-00031	-0.03/	$S - 0.030 \pm 0.004$

- 11. CRS Nav Tones Audio Equipment:用計頻器量測CRS音頻90Hz及150Hz是否正確。
- SETUP : Connect frequency counter to the RF Monitor Detected port and select CRS CSB on the LCU wattmeter.



- (1). Turn only 90 Hz modulation on.
- (2). Record external reading from frequency counter



- (3). Turn only 150 Hz modulation on.
- (4). Record external reading from frequency counter.



(5). Repeat steps 1 thru 4 for transmitter 2.

(2)

(4)

90 Hz frequency

 150 Hz frequency
 了
 150 ± 0.1% (0.15 Hz)

 12.
 CLR Nav Tones Audio Equipment : 用計頻器量測CLR音頻90Hz及150Hz是否正確。

TX2

90

External

 $90 \pm 0.1\% (0.09 \text{ Hz})$ 

**SETUP**: Connect frequency counter to the RF Monitor sample port and select CLR CSB on the LCU wattmeter.

TX1

90

- (1). Turn only 150 Hz modulation on.
- (2). Record external reading from frequency counter.



(3). Repeat steps 1 and 2 for transmitter 2.



## **13.** Integral Monitor Voting Logic:驗證監視邏輯於AND及OR狀態下是否運作正常。

### SETUP : Station Operating Normally

1. On the PMDT, select [Monitors/Configuration/Integral] and set the alarm limits as shown in the following table.

	Int	egral Alarm Limits		
Parameter Alarm Low	Alarm Low	Prealarm Low	Prealarm High	Alarm High
		Course		
Path RF Level	80%	85%	115%	120%
Path DDM	-0.050	-0.038	0.038	0.050
Path SDM	76%	77%	83%	84%
Width DDM	0.125	0.137	0.213	0.225
		Clearance		
RF Level	75%	81%	125%	133%
150 Hz Mod Percent	65%	69%	85%	88%

2. On the PMDT, in the [RMS / Configuration / General] screen, verify the Monitor Voting Logic is set to the AND configuration.

- On the PMDT, select [Monitor 1 / Data / Status] and verify no alarms are shown for Monitor #1. Record.
- (2). On the PMDT, select [Monitor 2 / Data / Status] and verify no alarms are shown for Monitor #2. Record.
- (3). Set the Local/Remote switch on the transmitter front panel to the Remote position.
- (4). On the PMDT, select [Monitors / Commands / Integral Monitor Bypass / On] and verify a bypass indication is indicated for the Integral Monitor in the Monitors Status group at the left of the PMDT screen. Also verify the transmitter front panel Bypass light illuminates for the Integral Monitor.
- (5). Set the Local/Remote switch on the transmitter front panel to the local position. Press the Integral Monitor Bypass button on the transmitter front panel and verify the Bypass is removed.
- (6). Remove all monitor bypass conditions.
- (7). On the PMDT, select [Monitor 1 / Offsets and Scale Factors / Integral] and set the Path SDM Scale Factor to 0. This should result in an alarm condition for Monitor 1.
- (8). Verify the transmitter front panel Integral Monitor 1 alarm light is illuminated.
- (9). On the PMDT, select [RMS / Data / Maintenance Alerts/Alarms] and verify an Integral Monitor Mismatch indication.
- (10). Verify the station continues to operate in this condition.
- (11). On the PMDT, select [Monitor 2 / Offsets and Scale Factors / Integral] and set the Path SDM Scale Factor to 0. This should result in an alarm condition for Monitor 2.
- (12). Verify the transmitter front panel Integral Monitor 2 alarm light is illuminated and the station transfers and shuts down. This confirms the Monitor AND function.
- (13). Place the Integral Monitor in Bypass and reset the Offset for Monitor 2 to the normal condition.

Restart the station. This should result in a normal indication for Monitor 2. Monitor 1 should remain in alarm.

- (14). On the PMDT, in the [RMS / Configuration / General] screen, set the Monitor Voting Logic to the OR configuration.
- (15). Remove the Integral Monitor Bypass. The station should immediately transfer and shut down. This confirms the Monitor OR function.
- (16). Bypass the Integral Monitor and reset the SDM Scale Factors for Monitors 1 and 2 to their normal values.
- (17). On the PMDT, in the [RMS / Configuration / General] screen, reset the Monitor Voting Logic to the AND configuration.
- (18). Restart the station. Normal operation with no monitor alarms should be indicated.

(1)	Monitor #1 Normal Indication	M	Check if OK
(2)	Monitor #2 Normal Indication		Check if OK
(4)	Integral Monitor Bypass Function		Check if OK
	Integral Monitor Bypass Light		Check if OK
(5)	Integral monitor bypass removed		Check if OK
(8)	Integral Monitor 1 Alarm		Check if OK
(9)	Integral Monitor Mismatch	TY	Check if OK
(10)	Station Operational W/Mon 1 Alarm		Check if OK
(12)	Integral Monitor 2 Alarm/Station Transfer/	State Street	
	Shut Down (Monitor "And" Function)	V	Check if OK
(15)	Station Transfer /Shut Down (Monitor		
	"OR" Function)		Check if OK

# **14.** Integral and Standby Monitor Alarms:驗證Monitor各參數於超過High Alarm與 Low Alarm上時,是否正常顯示告警。

### SETUP : Station operation normal

- (1). On the PMDT, place the Integral and Standby Monitors in Bypass. Select [Monitor 1 / Data / Integral] and verify no alarms are shown for Monitor #1 and that the Path DDM Value is 0.000 + 0.001. Check if OK.
- (2). On the PMDT, select [Monitor 1 / Data / Standby] and verify no alarms are shown for Monitor #1 and that the Path DDM Value is 0.000 + 0.001. Check if OK.
- (3). On the PMDT, select [Monitor 2 / Data / Integral] and verify no alarms are shown for Monitor #2 and that the Path DDM Value is 0.000 + 0.001. Check if OK.
- (4). On the PMDT, select [Monitor 2 / Data / Standby] and verify no alarms are shown for Monitor #1 and that the Path DDM Value is 0.000 + 0.001. Check if OK.
- (5). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS and CLR CSB RF Levels down to cause the integral monitor to go into alarm.
- (6). On the PMDT, select [Monitor 1 / Data / Integral] and confirm a low alarm condition for the CRS and CLR RF Levels.
- (7). On the PMDT, select [Monitor 1 / Data / Standby] and confirm a low alarm condition for the CRS and CLR RF Levels.

- (8). Repeat Steps 6 and 7 for Monitor 2.
- (9). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS and CLR CSB RF Levels up to cause the integral monitor to go into alarm.
- (10). On the PMDT, select [Monitor 1 / Data / Integral] and confirm a high alarm condition for the CRS and CLR RF Levels.
- (11). On the PMDT, select [Monitor 1 / Data / Standby] and confirm a high alarm condition for the CRS and CLR RF Levels.
- (12). Repeat Steps 10 and 11 for Monitor 2.
- (13). Return CRS and CLR RF Levels to normal power.
- (14). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS and CLR CSB Mod Percent Values down to cause the integral monitor to go into alarm.
- (15). On the PMDT, select [Monitor1/Data/Integral]
- (16). Confirm a low alarm condition for the Path SDM and 150 Hz Mod Percent.
- (17). On the PMDT, select [Monitor1/Data/Standby] and confirm a low alarm condition for the Path SDM and 150 Hz Mod Percent.
- (18). Repeat Steps 16 and 17 for Monitor 2.
- (19). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS and CLR CSB Mod Percent up to cause the integral monitor to go into alarm.
- (20). On the PMDT, select [Monitor1/Data/Integral] and confirm a high alarm condition for the Path SDM and 150 Hz Mod Percent.
- (21). On the PMDT, select [Monitor1/Data/Standby] and confirm a high alarm condition for the Path SDM and 150 Hz Mod Percent.
- (22). Repeat Steps 20 and 21 for Monitor 2.
- (23). Return the CRS and CLR CSB Mod Percent Values to nominal.
- (24). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS CSB Mod Balance Value down to cause the integral monitor to go into alarm.
- (25). On the PMDT, select [Monitor1/Data/Integral] and confirm a low alarm condition for the Path DDM.
- (26). On the PMDT, select [Monitor1/Data/Standby] and confirm a low alarm condition for the Path DDM.
- (27). Repeat Steps 25 and 26 for Monitor 2.
- (28). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS CSB Mod Balance Value up to cause the integral monitor to go into alarm.
- (29). On the PMDT, select [Monitor1/Data/Integral] and confirm a high alarm condition for the Path DDM.
- (30). On the PMDT, select [Monitor1/Data/Standby] and confirm a high alarm condition for the Path DDM.
- (31). Repeat Steps 29 and 30 for Monitor 2.

- (32). Return the CRS CSB Mod Balance Value to nominal.
- (33). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS SBO RF Level Value down to cause the integral monitor to go into alarm.
- (34). On the PMDT, select [Monitor1/Data/Integral] and confirm a low alarm condition for the Width DDM.
- (35). On the PMDT, select [Monitor1/Data/Standby] and confirm a low alarm condition for the Width DDM.
- (36). Repeat Steps 34 and 35 for Monitor 2.
- (37). On the PMDT, select [Transmitters/Waveform/Waveform1] and adjust the CRS SBO RF Level Value up to cause the integral monitor to go into alarm.
- (38). On the PMDT, select [Monitor1/Data/Integral] and confirm a high alarm condition for the Width DDM.
- (39). On the PMDT, select [Monitor1/Data/Standby] and confirm a high alarm condition for the Width DDM.

N

Check if OK

Check if OK

Check if OK

Check if OK

- (40). Repeat Steps 38 and 39 for Monitor 2.
- (41). Return the CRS SBO RF Level Values to Nominal.
- (42). Restart the station. Normal operation with no monitor alarms should be indicated.
- (1) Integral Mon 1 Path DDM Value
- (2) Standby Mon 1 Path DDM Value
- (3) Integral Mon 2 Path DDM Value
- (4) Standby Mon 2 Path DDM Value

Test Step	Alarm	Freq Patt	INT 1	INT 2	STBY 1	STBY 2
(679)	DE ALADMI OW	CRS		M		V
(0,7,8) KF ALARM LOW	CLR				V	
(10.11.12)	DE ALADM HICH	CRS		$\checkmark$		V
(10,11,12)	KF ALARM HIGH	CLR	$\checkmark$	V		V
(16,17,18)	PATH SDM ALARM LOW	CRS		V		V
-	150HZ MOD% ALARM LOW	CLR		V	~	V
(20,21,22)	PATH SDM ALARM HIGH	CRS	V			V
1. 2000 - 21.2	150HZ MOD% ALARM HIGH	CLR				$\checkmark$
(25,26,27)	PATH DDM ALARM LOW	CRS	V		V	
(29,30,31)	PATH DDM ALARM HIGH	CRS	V			V
(34,35,36)	WIDTH DDM ALARM LOW	CRS			V	
(38,39,40)	WIDTH DDM ALARM HIGH	CRS	V	V		V

**15.** Integral Monitor Reverse Sensing Alarms: 於CRS CSB及CLR CSB加入180度線,並 檢視Monitor Width DDM使否發生反相。

SETUP : Station operation normal

(1). Place Transmitter 1 on antenna. On the PMDT sidebar, select TX1 Off. Install a 180 degree cable in Transmitter 1 Course Power Amplifier SBO output. On PMDT sidebar, select TX1 Antenna.



- (2). Observe on the PMDT the CRS width monitor reads approx. -0.175 DDM 90 Hz.
- (3). Confirm that both monitors show a reverse sensing alarm.
- (4). Remove system from bypass and confirm a hard shutdown.

### CRS TX

- CRS Width DDM (2)
- (3)Monitors indicate reverse sensing alarm
- (4) Hard shutdown

## -0.172 M Check if OK Check if OK

Approx -0.175 DDM

#### Monitors Certification and Certification Limits: 测試監視自我驗證功能是否正常。 16.

### SETUP : Station operation normal

- On the PMDT, log-on at Level 3 Password. Select the [RMS / Configuration / General]. (1).
- (2).Disable Monitor Certification.
- (3). On the PMDT, select [Monitor 1 / Data /] and verify Certification Test Results tab does not appear.
- (4). On the PMDT, select [RMS / Configuration / General].
- (5). Enable Monitor Certification.
- (6). On the PMDT, select [Monitor 1 / Data / Certification Test Results] and verify the monitor certification interval  $\leq$  two minutes.
- (7). On the PMDT, select [is Monitor 1/ Monitor Offsets and Scale Factors/Certification].
- (8). Change the Path SDM Scale to 0% Mod.



- (9). On the PMDT, select [Monitor 1 / Data / Certification Test Results].
- (10).Verify that an out-of-tolerance condition exists for Path SDM.

ocal Red	Standby Certificati	on Test Results					
ocal Que			Maintenance	Nots Status			timeanddate.cor an screen mode
() Scort	of Test 105/01/18	10:53:28	Communic	cations Fault	Certification	n Category CAT III	
Tx2		Porth Ha	th Test	Patr Ia	Test		00.01.377
		Expected	Actual	Epected	Actual		00.01.01.138
Pat	th RF Level	120.0	121.5	80.0	81.1	% of Nominal	00:01:37.738
Pat	ah DDM	0.050	0.049	-0.050	-0.050	DDM	
Pa	ath SDM	84.0	100	76.0	0.6	% Mod	
i ini	Vidth C/D/M	0.175	0.175	0.175	0 175	MOC	Split Reset
T III							
n <u>Y</u>		Width N	larow Test	Width V	Weber Test		Set start alert and sounds
		Expected	Actual	Expected	101.4	2 of Nominal	
	Path RF Loves	10000	10,000	0.000	0.000	DDM	More Detail * Reverse
	Path DDM	1 200	00	0.08	0.0	% Mod	Split
10.001 v	Path SDM	0.725	0.224	0.125	0.125	MOD	14 00:01:27 738
	Width DDM	10.223	1				#1 00.01.37.130

(11). On the PMDT, select [RMS / Status / Monitor/Transmitter Status] and verify the Monitor 2 Indicator is Green and Monitor 1 Indicator is not Green. This indicates the Monitor is disabled from voting.



- (12). Verify Monitor 1 is in an alarm condition for Integral and Standby Transmitter on LCU.
- (13). On the PMDT, select [Monitor 1 / Offsets and Scale Factors/Certification] and change the Path SDM Scale to 100% Mod.
- (14). On the PMDT, select [Monitor 2 / Offsets and Scale Factors/Certification].
- (15). Change the Path SDM Scale to 0% Mod.
- (16). On the PMDT, select [Monitor 2 / Data / Certification Test Results].
- (17). Verify an out-of-tolerance condition exists for Path SDM.
- (18). On the PMDT, select [RMS / Status / Monitor/Transmitter Status] and verify the Monitor 1 Indicator is Green and the Monitor 2 indicator is not Green. This indicates Monitor 2 is disabled from voting.
- (19). On the PMDT, select [Monitor 2 / Offsets and Scale Factors/Certification] and change the Path SDM Scale to +100% Mod.
- (20). On the PMDT, select [Monitor 1 / Data / Certification Test Results] and verify the Certification

Results are in tolerance for all parameters.

(21). On the PMDT, select [Monitor 2 / Data / Certification Test Results] and verify the Certification Results are in tolerance for all parameters.

(2)	Monitor Certification On/Off Control	V	Check if OK
(3)	No monitor certification tab	ল	Check if OK
(6)	Monitor Certification Interval	Imin. 37 sec	< 2 min.
(10)	Mon. 1 path SDM out of tolerance		Check if OK
(11)	Mon. 1 voting disabled		Check if OK
(12)	Mon. 1 alarm for integral and standby TX		Check if OK
(17)	Mon. 2 path SDM out of tolerance		Check if OK
(18)	Mon. 2 voting disabled		Check if OK
(20)	Certification results in tolerance for all parameters for monitor #1	M	Check if OK
(21)	Certification results in tolerance for		Chick II OIL
	all parameters for monitor #2	Ľ	Check if OK

### 17. Transmitter Selection and Indications:檢視發射機切換和指示正常。

### SETUP : Station operation normal

Operate the system to observe the following indications are normal.

- (1). Transfer TX #1 and TX #2 as main and observe the indicator lamps.
- (2). Transfer TX #1 and TX #2 and observe the on- antenna indicator lamps.
- (3). Make standby TX hot and observe correct indications of load lamps.
- (4). Turn TX #1 then #2 off and observe the correct indication of off lamps.

Check if OK

Check if OK

Check if OK Check if OK

<ol> <li>Main Transmitter Sele</li> </ol>	ect and Indication
---	--------------------

- (2) Transmitter Antenna Select and Indication
- Transmitter Load Select and Indication
   Transmitter OFF Select and Indication

+)	Transmitter	OFF	Select	and	Indication	

## 18. Power Supply Functions: 測試備用電池電源運作正常。

### SETUP : Station operation normal

Operate the system to observe the following indications and functions are normal.

- (1). Remove AC power from system and observe the AC fail indication.
- (2). With AC removed observe the on-batteries indication.









- (4). With the system normal observe the DC-DC converter indication.
- (5). Shut system down by turning off AC inputs. Turn on AC input only and observe the system returns to normal no alarm operation without a reset command.
- (6). Remove AC input and turn on DC (battery) input and observe that the system does not restart.
- (7). Press both BCPS reset buttons and observe the station returns to normal (with no alarm) operation.

(1)	AC Line Fail Indication		Check if OK	
(2)	Station On-Battery Indication		Check if OK	
(3)	Battery Fault Indication	V	Check if OK	
(4)	DC - DC Convertor OK Indication	V	Check if OK	
(5)	Automatic Station Power-Up on AC power			
	restoration (No Batteries)	И	Check if OK	
(6)	System does not restart	V	Check if OK	
(7)	Station On/Off Control on Batteries only -			
	(No AC Power Present)	N	Check if OK	

**19.** Station Transfer Action: Main-to-Standby; Hot Standby Operation: Hot Standby下檢 視告警觸發時,於標準時間內正常執行切換機。 **SETUP** : Dual System Operating in Hot Standby Configuration with Both Transmitters On. On the PMDT, select [RMS/Configuration/General] and set the Automatic Restart Delay to 20 seconds. Logoff / Disconnect from the PMDT.

Operate the system to observe the following indications and functions are normal.

(1). Disconnect the CRS system SBO Feed Line From main Transmitter output and start the stopwatch.



- (2). Observe the transfer to Standby Transmitter occurs in 1.0 second or less.
- (3). Observe the visual and aural alarms on the Glideslope system upon transfer.
- (4). Observe the system stays on line after transfer (no alarms).
- (5). Reset the Main Transmitter to normal and disconnect the lower antenna feed cable to the antenna simulator.



- (6). Observe the system transfers and shuts down the Standby transmitter, and is in the OFF condition.
- (7). Observe the visual and aural alarms on the Glideslope system.
- (2) Station Transfer Action: Main to Stby
- (3) Local Aural + Visual Alarms
- (4) Continued Operation on Stby
- (6) Station Transfer Action: Main to Stby to Off
- (7) Local Aural + Visual Alarms



< 1 Sec Check if OK Check if OK < 1 Sec Check if OK

## 20. Final System Settings:列印最終系統參數設定。

SETUP : Station operation normal

(1). Print the final system settings by selecting system / configuration print.

三、 DME 1118A性能測試: (金門06DME測試結果)

1. Frequency Verification Test:檢視DME各發射接收頻率是否符合該站台。

SETUP : This block diagram details the test setup.



Figure 3-3 Frequency Verification Test Setup

- (1). With the Power off, set up the DME for test.
- (2). Turn on the system by switching the AC TX1, AC TX2, DC TX1 and DC TX2 breaker switches to the ON position.
- (3). On the LCU put the DME in LOCAL mode. Select BYPASS on INTEGRAL and STANDBY Monitors. Turn ON both the MAIN and STANDBY transmitters.



- (4). Connect frequency counter to TX1 Power Amplifier (1A9) J1 TX LO connector. Measure and record the frequency.
- (5). Connect frequency counter to TX2 Power Amplifier (1A17) J1 TX LO connector. Measure and record the frequency.



- (6). Connect frequency counter to Monitor Interrogator (1A11) INT LO connector. Measure and record the frequency.
- (7). Connect frequency counter to Monitor Interrogator (1A15) INT LO connector. Measure and record the frequency.



- (8). Connect frequency counter to the Receiver Transmitter Controller (1A10) RX LO connector. This frequency is 125 MHz lower than the assigned receive frequency. Measure and record the frequency.
- (9). Connect frequency counter to the Receiver Transmitter Controller (1A16) RX LO connector. This frequency is 125 MHz lower than the assigned receive frequency. Measure and record the frequency.



	2 Transmitter Dower Output Test · 景油印		onitor题子的市家具不符
9.	Receiver (RTC) Local Oscillator Frequency	924.999 MHz	Assigned RX Freq
8.	Receiver (RTC) Local Oscillator Frequency (1A10 RX LO)	9 <u>-5</u> MHz	Assigned RX Freq -125 MHz ± 0.001%
7.	Monitor/Int 2 Output Freq (1A15 INT LO)	1050 MHz	Assigned RX Freq $\pm 0.001\%$
6.	Monitor/Int 1 Output Freq (1A11 INT LO)	1050 MHz	Assigned RX Freq ± 0.001%
5.	TX2 Output Frequency (1A17 J1 TX LO)	9 <u>87</u> MHz	Assigned TX Freq ± 0.001%
4.	TX1 Output Frequency (1A9 J1 TX LO)	98 <u>6.999</u> MHz	Assigned TX Freq ± 0.001%

合Low Power DME 100W以上。 SETUP: This block diagram details the test setup. Connect the PMDT to the USB Connector on the front of the RMS

CCA using a USB computer cable.



(1). On the LCU turn off both transmitters. Connect the Peak Power Sensor with a 10dB attenuator in line to the coupled port of the coupler.



- (2). Set the peak power meter test frequency to the DME transmitter frequency under the Channel Setup screen. Also verify Video B/W is Off.
- (3). Calibrate the peak power meter by pressing the CAL button then selecting Zero+Cal.
- (4). Turn on both transmitters with TX1 on antenna.
- (5). Position the cursors around the first TX pulse. Observe and record the peak meter reading.
- (6). Position the cursors around the second TX pulse. Observe and record peak meter reading.
- (7). Calculate the pulse pair difference reading from values obtained in Steps 7 and 8.



- (8). Log on to the DME with the PMDT. Click on System>>Log RMS>> and enter User ID (SEC3) and Password (THREE). Observe and record TX PWR displayed on PMDT >> Monitors >> Data >> Integral, TX Power.
- (9). Select Transmitter 2.
- (10). Observe and record TX PWR displayed on PMDT >> Monitors >> Data >> Integral, TX Power.

Connected	Il Monitor Data		🗿 📴 Next (F5)	Close (F6)	Apply (F7) Rasel
	Integral Standby		///////////////////////////////////////	mm	
Transmitters		05/03/18 10:24:09	05/03/18 10:24:10	111///	
Tx1 Tx2	(D)	Monitor 1	Monitor 2	HIIII	MMMM
Man	Delay	50,01	50,00	US	********
Load 5	Spacing	11.99	11 55	us	111111111
011	Ix Power	101	198	Watts	11111111111111111111111111111111111111
Monitors	(ERP		0.4	dB	WWWWW
Integral Standby	Efficiency		100.0	2.	141411111
G Normal 6	PRF	785	792	ppps	オオイイトレト
Sec Alarm	Ix Frequency	986.999	986.999	MHz	じかいびびび
Bypass	Ix Hequency Error	Constant of the second second	annesistante <b>France</b> ttante	ppm	Mana
	By IO Englisher	925.001	925.001	MHz	We Man She Manager
Delay (50.0	Bx frequency Error	Street	No. of Concession, Name	ppm	The states of th
1300	1 Journay	1050.001	1050.001	MH+	Adden They they they they

5.	First TX Pulse Peak Power (P1)	103	≥100W
6.	Second TX Pulse Peak Power (P2)	103	≥100W
7.	Pulse Pair Amplitude Difference (P1 – P2)	0	$\leq 0.5 dB$
8.	Display Monitor 1	104	P2 ±2.5W
	Display Monitor 2	104	P2 ±2.5W
10.	TX 2 Display Monitor 1	104	≥100W
	TX 2 Display Monitor 2	103	≥100W

- 3. Spectral Characteristics Test: 檢驗DME輸出信號頻寬對稱性及中心頻率± 800KHz與±2MHz之dB值大小是否符合規範。
- SETUP : This block diagram details the test setup.



(1). Disconnect Peak Power Meter from the directional coupler at the top of the DME cabinet. Connect Spectrum Analyzer to directional coupler.
- (2). Turn On Transmitter 1.
- (3). Adjust the spectrum analyzer for center frequency on the assigned frequency.
- (4). Adjust the total span to 5 MHz. Adjust the resolution bandwidth to 30 KHz, Video bandwidth to 30 kHz and sweep time to 2 seconds.
- (5). Select Marker Peak Search. Record Center Frequency amplitude.
- (6). Measure and record the difference between the reference level from step 5 and the level at each of the points listed on the data sheet.
- (7). Select Transmitter 2.
- (8). Set the top of displayed spectrum to the top reference line. Record Center Frequency amplitude.
- (9). Measure and record the difference between the reference level from step 5 and the level at each of the points listed on the data sheet.







5	TX 1 Center Frequency Amplitude
6.	TX1 Offset Frequency of +2 MHz
	TX 10ffset Frequency of +800 kHz
	TX 10ffset Frequency of -800 kHz
	TX 1 Offset Frequency of – 2 MHz
8.	TX 2 Center Frequency Amplitude
9.	TX2 Offset Frequency of +2 MHz
	TX 20ffset Frequency of +800 kHz
	TX 20ffset Frequency of -800 kHz
	TX 2 Offset Frequency of – 2 MHz

<u> </u>	Reference (0 dB)
-68.7	$\geq$ 53 dB from reference
-17.8	$\geq$ 33 dB from reference
- 57.3	$\geq$ 33 dB from reference
-68.4	$\geq$ 53 dB from reference
0	Reference (0 dB)
-67.1	≥ 53 dB from reference
-57.4	≥ 33 dB from reference
-57.2	$\geq$ 33 dB from reference
-67-1	$\geq$ 53 dB from reference

**4.** Spectral Harmonic Characteristics Test: 量測DME REPLY頻率2次諧波及3次諧波 是否符合標準。

SETUP :



(1). Spectrum Analyzer to directional coupler, as shown in Figure 3-6 with 50 dB of attenuation between the straight through port of the directional coupler and the spectrum analyzer, and the 30 dB forward coupled port of the directional coupler to J2, the monitor input. Do NOT use the coupled port of the directional coupler for harmonic measurements.



- (2). Turn On Transmitter 1.
- (3). Configure spectrum analyzer:
  - i. Center frequency = channel frequency of DME
  - ii. Frequency Span = 4 MHz
  - iii. Internal attenuation 10 dB minimum
  - iv. Resolution Bandwidth (RBW) 100 KHz
  - v. Video Bandwidth (VBW) 300 KHz
  - vi. Sweep time 10 seconds or greater

- vii. Marker = Normal
- (4). Place a marker at the peak of the carrier using peak search
- (5). Set the marker mode to delta

NOTE: the spectrum analyzer marker should read 0 dB

- (6). Set the Center frequency to x2 the channel frequency of the DME
- (7). Select peak search to find the peak of the 2nd harmonic



(8). Record the marker value in dB in the data sheet

(9). Set the Center frequency to x3 the channel frequency of the DME





(11). Record the marker value in dB in the data sheet

(12). Select Transmitter 2 and repeat steps 3 through 11

8.	TX 1 2 <sup>nd</sup> Harmonic	-62.18	$\geq 60 \text{ dB}$ from reference
11.	TX 1 3 <sup>rd</sup> Harmonic	-68	≥ 60 dB from reference
12.	TX 2 2 <sup>nd</sup> Harmonic	-62.08	≥ 60 dB from reference
	TX 2 3 <sup>rd</sup> Harmonic	-68	≥ 60 dB from reference

#### 5. General Monitor Configuration Verification: 檢視各項 MONITOR 參數設定是否 正確。

- (1). Select Monitors>>Monitor Configuration>>General
- (2). Verify that the current settings match Figure 3-7. If not, change to match.
- (3). Print the screen and attach to the data sheet.



- 6. Monitor Alarm Limits Configuration Verification:檢視MONITORS告警臨界參數 設定是否正確。
  - (1). Select Monitors>>Monitor Configuration>>Alarm Limits
  - (2). Verify that the current settings (except for Monitor Reply Attenuation and Directional Coupler Loss) match Figure 3-8. If Y-Channel, substitute 56.00 us for the Nominal Delay. If not, change to match.
  - (3). Print the screen and attach to the data sheet.



#### 7. Monitor Alarm Limit Verification:確認MONITORS告警臨界自我檢驗正常。

Select RMS>>Configuration>>General and check the box (enable) Monitor Integrity Tests. This activates the monitor integrity tests that validate each monitor' s ability to correctly determine out of tolerance conditions. Failure of this test will disable a monitor from voting on the shutdown and/or changeover of the equipment.

- (1). From the PMDT select <u>Monitor 1 >> Test Results >> Alarm Limits</u>.
- (2). Review the Date and Time to verify that current test results are displayed.
- (3). Validate that all parameters are within the high and low limit as indicated by a green background.
- (4). Print the Screen and attach to the test data sheets.

(8).

(5). From the PMDT select <u>Monitor 2 >> Test Results >> Alarm Limits</u>.

Print the Screen and attach to the test data sheets.

- (6). Review the Date and Time to verify that current test results are displayed.
- (7). Validate that all parameters are within the high and low limit as indicated by a green background.
  - SELEX ES Inc. PMDT nitor 1 Test Results 6 DN Next (F5) (FG) units Inten 05/03/18 09:40:53 DK) 49.60 11.60 50 70.0 bK) DK)



- 8. Monitor Interrogator Signal Generator Tests: 確認MONITORS詢問波產生器測試結果是否正常。
  - (1). From the PMDT select <u>Monitor 1 >> Test Results >> Interrogator</u>.
  - (2). Review the Date and Time to verify that current test results are displayed.

- (3). Validate that all parameters are within the high and low limit as indicated by a green background.
- (4). Print the Screen and attach to the test data sheets.
- (5). From the PMDT select <u>Monitor 2 >> Test Results >> Interrogator</u>.
- (6). Review the Date and Time to verify that current test results are displayed.
- (7). Validate that all parameters are within the high and low limit as indicated by a green background.
- (8). Print the Screen and attach to the test data sheets.



Connected	Aunitor 2.1 est Resulti Name Limin / Interrogator   Transpor	ader Decs	oder	é	6	Nort	(5) [Gose (1	ES] [ADDA/ FT7] (Reset (P3))
Alext Local Transmitters Tx1 Tx2	05/03/18 09:41:39		Low Limit	Data		High Linit		
Man	First Pulse Width		3.0	351		4.0		pk)
G Antenna	First Pulso Rise Time		15	21		3.0	un	
Load C	First Pulse Decay Time		1.5			3.0	10	1914/99/199/10/99/2010/04/05 19/20/2017/2017/2017/2017/2017/2017/2017/2
	Second Pulse Width		1 30	1 Ball		4.0	us	
Integral Standby	Second Pulse Rise Time		15	<b>Non</b>		3.0	10	8
Normal Dr	Second Pulse Decay Time		1.5	1281		3.0	un	
PriAlam T	Pulse Angiltude Difference		-0.5	L HO		0.5	dll	DK)
Sec Alom	Pulse Spacing	N	11.80	12:00		12.20	WS:	
1 Obbury	Pulse Rato		25	<b>Hatia</b>		60	ppps	s
Honker 1           Delay         43.99           Spacing         11.19           T # Power         1.04           ERP         0.5           Ethornop         1000           PRF         704	Signal Constants Reference		1.0	<b>11</b> 0.0		10	d <b>B</b>	DK) ps

## 9. Transponder Signal Test:檢視MONITORS對TX1及TX2發射信號之測試是否正常。

- (1). From the PMDT select <u>Monitor 1 >> Test Results >> Transponder</u>.
- (2). Review the Date and Time to verify that current test results are displayed.
- (3). Validate that all parameters are within the high and low limit as indicated by a green background.
- (4). Print the Screen and attach to the test data sheets.
- (5). From the PMDT select <u>Monitor 2 >> Test Results >> Transponder</u>.
- (6). Review the Date and Time to verify that current test results are displayed.
- (7). Validate that all parameters are within the high and low limit as indicated by a green background.
- (8). Print the Screen and attach to the test data sheets.

(9). Put TX2 on antenna and repeat steps 1 to 8 for transmitter 2.





#### **10.** Transponder Decoder Tests:檢視MONITORS對TX1及TX2的DECODER之測試是 否正常。

- (1). Using the LCU controls bypass the Integral and Standby monitors.
- (2). Put TX1 on antenna
- (3). From the PMDT select Monitors>>Special Tests. Select Decoder Tests for Monitor 1 and 2 then press the "Apply" button followed by the "Start" button.
- (4). From the PMDT select Monitor 1 >> Test Results >> Decoder. Wait for all tests to complete.
- (5). Validate that all parameters are within the high and low limits as indicated by a green background.
- (6). Print the Screen and attach to the test data sheets.
- (7). From the PMDT select <u>Monitor 2 >> Test Results >> Decoder</u>. Wait for all tests to complete.
- (8). Validate that all parameters are within the high and low limits as indicated by a green background.
- (9). Print the Screen and attach to the test data sheets.
- (10). Put TX2 on antenna and repeat steps 3 to 9 for transmitter 2.
- (11). Logoff the PMDT then press the RESET button on the LCU.

				CHE LAND	(rol) [cause (ro	CHANG (0.1)	necet (ro)	
Backup Needed	inits Interrogator Transponder Decod	er						
Allert Y Local 05/1	33/18 09:43:15							
Transmitters		Low Limit	Data	High Limit			DK)	
R Main Rec	ceiver Sensitivity @ 12.0 us (R)	97.0	EXC	-91.0	dBm		pr.,	
6 Antenna Spa	acing: 13.0 us @ -93.3 dBm (R + 1dB)	70.0	\$78	100.0	2	Updated		
Load 6 Sp	acing: 12.5 us @ -93.3 dBm (R + 1dB)	70.0	93.3	100.0	2	Updated		
_ 0# _ I	acing: 11.5 us @ -93.3 dBm (R + 1dB)	70.0	96.0	100.0	2	Lipdated /	5	
Monitors Standhu St	secing 11.0 us @ -93.3 dBm (R + 1dB)	70.0	87.0	100.0	1	Updated		
Normal R	F +200 kHz @ -91.3 dBm (R + 3dB)	70.0	58.0	100.0	*	Updated	DK)	
Pri Alarm	IF -200 kHz @ -91.3 dBm (R + 3dB)	70.0	58.4	100.0	<u>*</u>	Undered		
Sec Alam Y	8F +900 kHz (@ -10 dBm)	0.0	00	50		Dested	5	
T oypers T	RF-900 kHz (@ -10 dBm)	00	10	5.0	2	Updated		
Monitor 1	Specing 9.0 us (e) -17.3 dBm (H + 7700)	0.0	00	5.0	¥ 🚺	Updated	DK)	
Delay 0.00	Spacing: 10.0 us (@ -10 dBm)	0.0	0.0	5.0	2	bdated		
Tx Power 0	Spacing 15 0 us @ 17.3 dBm (R + 77dB)	0.0	00	5.0	2 1	Process	ps	
Elforence 00								
RIVIS Monitors Mor	nitor 1 Monitor 2 Transmitte	rs Diagn	ostics Info			-staticality		
KANS Monitors Mor Connected Morelo est-up teeded Akam	nitor 1 Monitor 2 Transmitte r 2 Test Results Lanta   Interrogator   Transporder   D	rs Diagn	ostics Info		Next (F5)	Close (F6)	Apply (F7) [Reset (F8]]	
Toms Montors Mor Connected Morelo Schus Needed Alarm. Alert V Local Tos	nitor 1 Monitor 2 Transmitte r 2 Test Riesuits Limits interrogetor Transponder D 203/18 09 43 35	rs Diagn	ostics Info		Next (F5)	(Clase (F6))	Arply (F7) [Reset (F8)]	
Terrisonaters	nitor 1 Monitor 2 Transmitte r 2 Test Results Linita: Interrugator Transponder D 03/18.09.43.36	rs Diagn	ostics Info		Next (F5)	(Close (F6))	Acply (F7) [Reset (F8)]	
Turnis Monitors More Connected Morelo Style Needed Alert M Local Transmitters A Ty2	nitor 1 Monitor 2 Transmitte r 2 Test Results Linita: Interregistor Transponder D 103/18 09:43:36	ecoder	ostics Info	ta H	hgh Line	(Close (F6))	Arphy (F7) (Reset (F8))	
Transmiters Trace Transmiters	nitor 1 Monitor 2 Transmitte r 2 Test Riesults Lanta: Interrogator Transponder D 703/18 09 43 36 conver Senstivity @ 12.0 us (R)	rs Diagn ecoder	ostics Info	ta +	hgh Lint -91.0 d	(Close (F6))	Acply (F7) (Reset (F8))	Х рк
NMS         Monitors         Morito           Connected         Morito         Morito           Schust Heeded         Alarm.         Mar.           Alert M Local         Transmitters         IDS           Main         Tx2         Reg           Main         Sk         Sk	nitor 1 Monitor 2 Transmitte r 2 Test Riesuits Limits Interrogetor Transponder D 703/18 09:43:36 cenver Senativity (2:12.0 us (R) accing: 13.0 us (2:93.3 dBm (R + 148)	ecoder	ostics Info mit Da	ta +	kgh Linat -91.0 d 100.0	(Elose (F6))	Acpb/ (F7) [Reset (F8)]	Ж
Avis Monitors Mori Corrected Morito Stud Needed Alest M Local Transmitters Al Tx2 S Anterno S Anterno Off	intor 1 Monitor 2 Transmitte 12 Test Results Limits Interrogator Transponder D 03/18 09:43.36 conver Sensitivity @ 12.0 us (R) secing: 13.0 us @ 43.3 dBm (R + 1dB) aecing: 12.5 us @ 43.3 dBm (R + 1dB)	ecoder Low Li 700 700	ostics Info mit Da 9 94 9 85 9 96	ta + 3 [ 4 [	kgh Lme 91.0 d 100.0	Clase (F6)	Acply (F7) Reset (F8)	ÞK
Turnis Monitors More Connected Moreto Status Needed Alert Local Transmitters A Tr2 Re Arterna Load B Main S Moretors	ntor 1 Monitor 2 Transmitte r 2 Test Results Lants Interrogator Transponder D 103/18 09 43.36 convor Sensitivity @ 12.0 us (R) ascing 13.0 us @ 93.3 dBm (R + 1dB) pacing 11.5 us @ 93.3 dBm (R + 1dB) pacing 11.5 us @ 93.3 dBm (R + 1dB)	rs Diagn ecoder Low L - 97.0 70.0 70.0 70.0 70.0 70.0	ostics Info mt Da 94 95 95 96 96 96	ta + 3 [ 4 ] 0 [	Next (F5)	Close (Fb)	Acply (F7) Reset (F8)	рк
Nontors     Montors       Connected     Monitors       Schuck Heeded     Alarm.       Alert M Local     Transitives       Instructures     File       Main     Signature       Local     Signature       Units     Signature       Off     Signature       Monitors     Standby	nitor 1 Monitor 2 Transmitte r 2 Test Riesults Linita: interrogator Transponder D 03/18 09.43.36 cenver Senativity @ 12.0 us (R) secing: 11.0 us @ 93.3 dBm (R + 1dB) pacing: 11.5 us @ 93.3 dBm (R + 1dB) pacing: 11.0 us @ 93.3 dBm (R + 1dB) pacing: 11.0 us @ 93.3 dBm (R + 1dB)	rs Diagn ecoder Low L 97.0 70.0 70.0 70.0 70.0 70.0	ostics Info mt De 3 54 7 56 7 56 7 56 7 56	ta + 3 [ 4 [ 0 ] 3 ]	tgh Line 91.0 d 100.0 100.0 100.0	Bm         1           X         Upx           X         0.05           X         0.05           X         0.05           X         0.05	Acoly (F7) (Reset (F8))	DK 5
NMS Monitors Mori Connected Moriao soluzi Needed Alami Alert M Local Transmites Al Tx2 Man Fix G Arterna Si Lood Si Off Si Noralos Nandby	nitor 1 Monitor 2 Transmitte r 2 Test Riesults Limits Interregator Transponder D 003/18 09:43:36 cerver Senativity @ 12.0 us (R) aeang 13.0 us @ 53.3 dBm (R + 148) paeang 11.5 us @ 53.3 dBm (R + 148) paeang 11.1 us @ 53.3 dBm (R + 148) paeang 11.1 us @ 53.3 dBm (R + 148) paeang 11.1 us @ 53.3 dBm (R + 148)	rs Diagn ecoder Low L -97.0 70.0 70.0 70.0 70.0 70.0 70.0 70.0	ostics Info mt Da 94 95 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9		kgh Line 91.0 d 100.0 100.0 100.0 100.0 100.0 100.0	Close (F6)         (           K         Use           X         Use           X         Use           X         Use           X         Use           X         Use           X         Use	Acply (F7) Reset (F8)	DK
Nonitors     Monitors       Corrected     Moreto       School Meedad     Marm       Alest M Local     Marm       Transmitters     Marm       Marm     School Meedad	Intor 1 Monitor 2 Transmitte 12 Test Results Limits Interrogator Transponder D 03/18 09:43.36 conver Sensitivity @ 12.0 us (R) secing: 13.0 us @ 33.3 dBm (R + 1dB) pacing: 11.5 us @ 33.3 dBm (R + 1dB) pacing: 11.5 us @ 33.3 dBm (R + 1dB) pacing: 11.5 us @ 33.3 dBm (R + 1dB) RF -200 kHz @ 31.3 dBm (R + 3dB) RF -200 kHz @ 31.3 dBm (R + 3dB)	rs Diagn ecoder Low L - 57.0 70.0 70.0 70.0 70.0 70.0 70.0 70.0	ostics Info mat Do 94 7 8 9 7 9 8 9 8 9 9 9 9 000 000 0000000000		tgh Line 91.0 d 100.0 10	(Clase (Fb))         (           Bm         (           2         (           2         (           2         (           4         (           4         (           4         (	Acply (F7) Reset (F8)	DK S
NAME     Monitors     Morito       Connected     Moreto       Schurz Liesdad     Alarm.       Alart     Local       Transmiters     Alarm.       Off     Standby       Moreto     Standby       Moreto     Standby       Pin Alarn     Standby       Moreto     Standby       Moreto     Standby       Pin Alarn     Standby       Moreto     Standby       Pin Alarn     Standby       Moreto     Standby	Intor 1 Monitor 2 Transmitter r 2 Test Riesults: Limits: Interrogator Transponder D 103/18 09 43 36 rootvor Senstwy @ 12.0 us (R) nacing: 13.0 us @ -93.3 dBm (R + 1dB) pacing: 11.0 us @ -93.3 dBm (R + 1dB) RF + 200 kHz @ -13.3 dBm (R + 3dB) RF + 900 kHz (@ -10 dBm)	rs Diagn ecoder Low Lu - 97 0 70 0 70 0 70 0 70 0 70 0 70 0 70 0	ostics Info mat Do 55 2 55 3 1000 2 1000 0 1000		tgh Line 91.0 d 100.0	Close (F6)         (           100         (           100         (           100         (           100         (           100         (           100         (           100         (           100         (           100         (           100         (           100         (           100         (	Aroly (F7) (Reset (F8))	DK S
NMS     Montors     Morilo       Connected     Moralo       Schuce Liebedod     Alarm.       Alart     Local       Tremmatters     Alarm.       G     Arterna       Local     Standby       Moralors     Standby       Pickans     Standby       Yorkans     Standby       Yorkans     Standby       Yorkans     Standby       Yorkans     Standby	nitor 1 Monitor 2 Transmitte r 2 Test Riesults Linits: Interregistor Transponder D 03/18 09 43 36 cerver Senatively (e) 12.0 us (R) accing: 13.0 us (e) 43.3 dBm (R + 14B) pacing: 11.0 us (e) 43.3 dBm (R + 14B) pacing: 11.0 us (e) 43.3 dBm (R + 14B) pacing: 11.0 us (e) 43.3 dBm (R + 14B) Price 200 kHz (e) 43.3 dBm (R + 34B) RF - 200 kHz (e) 43.3 dBm (R + 34B) RF - 900 kHz (e) - 10 dBm)	rs Diagn ecoder Low L -97.0 70.0 70.0 70.0 70.0 70.0 70.0 70.0	ostics Info mat Day 1 949 1 959 1 97 1		sph Line 910 d 1000 1000 1000 1000 50 5 50 55	(Close (F6)) ( Bm 2 (164 2 (164 2 (164 2 (164 2 (164 2 (164 3 (164) 2	Acoby (F7) (Received (F8))	DK S
HMS     Monitors     Mora       Dameeted     Mora       School Meeted     Alam       Alert Y     Local       Transmitters     Alam       Alert Y     Local       Main     Ts2       Main     School       Off     School       Off     School       Moraios     School       Moraios <td>nitor 1 Monitor 2 Transmitte r 2 Test Results Limits Interregator Transponder D 003/18 09:43.36 conver Senatively @ 12.0 us (R) acting: 13.0 us @ 93.3 dBm (R + 1dB) pacing: 12.5 us @ 93.3 dBm (R + 1dB) pacing: 12.5 us @ 93.3 dBm (R + 1dB) pacing: 11.5 us @ 93.3 dBm (R + 1dB) pacing: 11.5 us @ 93.3 dBm (R + 3dB) RF - 900.kHz @ 91.3 dBm (R + 3dB) RF - 900.kHz @ 01.3 dBm (R + 7dB) Sealing: 9.0 us @ 17.3 dBm (R + 72dB) Sealing: 9.0 us @ 17.3 dBm (R + 72dB)</td> <td>rs Diagn ecoder Low La -970 700 700 700 700 700 700 700 700 700</td> <td>Ostics Info mit Da 94 95 9 85 9 85 9 85 9 85 9 85 9 85 9 85 9</td> <td></td> <td>kyh Line 91.0 d 100.0 1000 100.0 1000 100.0 1000 50 50 50</td> <td>Elose (Fb) {</td> <td>Acply (F7) Reset (F8)</td> <td></td>	nitor 1 Monitor 2 Transmitte r 2 Test Results Limits Interregator Transponder D 003/18 09:43.36 conver Senatively @ 12.0 us (R) acting: 13.0 us @ 93.3 dBm (R + 1dB) pacing: 12.5 us @ 93.3 dBm (R + 1dB) pacing: 12.5 us @ 93.3 dBm (R + 1dB) pacing: 11.5 us @ 93.3 dBm (R + 1dB) pacing: 11.5 us @ 93.3 dBm (R + 3dB) RF - 900.kHz @ 91.3 dBm (R + 3dB) RF - 900.kHz @ 01.3 dBm (R + 7dB) Sealing: 9.0 us @ 17.3 dBm (R + 72dB) Sealing: 9.0 us @ 17.3 dBm (R + 72dB)	rs Diagn ecoder Low La -970 700 700 700 700 700 700 700 700 700	Ostics Info mit Da 94 95 9 85 9 85 9 85 9 85 9 85 9 85 9 85 9		kyh Line 91.0 d 100.0 1000 100.0 1000 100.0 1000 50 50 50	Elose (Fb) {	Acply (F7) Reset (F8)	
Transmiters	Intor 1         Monitor 2         Transmitter           r 2 Test Results         I         Intercogator         Transponder         D           03/18 09 43:36         D         D         D         D         D           03/18 09 43:36         D <td< td=""><td>rs Diagn ecoder - Low La - 9700 7000 7000 7000 7000 7000 7000 7000</td><td>mat Du mat Du 994 9 995 9 99 9 99 9 99 9 99 9 90 9 90 9 9</td><td></td><td>kgh Line 910 d 1000 1000 50 5 50 5 50 5 50 5</td><td>Bm           %</td><td>Acply (F7) (Reset (F8))</td><td></td></td<>	rs Diagn ecoder - Low La - 9700 7000 7000 7000 7000 7000 7000 7000	mat Du mat Du 994 9 995 9 99 9 99 9 99 9 99 9 90 9 90 9 9		kgh Line 910 d 1000 1000 50 5 50 5 50 5 50 5	Bm           %	Acply (F7) (Reset (F8))	
Nontors     More       Connected     Morelo       Sciucitiesded     Alarm       Alert     Local       Transmitters     Alarm       Alarman     Signal       Off     Signal       Off     Signal       PinAlarman     Signal       Moraious     Signal	Itor 1 Monitor 2 Transmitter     (2 Test Riesults     Linita: interrogator Transponder D     003/18 09.43.36     003/18 09.43.36     003/18 09.43.36     003/18 09.43.36     004 09.43.36     004 09.43.36     004 09.43.34     004 09.43     004 09.43.34     004 09.43     004 09.43.34     004 09.43     004 09.43     004 09.43     004 09.43     004 09.43     004	**************************************	ostics Info met Da 1 994 2 85 2 85 2 86 3 86 3 86 3 86 3 86 3 86 3 86 3 86 3		Ness (FS)           \$10         d           100.0         d           100.0         d           50         x	Ebm         105           2         105           2         105           2         105           2         105           2         105           2         105           2         105           3         105           4         105           5         105           6         105           7	Aroly (F7) (Receive (F9))	
NAMS Monitors Mor Connected Moralo Soluzi Liesded Alert M Local Transmittes Al Tx2 Man File Aretrona Load S Orf Standby Noralos Negal Standby Moralos Negal Standby Moralos Noral	Intor 1 Monitor 2 Transmitte r 2 Test Riesulas Linitas Interregetor Transponder D 003/18 09 43:36 roceiver Senatively (€ 12.0 us (R) aeang: 13.0 us (€ 93.3 dBm (R + 14B) paeang: 11.2 Su (€ -93.3 dBm (R + 14B) paeang: 11.5 us (€ -93.3 dBm (R + 14B) Beaang: 11.0 us (€ -93.3 dBm (R + 14B) BF - 200 kHz (€ -91.3 dBm (R + 34B) RF - 200 kHz (€ -10.3 dBm (R + 74B) Spaeang: 9.0 us (∈ -10.3 dBm (S) Spaeang: 9.10 us (∈ -10.3 dBm (S) Spaeang: 15.0 us (€ -17.3 dBm (S) + 778B)	ecoder	ostics Info mit Da 3 34 3 55 3 55 3 55 3 55 3 55 3 55 3 55		A Next (F5) Agh Line 910 0 100.0 100.0 100.0 100.0 50 50 50 50 50 50 50 50 50 5	Bin 22 (Bose (Fb)) ( 22 (Bos 22 (Bos 24 (Bos 25 (Bos 25 (Bos 26 (Bos 2	Acoby (F7) Reset (F8)	рк рк
	Intor 1         Monitor 2         Transmitter           r 2 Test Results         I	rs Diagn ecoder Low La -970 70.0 70.0 70.0 70.0 70.0 70.0 70.0 7	ostics Info mat Do 94 95 95 96 96 97 97 97 97 97 97 97 97 97 97 97 97 97		Next (F5)           \$91.0         d           91.0         d           100.0         100.0           100.0         5           5.0         %           5.0         %           5.0         %           5.0         %           5.0         %           5.0         %	Em 22 (Lose (Fb)) ( 22 (Lose 22 (Lose 24 (Lose 2	Acoby (F7) Reset (F8)	рк 5 ж)
NMMS     Monitors     Morito       Connected     Morelo       Sciup Licestad     Alam.       Alam     Tassaites       A     Tassaites       Load     Stadby       Load     Stadby       Marria     Stadby       Morelos     Stadby	Intor 1 Monitor 2 Transmitte (2 Test Riesults: Linits: Interrogator Transponder D 103/18 09 43 36 103/18 09 43 36 conver Senatively @ 12.0 us (R) bacing: 11.5 us @ 33.3 dBm (R + 1dB) bacing: 11.5 us @ 33.3 dBm (R + 1dB) bacing: 11.0 us @ 33.3 dBm (R + 1dB) RF +900 kHz @ -13.3 dBm (R + 3dB) RF +900 kHz @ -10.3 dBm (R + 7xB) Seacing: 10.0 us (@ -10.4 Bm) Spacing: 10.0 us (@ -10.4 Bm) Spacing: 10.0 us @ -17.3 dBm (R + 7xB) Spacing: 10.0 us @ -17.3 dBm (R + 7xB)	rs Diagn ecoder Low L -97.0 70.0 70.0 70.0 70.0 70.0 70.0 70.0	ostics Info mat Du 55 5 5 5 5 5 5 5 5 5 5 5 5		Next (F5)           \$91.0         d           991.0         d           100.0         d           100.0         d           100.0         d           50         %           50         %           50         %           50         %           50         %           50         %           50         %           50         %           50         %           50         %           50         %	Eben           X         Use           X         Use <td>Aroly (F7) (Reset (F8))</td> <td>рк 5 ж)</td>	Aroly (F7) (Reset (F8))	рк 5 ж)

## 11. RSCU Controls:驗證RCSU之連線功能及軟體連線操作,RCSU面板操作控制 及燈號顯示是否正常。

- (1). Connect a dedicated pair of wires from the RCSU to the DME at the Interface CCA terminals TB2 pins 1 and 2 (polarity is not important)
- (2). Logon to the DME at Security Level Three and put the system in Local Mode.
- (3). From the RMS>>Configuration screen, set RCSU Present and Connection Type to "Dedicated Modem". Press "Apply" then select RMS>>Config Backup to save the settings.
- (4). Logoff the PMDT then press the RESET button on the LCU.
- (5). After the DME boots up, verify that there is communication indication between the RCSU and the DME by viewing the communication status. Check Data Sheet if OK.
- (6). Verify a normal condition on both Main and Standby DMEs. Check Data Sheet if OK.
- (7). From the RCSU turn OFF the DME. Verify both transmitters respond by shutting down. Silence any audible alarms at the RCSU or DME. Check Data Sheet if OK.
- (8). Wait more than 20 seconds then turn the DME ON from the RCSU.Verify the Integral and Standby monitors are normal and the main transmitter is running. Check Data Sheet if OK.
- (9). On the RCSU press the TRANSFER button. Verify system transfer. Check Data Sheet if OK.

5.	Communication established as indicated on the RCSU		(Check if OK)
6.	RCSU indicates Main and Standby in Normal condition		(Check if OK)
7.	Both Main and Standby DMEs Shutdown		(Check if OK)
8.	Both Main and Standby DMEs Startup after 20 sec	V	(Check if OK)
9.	Transfer Command switches main	V	(Check if OK)

- **12.** Modem Remote Monitoring:驗證RCSU能透過外部MODEM連線至裝備,並進行相關之監視及控制。
  - (1). Log OFF from PMDT. Connect a telephone line to the DME modem at the Interface CCA (TB2 Pins 3 and 4). Using a remote computer with PMDT software, call the DME and establish communications. Log on to the system.
  - (2). Check data sheet if OK then logoff the PMDT.



2. Communications to the DME with the remote PMDT established

(Check if OK)

 $\square$ 

- 13. Battery Backup:檢驗DME裝備BCPS對蓄電池充放電功能,市電中斷、蓄電池 故障等監視功能是否正常。
  - Turn off the AC and DC breakers for both systems. Connect four discharged 12Vdc batteries in series to the DME TX1 and TX2 DC breakers and the ground buss bar.
     NOTE: If the batteries are fully charged it may be necessary to check when batteries are at a lower level.
  - (2). Place a DC current probe around the negative battery cable then turn on the AC and DC breakers for TX1. Verify that BCPS1 is supplying 4 to 7 amps of peak charge current. Record on the data sheet.



**NOTE:** The battery charge current will dip every five seconds as the BCSP is performing a battery fault test.

- (3). Turn off TX1 AC circuit breaker and verify TX1 continues to operate on battery power. Check data sheet if OK. Turn off TX1 DC breaker.
- (4). Turn on TX2 AC and DC breakers. Verify that BCPS2 is supplying 4 to 7 amps of peak charge current. Record on the data sheet.



(5). Turn off TX2 AC circuit breaker and verify TX2 continues to operate on battery power. Check

data sheet if OK. Turn off TX2 DC breaker.

(6). Turn on TX1 and TX2 AC and DC breakers. Verify that the summed chargers are supplying 8 to 14 amps of charge current. Record on the data sheet.



2.	BCPS1 Charge current	6.2	4 to 7 amps
3.	TX1 operates on Batteries	Ø	(Check if OK)
4.	BCPS2 Charge current	6.5	4 to 7 amps
5.	TX2 operates on Batteries	V	(Check if OK)
6.	Summed Charge current	17.1	8 to 14 amps

# 14. Fault Isolation:以PMDT軟體連線至DME,執行完整的錯誤偵測,確認DME裝備無故障訊息產生。

- (1). Put the DME in Local mode
- (2). Logon locally at Security Level 3
- (3). From the PMDT select Diagnostics >> Fault Isolation. Press the Run Full Diagnostics button.
- (4). Verify the DME passes fault isolation with no faults found.
- (5). Print the Screen and attach to the test data sheets.

pme	System RMS Monito	RWY 06 - Dual DME - SELEX E rs Monitor 1 Monitor 2 Trans	S Inc. PMDT mitters Diagnostics Info		ty Mo
	Connected	Diagnostice Data and Commande	Next (F5)	Close (F6) Apply (F7) Reset (F8)	
	Alet V Loos	Power Up Results Fault Isolation			
	Transmitters	Sub System	Progress	Results	
	Tx1 Tx2	Power Supplies		Passed	DK)
N I I I I I I I I I I I I I I I I I I I	G Antenna	Monitor		Passed	
	Load 6	Rx/Tx Controller	CONTRACTOR OF STREET, STR	Passed	
	Monitors	Power Amplifiers		Passed	
	Integral Standby	Control		Passed	
	Pri Alarm		Fault Isolation Results		DK)
	Y Bypass Y	-> NO FAULT FOUND <			8
	Monitor 1				
	Delay 50.01 Spacing 11.99				DK)
- Bar	Tx Power 104			Q.,	ps
A COLORED IN COLOR	Ethciency 1000			Bin On Ar	
	PRF 785	Diagnostica	Cancel	Diagnostics	
-		Periodic Fault Isolation Results			
		FDC9 MOD6			
		×m		·	
August					
and the second second			CAP	NUM Level 3 SEC3	05/03/18 09:50:52

- **15.** Configuration at time of Final Testing:恢復DME裝備正常使用狀態,列印DME 裝備系統參數。
  - (1). Select system configuration from the PMDT
  - (2). Select System >> Configuration print
  - (3). Attach the printout to the test data sheets.

### 肆、 心得及建議

一、心得

- (一)本次為本總臺五年計 17 套 ILS/DME(或 LDA/DME)採購案之第二梯次工廠測 試,測試設備計有金門 06 ILS/DME 及花蓮 21 LDA/DME。有鑑於本案已完成 嘉義 36ILS、馬公 02ILS 及高雄 27ILS 之架設,故本次工廠測試驗收期間,SELEX 公司亦安排原廠工程師團隊與本總臺廠測人員進行技術研討會議,討論自架 設以來各 ILS 架設陣地所遇到的各項技術性問題,藉由現場操作經驗說明,使 SELEX 工程師團隊得以更確切瞭解並掌握裝備之技術性問題,避免了因問題 報告單(PCR)之書面簡短問題敘述,致 SELEX 工程師團隊誤解問題而造成回覆 偏差,透過本次裝備設計者與操作者齊聚的座談會,有利於問題釐清及技術 交流,並能有效且快速解決問題。
- (二)此次汰換 SELEX 公司 ILS/DME 設備為該公司最新開發生產之裝備型號,除了 設備外型由「壁掛式機體」改為「落地式機櫃」外,其中最大的差異實屬 LOC 及 GP 設備的核心-功率放大模組(PA Module)的改變,其PA Module 除了將前一 代 ILS 的 Synthesizer CCA、CRS PA 及 CLR PA 等整合在一起,亦將音頻測試 訊號連接至 RF Monitor CCA,因此當測試 CRS 或 CLR 的音頻訊號時已不需如 前一代 ILS 一樣頻繁地更改測試點,只需在 LCU 面板上切換訊號源即可執行 各種訊號的量測,如此大大提升了測試的效率及增加維護時的便利性。而裝 備由壁掛式機體改為落地式機櫃,讓各模組放置的空間更為寬裕,使維護人 員查修時及更換模組時更加方便,同時將裝備電池整合於機櫃內,使外觀更 加美觀。SELEX 原廠亦將 PA Module 的相位調校修改成可由 PMDT 軟體調設 360 度相位,改善以前調校相位時需外加 90 度相位線的缺點,由軟體調校相 位不僅增加裝備維護的效率,更避免了拆裝傳輸線接頭造成的損壞風險。
- (三)在工廠測試期間,於 SELEX 公司人員帶領下參觀廠內其他部門,含生產、維修、研發、品管、測試及軟體設計等單位,各部門間井然有序地分工處理各業管事務,處處可見嚴謹的管理模式。另參訪物料倉儲管理單位時發現該公司針對各世代系統之庫儲料件均存有 15 年的備料,這對該公司的客戶是一種安全保障;爰此,該公司亦承諾提供本總臺採購 ILS 裝備 10 年的保固承諾。

#### 二、建議:

- (一)本次採購案係以一次性採購分年安裝方式執行,並於5年內完成本總臺轄下各 陣地含訓練機在內共17套ILS/DME或LDA/DME設置,本次辦理成果已因廠 牌系統相同及性能一致,使得各陣地的備份件得以互相支援調撥,設備發生 故障時,各陣地維護人員亦可彼此討論故障原因及解決方式。同時,本次得 標商SELEX公司亦於臺灣成立備品交換中心,使本總臺各陣地的組件發生故 障時,經換上本總臺自有的備份件後,該故障組件可再送交臺灣備品交換中 心取得良品並運抵各陣地,確保備品之可用性,此舉大幅提升助航導裝備的 組件後勤補給能力,有鑑於本總臺的助導航設施採購汰換已朝向一次採購分 年汰換的計畫執行方式,爰建議未來助航設備採購中,除各設備主要模組於 各陣地備份外,亦建議於契約中載明得標商應於臺灣成立完整備品交換中 心,俾確保裝備故障組件的立即換修能力。
- (二)本次工廠測試得以順利且有效率的完成原因,除了有經驗豐富的原廠工程師主 導外,尚需備有充足且先進的儀表輔助,有道是"工欲善其事必先利其器"。 本總臺將陸續執行各陣地 ILS/DME 或 LDA/DME 汰換,惟每個維護單位所擁 有的測試儀表均因不同時期採購而有所不同,為期更有效率的執行裝備檢 測,爰建議於各設備採購時,一併購入符合各陣地設備需求的檢測儀表,俾 利新裝備的維修測試。
- (三)此次在美期間與原廠的會議中,SELEX 公司展現解決架設期間所面臨各項問題 的重視,相關系統規劃設計軟/硬體工程師均親自與會討論,實屬難得,爰建 議未來之國外工廠測試及訓練課程中,應要求原廠成立軟/硬體工程師團隊, 介紹原始系統設計理念並進行技術交流座談,俾利設備維護學員們能更迅速 發現系統問題並解決問題。

### 伍、 附錄:花蓮 21LDA/DME 工廠測試文件

#### -、 花蓮LOCALIZER測試文件

#### 3.4.1.2 Maintenance Alerts

(2)

Parameter	Low Limit	High Limit	Nominal Value
AC Input Volts	98 (196)	132 (264)	111.9
AC Input Current	1	7	3.8
TX #1 - 24 V P.S. Volts	23.3	25.2	24.0
TX #1 - 24 V P.S. Current	3	15	7.9
TX #2 - 24 V P.S. Volts	23.3	25.2	24
TX #2 - 24 V P.S. Current	3	15	8.1
Battery 1 Volts	21.5	30	29.6
Battery 1 Current	-6	10	0
Battery 2 Volts	21.5	30	29.5
Battery 2 Current	-6	10	0
+ 5V DC Monitor #1	4.80	5.20	4.86
+12V DC Monitor #1	11.75	13.25	12.52
- 12 V DC Monitor #1	-13.25	-11.75	-12,43
+24V DC Monitor #1	23.3	25.2	23,9
+ 5V DC Monitor #2	4.80	5.20	4.85
+12V DC Monitor #2	11.75	13.25	12.5
-12V DC Monitor #2	-13.25	-11.75	-12,44
+24V DC Monitor #2	23.3	25.2	73.9

#### 3.4.2.2 Power On/Off Indications

- (1) TX #1 AC Power Indicator
- (2) TX #1 DC Power Indicator
- (3) TX #2 AC Power Indicator
  (4) TX #2 DC Power Indicator
- (4) TX #2 De Tower Indicator

#### 3.4.3.2 Transmitter RF Control

- (2) Course Transmitter On/Off Control
- (2) Clearance Transmitter On/Off Control

#### 3.4.4.2 Radio Frequency and RF Frequency Control

- (1) S1 Switch Setting: (6 5 4 3 2 1): Enter Setting
- (2) Localizer Channel Frequency
- (3) Meas. CRS Freq. (Channel +4 kHz) A15A3 J4
- (4) Meas. CLR Freq. (Channel -4 kHz) A15A3 J1
- (5) Measured Frequency Difference
- (6) Indicated Frequency Difference
- (3) Meas. CRS Freq. (Channel +4 kHz) A15A3 J4
- (4) Meas. CLR Freq. (Channel -4 kHz) A15A3 J1
- (5) Measured Frequency Difference
- (6) Indicated Frequency Difference





₩2 Check if OK Check if OK

0/0//0 1/0-3 MHz

 $\frac{1X1}{10.303705} \pm 0.001\%$   $\frac{10.375705}{10.37500} \pm 0.001\%$   $\frac{8000}{10.0000}$ (7500Hz to 8500Hz)
(7500Hz to 8500Hz)

TX2  $//0.3038/b \pm 0.001\%$  //0.7500Hz to 8500Hz) 8000 (7500Hz to 8500Hz) 8000 (7500Hz to 8500Hz)

#### 3.4.5.2 CRS CSB Reflected Power and VSWR

		TX1	TX2
(1)	CRS CSB forward power	15	15 Record
(2)	CRS CSB reflected power	U	<i>Q</i> Record
(3)	CRS CSB VSWR (calculated)	1=1	/=/ Record
3.4.6.2	CRS SBO Reflected Power and VSWR		
		TX1	TX2
(1)	CRS SBO forward power	0.2	02 Record
(2)	CRS SBO reflected power	0	Q Record
(3)	CRS SBO VSWR (calculated)	1=1	I=/ Record
3.4.7.2	CLR CSB Reflected Power and VSWR		
		TX1	TX2
(1)	CLR CSB forward power	12	12 Record
(2)	CLR CSB reflected power	0	Record
(3)	CLR CSB VSWR (calculated)	1=1	1: Record
3.4.8.2	CLR SBO Reflected Power and VSWR		
		TX1	TX2
(1)	CLR SBO forward power	0.2	0, > Record
(2)	CLR SBO reflected power	0	0. 0 Record
(3)	CLR SBO VSWR (calculated)	7=1	F= Record

#### 3.4.9.2 **RF** Power Metering

#### Wattmeter Functions:

	CRS Transmitter		-
(1,2)	Main CSB F Pwr Reading Accuracy	Wm 15.0	Int $15.2$ (Wm $\pm 4\%$ )
(3)	Main CSB F Pwr Select and Waveform	and the state	Check if OK
(1,2)	Main CSB R Pwr Reading Accuracy	Wm 0,0	Int $O$ (Wm $\pm 4\%$ )
(3)	Main CSB R Pwr Select and Waveform		Check if OK
(1,2)	Main SBO F Pwr Reading Accuracy	Wm 0.2	Int $0,301$ (Wm ± 4%)
(3)	Main SBO F Pwr Select and Waveform		Check if OK
(1,2)	Main SBO R Pwr Reading Accuracy	Wm 0.0	Int $\mathcal{O}$ (Wm $\pm 4\%$ )
(3)	Main SBO R Pwr Select and Waveform		Check if OK
(1,2)	Stby CSB Pwr Reading Accuracy	Wm 15.0	Int $15-1$ (Wm ± 4%)
(3)	Stby CSB Pwr Select and Waveform		Check if OK
(1,2)	Stby SBO Pwr Reading Accuracy	Wm 0.2	Int 0.705 (Wm ± 4%)
(3)	Stby SBO Pwr Select and Waveform		Check if OK
	CLR Transmitter		
(1,2)	Main CSB F Pwr Reading Accuracy	Wm Tro	Int ) $\rightarrow$ (Wm $\pm$ 4%)
(3)	Main CSB F Pwr Select and Waveform		Check if OK
(1,2)	Main CSB R Pwr Reading Accuracy	Wm 0.0	Int $\mathcal{O}_{\mathcal{O}_{\mathcal{O}_{\mathcal{O}_{\mathcal{O}}}}}$ (Wm ± 4%)
(3)	Main CSB R Pwr Select and Waveform	,	Check if OK
(1,2)	Main SBO F Pwr Reading Accuracy	Wm 0. Y	Int 0. 207 (Wm ± 4%)
(3)	Main SBO F Pwr Select and Waveform		Check if OK
(1,2)	Main SBO R Pwr Reading Accuracy	Wm 0.0	Int $o$ (Wm ± 4%)
(3)	Main SBO R Pwr Select and Waveform		Check if OK
(1,2)	Stby CSB Pwr Reading Accuracy	Wm (r.0	Int $12$ (Wm ± 4%)
(3)	Stby CSB Pwr Select and Waveform	and the second	Check if OK
(1,2)	Stby SBO Pwr Reading Accuracy	Wm 0, V	Int 0.7/0 (Wm ± 4%)
(3)	Stby SBO Pwr Select and Waveform		Check if OK

#### 3.4.10.2 CRS System Spurious Emissions

	TX1	Frequency	Level
(3)	Fundamental	110.3 MHz	2 Record
(4)	Second Harmonic	220,6 MHz	- 21, 12 < -60 dBC
	Third Harmonic	330.9 MHz	-82.01<-60 dBC
(5)	No spurious output greater than -60 dBC		Check if OK
	TX2	Frequency	Level
(3)	Fundamental	110.3 MHz	Record
(4)	Second Harmonic	220.6 MHz	-71, 19 < -60 dBC
	Third Harmonic	330.9 MHz	-8/.1 < -60  dBC
(5)	No spurious output greater than -60 dBC	/	Check if OK
3.4.11	.2 CLR System Spurious Emissions		
	TX1	Frequency	Level
(3)	Fundamental	110.3 MHz	0 Record
(4)	Second Harmonic	220. 6 MHz	-11.5 < -60  dBC
	Third Harmonic	340.9 MHz	-81,-3<-60 dBC
(5)	No spurious output greater than -60 dBC	/	Check if OK
	TX2	Frequency	Level
(3)	Fundamental	1/0.3 MHz	Record
(4)	Second Harmonic	220 MHz	-21.53 < -60 dBC
	Third Harmonic	330.9 MHz	-8/44 -60 dBC
(5)	No spurious output greater than -60 dBC	/	Check if OK
2 4 1 7	1 CDC Coming' I COULD TO		

3.4.12.2 CRS Carrier Signal at Sideband Output (SBO Carrier Suppression)

(2) CRS carrier signal at sideband output TX1 = -b7.5 -b7.5 -b7.5 -b7.5 -b7.5 -b7.5 -b7.5

3.4.13.2 CLR Carrier Signal at Sideband Output (SBO Carrier Suppression)

(2)	CLR carrier signal at sideband output	- <u>75-</u> 7	- 14.8 <-30 dBC
3.4.14.	2 LO Outputs		
(2) (4)	CRS LO Output Power CLR LO Output Power	TX1 8-6 8-64	$\frac{TX2}{8.44} \ge 6.3 \text{ mW but} \le 63.1 \text{ mW}$

#### 3.4.15.2 CRS Modulation Balance Adjustment

#### TX1

	At 40% SDM (Nor	ninal Modulation Setting)		
(3,4)	DDM setting	External	Internal	Tolerance
	0.000	0.000	0.000	S (standard)
	0.015	0.016	0.014	$S + 0.015 \pm 0.002$
	0.030	0.031	0.030	$S \pm 0.030 \pm 0.004$
	-0.015	-0-015	-0.016	$S - 0.015 \pm 0.002$
	-0.030	-0.030	-0.031	$S - 0.030 \pm 0.004$

#### TX2

	At 40% SDM (Nominal Modulation Setting	g)		
(3,4)	DDM setting External		Internal	Tolerance
	0.000 0.000		0.000	S (standard)
	0.015 0.016		0.015	$S \pm 0.015 \pm 0.002$
	0.030 0.031		0.020	$S + 0.030 \pm 0.004$
	-0.015 -0.015		-0.016	$S - 0.015 \pm 0.002$
	-0.030		- 0.031	$S$ - $0.030\pm0.004$
3.4.16.	2 CRS Nav Tones Audio Frequency			
		TX1	TX2	External
(2)	90 Hz frequency	70	90	$90 \pm 1\% (0.90 \text{ Hz})$
(4)	150 Hz frequency	150	150	150 ±1% (1.50Hz)
3.4.17.	2 CLR Nav Tones Audio Frequency			
(2)	90 Hz frequency	TX1	TX2	$\frac{\mathbf{External}}{90 + 194}$
(4)	150 Hz frequency	150	150	$150 \pm 1\% (0.90 \text{ Hz})$ $150 \pm 1\% (1.50 \text{ Hz})$
3.4.18.	2 Integral Monitor Voting Logic	No.		
(1)	Monitor #1 Normal Indication		Check if OK	
(2)	Monitor #2 Normal Indication		Check if OK	
(4)	Integral Monitor Bypass Function		Check if OK	
. ,	Integral Monitor bypass light		Check if OK	
(5)	Integral monitor bypass removed		Check if OK	
(8)	Integral monitor 1 alarm		Check if OK	
(9)	Integral Monitor Mismatch indication		Check if OK	
(10)	Station operational w/mon 1 alarm		Check if OK	
(12)	Integral monitor 2 alarm/station transfer/ Shut down (monitor "and" function)		Check if OK	
(15)	Station transfer /shut down (Monitor			
	"OR" Function)		Check if OK	
3.4.19.	2 Integral and Standby Monitor Alarms			
(1)	Integral Mon 1 CRS Centerline DDM Valu	ie	Check if OK	
(2)	Standby Mon 1 CRS Centerline DDM Valu	ie	Check if OK	
2000	Standby Mon 1 CLR Centerline DDM Valu	ue	Check if OK	
(3)	Integral Mon 2 CRS Centerline DDM Valu	ie	Check if OK	
(4)	Standby Mon 2 CRS Centerline DDM Valu	ie	Check if OK	
	Standby Mon 2 CLR Centerline DDM Valu	ue	Check if OK	

Tast Stan	Alauma	CDS/CLD	Mo	Monitor Test (Check If OK)				
Test Step	Alarm	CRS/CLR	INT <sub>1</sub>	INT 2	STBY 1	STBY 2		
(6,7,8)	RF Alarm Low	CRS	Ľ∑		И	P		
State State		CLR	V	V		V		
(10,11,12)	RF Alarm High	CRS	$\mathbf{\nabla}$		V			
		CLR	$\checkmark$	$\sim$				
(15,16,17)	Centerline SDM Alarm Low	CRS	Y					
		CLR	$\checkmark$		V			
(19,20,21)	Centerline SDM Alarm High	CRS	V					
		CLR	V	4	V			
(24,25,26)	Centerline DDM Alarm Low	CRS		V	V	V		
1-21-1ND		CLR	N/A	N/A	N/A	N/A		
(28,29,30)	Centerline DDM Alarm High	CRS		V	V			
1225 1074		CLR	N/A	N/A	N/A	N/A		
(33,34,35)	Width DDM Alarm Low	CRS			V	2		
		CLR		V	И	7		
(37,38,39)	Width DDM Alarm High	CRS	M		M	V.		
Section 200		CLR	V	V	M			
(42,43,44)	Ident Mod Alarm Low	CRS			V			
		CLR			V	V		
(46,47,48)	Ident Mod Alarm High	CRS	V			V		
		CLR				V		
(51,52,53)	Continuous Ident Timeout		V			1		
(56,57,58)	No Ident Timeout	1738 19175 19	M		V	V		

#### 3.4.20.2 Integral Monitor Reverse Sensing Alarms

#### CRS TX

- (2) CRS Width DDM
- (3) Monitor indicates reverse sensing alarm
- (4) Hard shutdown
- (5) Alarm on monitor 2

#### CLR TX

- (7) CLR 1 Width DDM
- (8) CLR 2 Width DDM
- (9) Monitor indicates reverse sensing alarm
- (10) Hard shutdown
- (11) Alarm on monitor 2

#### 3.4.21.2 Monitor Certification and Certification Limits

- (2) Monitor Certification On/Off Control
- (3) No monitor certification tab
- (6) Monitor Certification Interval
- (10) Mon. 1 centerline SDM out of tolerance
- (11) Mon. 1 voting disabled
- (12) Mon. 1 alarm for integral, standby tx and nfm
- (17) Mon. 2 centerline SDM out of tolerance
- (18) Mon. 2 voting disabled
- (20) Certification results in tolerance for all parameters for monitor #1
- (21) Certification results in tolerance for all parameters for monitor #2



-0. 20 Approx -0.260 DDM -0. 26 Approx -0.305 DDM Check if OK Check if OK Check if OK



#### 3.4.22.2 Transmitter Selection and Indications

(1) (2) (3)	Main Transmitter Select and Indication Transmitter Antenna Select and Indication		Check if OK Check if OK
(4)	Transmitter OFF Select and Indication		Check if OK
3.4.23.	2 Power Supply Functions		
<ol> <li>(1)</li> <li>(2)</li> <li>(3)</li> <li>(4)</li> <li>(5)</li> <li>(6)</li> <li>(7)</li> </ol>	AC Line Fail Indication Station On-Battery Indication Battery Fault Indication DC - DC Convertor OK Indication Automatic Station Power-Up on AC power restoration (No Batteries) System does not restart Station On/Off Control on Batteries only - (No AC Power Present)	বে ব্যব্ধব	Check if OK Check if OK Check if OK Check if OK Check if OK Check if OK
3.4.24.	2 Station Transfer Action: Main-to-Standby; He	ot Standby Operation	
(3) (4) (5) (7) (8)	Station Transfer Action: Main to Stby Local Aural + Visual Alarms Continued Operation on Stby Station Shutdown: Main and Stby to Off Local Aural + Visual Alarms	N N N N N N N N N N N N N N N N N N N	<pre>_≤1 sec Check if OK Check if OK _≤1 sec Check if OK</pre>
3.4.25.	2 CRS CSB Power Range	8	
(2) (3) (4) (6) (7) (8) (9) (10) (11)	Mod Bal at 20 Watts CSB SDM at 20 W CSB Course Width at 20 W CSB Mod Bal at 8 Watts (40% CSB) SDM at 8 Watts (40% CSB) Course Width at 8 W (40% CSB) Modulation balance difference Course width difference SDM difference	TX1 0 40.7 0.155 0.155 0.155 0.155 0.154 0.154 0.154 0.154 0.154 0.154 0.154 0.154 0.154	TX2 DDM 40.3% 0.155 DDM 0.000 DDM 37.7% 0.155 DDM 0.005 DDM 0.005 SDDM $0.000 \le 0.002$ DDM $0.000 \pm 2\%$ of step 4 $0.0 \pm 1\%$
3.4.26.	2 CLR CSB Power Range	TX1	TX2
(2) (3) (4) (6) (7) (8) (9) (10) (11)	Mod Bal at 20 Watts CSB SDM at 20 W CSB CLR 1 DDM at 20 W CSB Mod Bal at 8 Watts (40% CSB) SDM at 8 Watts (40% CSB) CLR 1 DDM at 8 W (40% CSB) Modulation balance difference CLR 1 DDM difference SDM difference	0,00 403 0,73 0,00 59.5 0,00 0,00 0,00	$\frac{\partial_{-}\sigma\sigma}{\partial_{-}\sigma\sigma} \int DDM$ $\frac{\partial_{-}\sigma\sigma}{\partial_{-}\sigma} DDM$ $\frac{\partial_{-}\sigma}{\partial_{-}\sigma} DDM$ $\frac{\partial_{-}\sigma}{\partial_{-}\sigma\sigma} DDM$ $\frac{\partial_{-}\sigma\sigma}{\partial_{-}\sigma\sigma} = 0.002 DDM$ $\frac{\partial_{-}\sigma\sigma}{\partial_{-}\sigma\sigma} = 2\% \text{ of step 4}$
()			± 170

#### 3.4.27.2 Identification Signal and Modulation Range

TX1

- (3) Audio Frequency
- (5) CRS Identification Coding verification
- (6) CLR Identification Coding verification

#### TX2

- (3) Audio Frequency
- (5) CRS Identification Coding verification
- (6) CLR Identification Coding verification

#### 3.4.28.2 Antenna Fault Alarms

(3) Individual Antenna Indications

 $1020 \pm 0.1\% (1.02 \text{ Hz})$  157 "I" + 3 Letters1757 "I" + 3 Letters

1020 ± 0.1% (1.02 Hz) "I" + 3 Letters "I" + 3 Letters

Antenna #	Normal	Open	Mon. Short	Feed Short
lL	$\sim$	$\checkmark$		
2L	$\mathbf{\Sigma}$	V	N N	
3L	$\checkmark$	Ň		V
4L	$\mathbf{N}$			Y
5L	$\checkmark$	Z		V
6L		V		V
7L	V			Y
8L				
9L				
10L				
1R	$\checkmark$		<b>V</b>	V
2R	$\mathbf{\mathbf{\nabla}}$	M		$\checkmark$
3R	V	$\mathbf{N}$	V	V
4R	Ň		$\checkmark$	$\checkmark$
5R	V	V		$\checkmark$
6R	$\checkmark$			V.
7R	V	$\mathbf{\nabla}$	V	V
8R -				
9R				
10R				

(5) Antenna Misalignment is Displayed

(6) Antenna Misalignment Causes Maint. Alert

(9) Antenna Fault Causes System Shutdown

(10) No restart on #2 Transmitter

3.4.29.2 Final System Settings

(1) Attach the printed system configuration file.



### 二、 花蓮DME測試文件

<u>Ref</u> 3.4.1.1	<u>Measurement</u> Frequency Verifications	<u>Recorded Data</u>	Standard Specification
4.	TX1 Output Frequency (1A9 J1 TX LO)	1000. 199 MHz	Assigned TX Freq $\pm 0.001\%$
5.	TX2 Output Frequency (1A17 J1 TX LO)	/ 000 . 99 MHz	Assigned TX Freq $\pm 0.001\%$
6.	Monitor/Int 1 Output Freq (1A11 INT LO)	1064.000 MHz	Assigned RX Freq ± 0.001%
7.	Monitor/Int 2 Output Freq (1A15 INT LO)	1064.000 MHz	Assigned RX Freq $\pm 0.001\%$
8.	Receiver (RTC) Local Oscillator Frequency (1A10 RX LO)	939.00 MHz	Assigned RX Freq -125 MHz ± 0.001%
9.	Receiver (RTC) Local Oscillator Frequency (1A16 RX LO)	9 <u>39.50 MHz</u>	Assigned RX Freq -125 MHz ± 0.001%
3.4.2.1	Transmitter Output Power	!	
5.	First TX Pulse Peak Power (P1)	103.5	≥100W
6.	Second TX Pulse Peak Power (P2)	103.5	≥100W
7.	Pulse Pair Amplitude Difference (P1 – P2)	0	$\leq 0.5 dB$
8.	Display Monitor 1	103	P2 ±2.5W
	Display Monitor 2	103	P2 ±2.5W
10.	TX 2 Display Monitor 1	103	≥100W
	TX 2 Display Monitor 2	104	≥100W
3.4.3.1	Spectral Characteristics		
5	TX 1 Center Frequency Amplitude	0	Reference (0 dB)
6.	TX1 Offset Frequency of +2 MHz	-67.8	≥ 53 dB from reference
	TX 10ffset Frequency of +800 kHz	-57.4	≥ 33 dB from reference
	TX 10ffset Frequency of -800 kHz	- 56.3	≥ 33 dB from reference
	TX 1 Offset Frequency of - 2 MHz	-67.2	≥ 53 dB from reference
8.	TX 2 Center Frequency Amplitude	0	Reference (0 dB)
9.	TX2 Offset Frequency of +2 MHz	-68.5	$\geq$ 53 dB from reference
	TX 20ffset Frequency of +800 kHz	-58.1	≥ 33 dB from reference
	TX 2Offset Frequency of -800 kHz	-57.1	≥ 33 dB from reference
	TX 2 Offset Frequency of – 2 MHz	-66.49	$\geq$ 53 dB from reference

3.4.3.2	Spectral Characteristics –Harmonics		
8.	TX 1 2 <sup>nd</sup> Harmonic	-62	≥ 60 dB from reference
11.	TX 1 3 <sup>rd</sup> Harmonic	-67	≥ 60 dB from reference
12.	TX 2 2 <sup>nd</sup> Harmonic	-64	≥ 60 dB from reference
	TX 2 3 <sup>rd</sup> Harmonic	-69	≥ 60 dB from reference
<u>Ref</u>	Measurement	Recorded Data	Standard Specification
3.4.5 R	CSU Controls		
5.	Communication established as indicated on the RCSU	V	(Check if OK)
6.	RCSU indicates Main and Standby in Normal condition		(Check if OK)
7.	Both Main and Standby DMEs Shutdown		(Check if OK)
8.	Both Main and Standby DMEs Startup after 20 sec		(Check if OK)
9.	Transfer Command switches main		(Check if OK)
3.4.6 N	Iodem Remote Monitoring		
2.	Communications to the DME with the remote PMDT established		(Check if OK)
3.4.7 B	attery Backup		
2.	BCPS1 Charge current	6.4	4 to 7 amps
3.	TX1 operates on Batteries	5	(Check if OK)
4.	BCPS2 Charge current	6.3	4 to 7 amps
5.	TX2 operates on Batteries		(Check if OK)
6.	Summed Charge current	12)	8 to 14 amps
		/	



Backup Needed	neral Alarm Limits			6	Next	(F5) Close (F	6) Apply (F7)	Reset (F8)
Alert <u>Y</u> Local Transmitters Tx1 Tx2	05/03/18 08:55:37		1112					
G Main	Delay			rvominal	PreAlarm Rang	e Nam Ran	ige	
Antenna	Spacing		Sec. Manual	50100	+/- 0.32	+/- 0.40	us	
	opularig			12.00	+/- 0.32	+/- 0.40	us	
Monitors	////////	Nam Low	PreAlarm Low		Pre Alarm High	Alarm High		ps
Integral Standby	Tx Power	50 🚔	55 🚖	100 🚔	122 🚔	125	Watts	
Normal	ERP	-3.0 🖨	-2.7 😓	0	0.9 ≑	1.0	dB	OK)
Pri Alarm	Efficiency	70.0 🚔	73.0 ≑				2	
Runas:	PRF	720 ≑	730 ≑	800 🚔	6000	6000	DDDs	ps
- Ogpan	Tx Frequency Error	-20 ≑	-18 🜩	0 🖨	18	20	aom	
Monitor 1	Rx Frequency Error	-20 🚔	-18 🗘	0	18 +	20	DOM	OK)
Delay 0.00	VSWR		1 8 8 8 8 1	1.1 🜩	3.0	4.0	1	
Spacing 0.00	Timers		1#####	System-Level	Settings			nps
ERP 10.0	Integral Shutdown Delay	7.0	Seconds	Efficiency Cer	tification Level	70 2		
Efficiency 0.0	Standby Shutdown Delay	7.0	Seconds	Monitor 1 Rep	by Attenuation	12 dB		
PRF 0	Continuous Ident	5.0 🚖	Seconds	Monitor 2 Rep	ly Attenuation	12 🚔 dB		
(Incompany)	No Ident	65.0 ≑	Seconds	Directional Cou	upler Loss	29.46 dB		
	A CONTRACTOR OF							

Connected	Monitor 1 Test Results	aaaa			- 8 R	Next (F5)	Close (F6)	Apply(F7) Reset (F8)	
	Alarm Limits Interrogator	Transponde	r Decoder						
Y Alert Y Local Transmitters	05/03/18 08:57:48	Low Test	Low Limit	High Test	Low Test	High Limit	High Test		
Main	Delay	49.54	49.60	49.57	50(35)	50.40	<b>60,47</b>	US	XII
G Antenna	Spacing	hhise	11.60	11.68	12.36	12.40	12.43	US	XII
Load 📴	Tx Power	46	50	67	7,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			Watts	XII
O#	ERP	I all	-3.0	24	,,,,,,,,,,,,,,,,			dB	111
Monitors	Efficiency	63.0	70.0	177.01	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	11111111			
Integral Stanuby	PRF	THE	720	728	15482	6000	1444	ppps	()())
Pri Alarm	Tx Freq Error		-20	THAT	TAPITI	20		ppm	1111
Sec Alarm	Rx Freq Error	-21	-20	1.18	M/1\$/1	20	<b>     22    </b>	ppm	IM
Bypass						()))))))))			
Monitor 1						(//////////////////////////////////////	///////////////////////////////////////		IM
Delay 50.00						///////////////////////////////////////			1111
Spacing 11.99									11
Tx Power   104									111
Enr J 0.2						///////////////////////////////////////	,,,,,,,,,,,,,		////



d	Monitor 1 Test Results		8	Next (FE	6) Close (F6) Apply (F7)	Reset (F8)
	Alarm Limits Interrogator Transponder	Decoder		11 Para	P. B.	
Local HS Tx2	05/03/18 08:58:30	- Low Limit	Data	High Limit		OK)
	First Pulse Width	3.0	3.4	4.0	us	1180101 10984 C. S.
	First Pulse Rise Time	1.5	23	3.0	us	11111111111111111
G	First Pulse Decay Time	1.5	2.5	3.0	US	DS
	Second Pulse Width	3.0	3.4	4.0	US	alletter all the
	Second Pulse Rise Time	1.5		3.0	us	OK)
standby	Second Pulse Decay Time	1.5	2.6	3.0	US	mullin and with
	Pulse Amplitude Difference	-0.5	0.0	0.5	dB	DS
	Pulse Spacing	11.80	12.00	12.20	us	ansann ann ann
	Pulse Rate	25	52	60	ppps	OK)
1	Signal Generator Reference	-1.0	-0.1	1.0	dB	
49.99						nps
11.99						
104			3			all and all children
0.2						San Carlos Carlos
100.0						Maria Charles Contra
ЯЛР						The second second second



Connected	Monitor 1 Test Results	6	Next (F5) Close (F6) Apply (F7) Res	et (F8)
	Alarm Limits Interrogator Transponder	Decoder		
Alert M Local Transmitters	05/03/18 08:58:48	Low Limit Data	- High Limit -	OK)
Hain .	First Pulse Width	3.0 3.3	4 <u>0</u> us	682111 (cite
Antenna	First Pulse Rise Time	1.5	3.0 us	
Load 6	First Pulse Decay Time	1.5	3.0 us	ps
10	Second Pulse Width	3.0	40 us	
Monitors	Cacood Pulse Rise Time	1.5 24 1	3.0 us	OK)
ral Standby	Second Pulse Decay Time	1.5	3.0 us	10000
Normal 6	D L Analitica Difference	-0.5 0.0	0.5 dB	ps
Pri Alarm	Puise Andridoc careera	1340 1350	1360 Hz	
Sec Alarm	Ident	90.0 99.9	110.0 us	OK)
] pypass —	Equalization Pulses	55 59	65 us	
14	RTC #1 Dead Time Gale	11 f f f att	Addition and the second s	nps
Moriku 1		1111 Martine	and the state of t	
cing 11.99	IN / / / / / / / / / / / / / / / / / / /	Section and the second	and a state of the	
Power 105		(	11111111111111111111111111111111111111	
0.2			ALLER REAL PROPERTY AND A DESCRIPTION OF	65536998 (: 111111111
niency 100.0			and didded and an and the second s	11111111111111111111111111111111111111



Profition 1 Test Hesu	lts			It Next IE	5) Chee (FS) (Apple (F7)) Pa	(03) 44
Alam Limits Interro	noator Transponder Dev	noder		(international international i	an convertion (abbilition) (i.e	30((70))
Y Alert Y Local		2000	111/1	11111111	Mannan	
Transmitters	W JANARAN T		00101			OK)
Tx1 Tx2	APP	Low Limit	Data	High Limit	1111114444	ULL)
Main G First Pulse Width	aff and the second	3.0	13	4.0	us	
Antenna <b>B</b> First Pulse Rise 1	ìme.	1.5	24	3.0	LIS	
First Pulse Deca	Time	1.5	22	3.0	us	ps
Second Pulse W	idth	3.0	1 231	4.0	us	
Monitors Second Pulse R	ise Time	1.5		3.0	us	OK)
Integral Standoy Second Pulse D	ecay Time	1.5	22	3,0	μ	
Pulse Amplitude	Difference	-0.5	1 00 1	0.5	dB	ps
Sec Albrin Litert	all successions	1340	1850	1360	Hz	
Bupass During Date		90.0	99.8	110.0	us	OK)
Equalization for	Smo Gate	55	191	65	Lus .	
Monitor 2	and other		2225717	111111111		hps
Delav 150,03	il unmmu	ちょうきょう	6922411	0111111		
Spacing 11.99	M. anna	62633	ama	ummi		
Tx Power 104	IT WITTING	3333	091111	(111111)		
ERP 0.1	1 all anning	14.76.76.76	222299	000000		
Efficiency 100.0	ar anning	1. 1. 1.	8333113	00000		
PRF 1 1692	I' M MARKE	196. 26. 20	622211)	6111116		
	ar anning	6. 1. 1.	011111	1111115		
	and the statement	1784 Mar 14	122221	11111111		

Alert Y Local Transmitters 1 Tx2 Main G First Artenna G First	inits Interrogator Transponder D 03/18 08:59:23	ecoder				
Alert Y Local Transmitters 1 Tx2 Main G First Antenna G First	03/18 08:59:23	Low Limit				
Transmitters Tx2 Main Antenna	111111111111111111111111111111111111111	Low Limit				OK)
Main G Antenna G			Data	High Limit		
Antenna 6 Firs	Pulse Width	3.0	3.3	4.0	us	
All the second	t Pulse Rise Time	1.5	2.4	3.0	us	
Load First	t Pulse Decay Time	1.5	22	3.0	US	ps
Off Se	cond Pulse Width	3.0	33	4.0	US	OK)
Monitors	cond Pulse Rise Time	1.5	24	3.0	US	OIN
egral Standby	acond Pulse Decay Time	1.5	22	05	dB	ps
Normal G	ulse Amplitude Difference	-0.5	1 1250	1360	Hz	
Pri Alarm	lent	1340	99.9	110.0	us	OK)
Runass T	aualization Pulses	90.0	59	65	us	
	DTC #2 Dead Time Gate	55				nps
Monitor 2           jekay         50.03           ipacing         11.39           ix Power         104           ERP         0.1           Efficiency         100.0           PRF         7.39						

Eachura Nananar	monitor i Test Mesults			Next (Fb)	Liose (hb) (Ant	big (F7) [Flester (F8)]	
The state of the set	Alarm Limits Interrogator Transponder Deco	oder	<u>CSC141741</u>				and the second s
Transmitters	05/03/18 09:00:04	Low Limit	— Data —	High Limit			OK)
G Main	Receiver Sensitivity @ 12.0 us (R)	-97.0	-94.6	-91.0	dBm	and the second second	
6 Antenna	Spacing: 13.0 us @ -93.6 dBm (R + 1dB)	70.0	765	100.0	3 00	dated	
Load 6	Spacing: 12.5 us @ -93.6 dBm (R + 1dB)	70.0	9.7	100.0	13	dates	ps
Off	Spacing: 11.5 us @ -93.6 dBm (R + 1dB)	70.0	37.4	100.0	34 VA	batabi	
Monitors	Spacing: 11.0 us @ -93.6 dBm (R + 1dB)	70.0	817	100.0			OK)
Integral Standby	RF +200 kHz @ -91.6 dBm (R + 3dB)	70.0	1 94	100.0		odated	
Normal	BE -200 kHz @ -91.6 dBm (R + 3dB)	70.0	96.8	100.0		Inchest	ps
	BE +900 kHz (@ -10 dBm)	0.0	0.0	( 5.0		hadwad .	(NO)
Y Bypass Y	PE 900 kHz (@ -10 dBm)	0.0	44	1 50		Undeted	UN)
$(\pi)$	Searcing: 9.0 us @ -17.6 dBm (R + 77dB)	0.0	1 10	1 30		lodated	
Menitor 1	Spacing: 10 0 us (@ -10 dBm)	0.0	1 00	0.0		Updated	ups
Delay 0.00	Spacing: 14.0us (@ -10 dBm)	0.0	1 00	1 30		Updated	HILL DO DO DO DO
Spacing 0.00	Spacing: 15.0 us @ -17.6 dBm (R + 77dB)	0.0	115 60	W 25			
FRP -10.0	NTT P manner	1.1.1.1	111111	1111111	11111111	ALL	
Efficiency 0.0	I I I I Martin	Sec. Carl	G	1111111	11111111		
PRF 786	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	State of the second	11115	1111111			
	A & & A Manual And A & A & A & A & A & A & A & A & A & A	Share and	111111	0111111	1012101		
	I I I I I M Marshine	State State	ろろろろ	10111111	199999	11111	
11111111111	I I I I I A A MARA	State States	1. 1. 2. 1. 1	11111111	111111111		

Connected Backup Needec	Monitor 2 Test Results Alarm Limits Interrogator Transponder Decor	ler		Next (F5	Close (F6)	Apply (F7) Reset (F8)	
Transmitters	05/03/18 09:01:51	Low Limit	Data	High Limit			OK)
1x1 1x2	Receiver Sensitivity @ 12.0 us (R)	-97.0	-943	-91.0	dBm	1000 C	
Man	Seacono: 13 0 us @ -93.3 dBm (R + 1dB)	70.0	792	100.0	The for the second	Updated	
	Spacing: 12 5 us @ -93 3 dBm (R+1dB)	70.0	915	100.0	Train a	Updated	ps
T Off	Spacing: 11 5 us @ -93.3 dBm (R + 1dB)	70.0	93.0	100.0	Constant of the owner of the owner of the owner of the owner own	Lodated	OF
Monitors	Spaceng: 11.0 us @ -93.3 dBm (R + 1dB)	70.0	83.9	100.0	The state of the s	Undated	ION
(Integral Standby	DE -200 kHz @ -91.3 dBm (R + 3dB)	70.0	38,5	100.0	Contraction of the local division of the loc	Updated	hs
Normal	DE 200 kHz @ -91 3 dBm (R + 3dB)	70.0	98.9	50	and the second	Updated	1 Pa
Pri Alarm	TOF (900 kHz (@ 10 dBm)	0.0		50		Updated	OK
Sec Alam M	(AF +300 KHz (C - 10 dBm)	0.0	0.0	5.0	and the second second	Updated	
	RF -500 KT/2 (C	0.0	All and a second	50	- 14	Updated	pp
Monitor 1	Spacing 3.0 dus (@ -10 dBm)	0.0	Sultana -	5.0	and and the	Updated	
Delau 0.00	Spacing. 10.0 ce (@-10.dBm)	0.0	Mar -	5.0	%	Updated	
Spacing 0.00	Spacing: 15.0 us @ -17.3 dBm (R + 77dB) Spacing: 15.0 us @ -17.3 dBm (R + 77dB)	0.0	11 mar				
ERP 7-10.0		11111					
Efficiency 0.0	II////////////////////////////////////	111111	Contraction of the second	A CONTRACTOR OF THE	and the second sec	111111111111111111	NIIII)

Eachup Needec	Monitor 1 Test Results Narm Limits Interrogator Transponder Decode			Next (F5)	Close (F6)	(Apply (F7)) (Reset (F8))	T
Transmitters	05/03/18 09:02:12	Low Limit	Data	High Limit			
Tx1 Tx2	Receiver Sensitivity @ 12.0 us (R)	-97.0	-54.4	-91.0	dBm		
Main III	Searce 13 Rus @ -93.4 dBm (R + 1dB)	70.0	80.7	100.0	%	In Process	
Antenna	Specing 125 up @ -93.4 dBm (R + 1dB)	70.0	82.5	100.0	%	In Process	
OH	Spacing, 12.5 us @ 93.4 dBm (R+1dB)	70.0	AES	100,0	%	In Process	
	Spacing, 11.5 us @ 93 4 dBm (B + 1dB)	700	752	100.0	2	In Process	
Monitors Internal Standby	Spacing: (1.0 us @ -554 user	70.0	96.8	100.0	<u>%</u>	In Process	
Normal	RF +200 kHz @ -91 4 dbm (( + 348)	100	97.6	100.0	1	In Process	
Pn Alarm BL	FRF 200 KHz @ -91 4 dbm // + 500	100	100	5.0		In Process	
Sec Alam Y	(RF +900 kHz (@ -10 dbm)	100	DO	1 50	7	In Process	
Bypass N	RE /900 kHz (@ -10 dBm)	100	00	1 5.0	The state of the s	In Process	
	Spacing 9.0 us @ -174 dism (5.4 / 60)	100	1 A CO	L ED	1 7	In Process	
Monitor 2	Spacing/ 10,0/us (@ -18 dBm)	100	11/1 20	1 50	7.	In Process	
Delay 0.00 Solacing 0.00	Spacing: 14 0 us (@ -10 dBm) Spacing: 15 0 us @ -17 4 dBm (R + 7/dB)	100		1.00	ß		



