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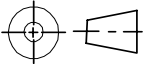
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CHK K. K. HAMBY XX-XX-XX		PRODUCTION TEST REQUIREMENTS FOR THE VHF-2100		
APVD S. F. BAULER XX-XX-XX		SIZE	CAGEC	DWG NO
ALL SHEETS ARE THE SAME REVISION STATUS		A	4V792	815-3620-001
THIRD ANGLE PROJECTION		SCALE: NONE		REV -
		MSWD 97		SHEET 1 OF 69

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1. **Scope**

These production test requirements apply to the VHF-2100, CPN 822-1287-XXX.

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2. Reference Information

2.1 Specifications

Interface Control Document for the VHF-2100, CPN: 815-3797-XXX
Hardware Requirements for the VHF-2100, CPN: 815-3618-XXX
Unit Requirements Documents for the VHF-2100, CPN: 815-3591-XXX

2.2 Drawings

RF Card Assembly, CPN: 828-1436-XXX
DSP/PS Card Assembly, CPN: 828-1437-XXX
Rear Interconnect Card Assembly, CPN: 828-1438-XXX

2.3 Operating Frequencies vs. ICAO Channel Designators

For all test frequencies listed in test setups in this report, the ICAO channel identification developed for the 8.33 kHz and VDL Mode 3 channels is used. The channel identification will not necessarily reflect the actual operating frequency. Table 2-1 shows the relationship between ICAO channel identification, actual operating frequency, ARINC 429 frequency control word, and operating mode.

2.4 Notes

Decimal and hex number representations are used interchangeably in this document. A hex number is indicated by the format “\$XXXXh”, where “X” is a hex digit. A decimal number has no special identification.

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Table 2-1: Operating Frequencies and ICAO Channel Designations

Frequency (MHz)	ICAO Channel Name	ARINC 429 Control Word Content	ARINC 429 Control Word Label	Mode
118.0000	118.000	118.000	030	25 kHz AM
118.0000	118.001	Slot A/240	046	VDL Mode 3 Slot A
118.0000	118.002	Slot B/240	046	VDL Mode 3 Slot B
118.0000	118.003	Slot C/240	046	VDL Mode 3 Slot C
118.0000	118.004	Slot D/240	046	VDL Mode 3 Slot D
118.0000	118.005	118.000	047	8.33 kHz AM
118.0083	118.010	118.008	047	8.33 kHz AM
118.0167	118.015	118.017	047	8.33 kHz AM
118.0250	118.021	Slot A/241	046	VDL Mode 3 Slot A
118.0250	118.022	Slot B/241	046	VDL Mode 3 Slot B
118.0250	118.023	Slot C/241	046	VDL Mode 3 Slot C
118.0250	118.024	Slot D/241	046	VDL Mode 3 Slot D
118.0250	118.025	118.025	030	25 kHz AM
118.0250	118.030	118.025	047	8.33 kHz AM
118.0333	118.035	118.033	047	8.33 kHz AM
118.0417	118.040	118.042	047	8.33 kHz AM
118.0500	118.050	118.050	030	25 kHz AM
118.0500	118.051	Slot A/242	046	VDL Mode 3 Slot A
118.0500	118.052	Slot B/242	046	VDL Mode 3 Slot B
118.0500	118.053	Slot C/242	046	VDL Mode 3 Slot C
118.0500	118.054	Slot D/242	046	VDL Mode 3 Slot D
118.0500	118.055	118.050	047	8.33 kHz AM
118.0583	118.060	118.058	047	8.33 kHz AM
118.0667	118.065	118.067	047	8.33 kHz AM
118.0750	118.071	Slot A/243	046	VDL Mode 3 Slot A
118.0750	118.072	Slot B/243	046	VDL Mode 3 Slot B
118.0750	118.073	Slot C/243	046	VDL Mode 3 Slot C
118.0750	118.074	Slot D/243	046	VDL Mode 3 Slot D
118.0750	118.075	118.075	030	25 kHz AM
118.0750	118.080	118.075	047	8.33 kHz AM
118.0833	118.085	118.083	047	8.33 kHz AM

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Frequency (MHz)	ICAO Channel Name	ARINC 429 Control Word Content	ARINC 429 Control Word Label	Mode
118.0917	118.090	118.092	047	8.33 kHz AM
118.1000	118.100	118.100	030	25 kHz AM
118.1000	118.101	Slot A/244	046	VDL Mode 3 Slot A
118.1000	118.102	Slot B/244	046	VDL Mode 3 Slot B
118.1000	118.103	Slot C/244	046	VDL Mode 3 Slot C
118.1000	118.104	Slot D/244	046	VDL Mode 3 Slot D
118.1000	118.105	118.100	047	8.33 kHz AM
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136.9750	136.971	Slot A/999	046	VDL Mode 3 Slot A
136.9750	136.972	Slot B/999	046	VDL Mode 3 Slot B
136.9750	136.973	Slot C/999	046	VDL Mode 3 Slot C
136.9750	136.974	Slot D/999	046	VDL Mode 3 Slot D
136.9750	136.975	136.975	030	25 kHz AM
136.9750	136.980	136.975	047	8.33 kHz AM
136.9833	136.985	136.983	047	8.33 kHz AM
136.9917	136.990	136.992	047	8.33 kHz AM

3. Test Equipment Required

The following test equipment or equivalent is required:

1. CATS-21 Full ATE IEI Inc. part number TA-110000-344-1 or VHF Configuration IEI Inc. part number TA-110000-344-5
2. VHF/VDL PTR sequence software, CPN EKD-006 (pre-release)
3. Vector Signal Analyzer HP 89441A
4. Test Cable, CPN 653-5025-002

4. Test Conditions

Unless otherwise specified, all tests shall be performed under the following conditions:

4.1 Temperature

Normal factory ambient.

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4.2 Humidity

Normal factory ambient.

4.3 Warm-up and Initialization

30 seconds

4.4 Atmospheric Pressure

Normal factory ambient.

4.5 Transmit Duty Cycle

20%, 30 seconds maximum single transmit duration

5. Test Definitions and Information

- In transmit mode, the antenna output shall be terminated in 50 ohm load and the sidetone audio output terminated in 600 ohm load. In receive mode, receiver and data audio outputs are terminated in 600 ohm load.
- All receiver RF levels are in dBm at UUT antenna input.
- Upper limit of operation at ICAO channel 136.990 applies for all units.
- Connect Muting pin (MP 15C) to 27.5 Vdc through a 270 ohm, 3 watt load.
- Connect Key Event pin (MP 1D) to 27.5 Vdc through a 10 kohm, ½ watt load.

5.1 Standard Discrete Configuration

The “Standard Discrete Configuration” is defined as the following configuration of the input discretes:

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Table 5-1: Standard Discrete Configuration

DISCRETE	VHF-2100 Pin #	STATUS
PTT	MP 1C	Open (Receive mode)
Maintenance Sys ID #1	MP 14A	Open (Boeing configuration)
Maintenance Sys ID #2	MP 11C	Open
Voice/Data Select	MP 7C	Open (Voice Mode)
Freq/Func Data Select	MP 11D	Open (Freq/Func Port B selected)
SDI_1	MP 9A	Open (All Call enabled)
SDI_0	MP 9B	Open
Air/Ground	MP 14B	Grounded (In Air)
Data Load Enable	MP 8B	Open (Data Load disabled)
Data Key Line	MP 7D	Open
Transmitter Timer Disable	MP 2A	Open (Transmitter Timeout enabled)
Self Test	MP 4A	Open
Squelch Disable	MP 13C	Grounded (Squelch disabled)
Shop Mode	TP 6A	Open

5.2 Standard RF Generator Configuration

The “Standard RF Generator Configuration” is defined as follows:

Generator set to the frequency defined at time of reference, amplitude modulated by a 1 kHz sine wave at a modulation level of 30%, and a RF level of –47 dBm.

5.3 Standard ARINC 429 Bus/Data Configurations

5.3.1 Standard Control Data Configurations

All test steps are performed using continuous tuning on the low speed ARINC 429 tuning input bus Freq/Func Select Port B (MP 7A, MP 7B). The control words are labels 030 for 25 kHz channels, 047 for 8.33 kHz channels, and 046 for Mode 3 channels.

Calibration and TFM parameters are set during Alignment Mode using the high-speed Dataload input bus (MP 2C, MP 2D) and Dataload output bus (MP 4C, MP 4D). The control word is label 277 and the response word is label 351 (see Appendix A for format).

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5.3.2 Standard Data Configurations

- The “Standard 25 kHz ARINC Configuration” is defined as follows:
Transmit the control data on label 030 (Oct) every 200 ms.
The tuning channel will be defined at the time of reference to this definition.
The SSM is set to 00 (Normal)
SDI set to 00 (All call).
- The “Standard 8.33 kHz ARINC Configuration” is defined as follows:
Transmit the control data on label 047 (Oct) every 200 ms.
The tuning channel will be defined at the time of reference to this definition.
The SSM is set to 00 (Normal)
SDI set to 00 (All call).
- The “Standard Mode 3 ARINC Configuration” is defined as follows:
Transmit the control data on label 046 (Oct) every 200 ms.
The tuning channel will be defined at the time of reference to this definition.
The SSM is set to 00 (Normal)
SDI set to 00 (All call).

5.4 Test Sequence

If the UUT has never been aligned then all alignment steps in 6.0 must be performed in sequence. For re-alignment of UUT as a result of a repair action or modification, perform only alignment steps of circuits that have been affected by repair action or modification. Checksum will be automatically updated whenever FLASH memory is updated.

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6. Alignment

Use Cooling fan during alignment.

Connect main connector plug from test station to UUT.

Apply 27.5 ± 0.5 Vdc to the power input, pin BP 2 and ground pin BP 4.

Set Discrete Configuration for Alignment (Table 6-1) and wait 30 seconds for the unit to complete power on testing.

Table 6-1: Discrete Configuration for Alignment

DISCRETE	VHF-2100 Pin #	STATUS
PTT	MP 1C	Open (Receive mode)
Maintenance Sys ID #1	MP 14A	Open (Boeing configuration)
Maintenance Sys ID #2	MP 11C	Open
Voice/Data Select	MP 7C	Open (Voice Mode)
Freq/Func Data Select	MP 11D	Open (Freq/Func Port B selected)
SDI_1	MP 9A	Open (All Call enabled)
SDI_0	MP 9B	Open
Air/Ground	MP 14B	Open (On Ground)
Data Load Enable	MP 8B	Open (Data Load disabled)
Data Key Line	MP 7D	Open
Transmitter Timer Disable	MP 2A	Open (Transmitter Timeout enabled)
Self Test	MP 4A	Open
Squelch Disable	MP 13C	Open (Squelch enabled)
Shop Mode	TP 6A	Grounded

The VHF-2100 may be aligned manually per Section 6.3 Alignment or with the automatic alignment system (CATS-21).

6.1 Software Load Procedure

Load the desired top-level software using the data loader capability of the UUT or the JTAG interface.

6.2 Calibration and TFM Parameters

The VHF-2100 uses electronic alignment for circuits that use values for various parameters stored in FLASH memory. TFM parameters are those that require different values depending upon temperature, frequency or mode. Calibration parameters are those that are the same for all temperature, frequency, and mode.

6.2.1 Initialization of Calibration Parameters

In the event that FLASH memory is blank, store into FLASH memory the hex values for calibration parameters listed in Table 6-2 or the nominal value (nominal values derived from trend data).

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Table 6-2: Calibration Parameters

Calibration Parameter	#	Mode	Value (Dec)	Value (Hex)	Notes
Combined Audio Level Adjust	43	Rx	17000	4268	level adjust for combined audio Rx output
Rx Compressor Threshold	45	Rx	9487	250F	input level threshold for receiver compressor
Carrier Squelch Mute Threshold	46	Rx	32767	7FFF	Carrier Squelch muting upper limit
Carrier Squelch Unmute Threshold	47	Rx	32767	7FFF	Carrier Squelch unmute upper limit
25 kHz Noise Squelch Mute Threshold	48	Rx	32767	7FFF	25 kHz Noise Squelch muting upper limit
25 kHz Noise Squelch Unmute Threshold	49	Rx	0	0000	25 kHz Noise Squelch unmute lower limit
8.33 kHz Noise Squelch Mute Threshold	50	Rx	32767	7FFF	8.33 kHz Noise Squelch muting upper limit
8.33 kHz Noise Squelch Unmute Threshold	51	Rx	0	0000	8.33 kHz Noise Squelch unmute lower limit
Combined Audio Sidetone Level Adjust	55	Tx	7225	1C39	level adjust for combined audio sidetone out
Low Voltage Scaling Threshold	56	Tx	2000	07D0	low volt limit for signal scaling in transmits
VSWR Scaling Threshold	57	Tx	20000	4E20	VSWR limit for signal scaling in transmits
Analog Tx Compressor Threshold	58	Tx	1758	06DE	level to begin analog Tx signal compression
Tx Power Upper Threshold for all but Mode 2	60	Tx	32767	7FFF	V Fwd high limit for non-Mode 2 Tx faults
Tx Power Lower Threshold for all but Mode 2	61	Tx	0	0000	V Fwd low limit for non-Mode 2 Tx faults
Tx Power Upper Threshold for Mode 2	62	Tx	32767	7FFF	V Fwd high limit for Mode 2 Tx faults
Tx Power Lower Threshold for Mode 2	63	Tx	0	0000	V Fwd low limit for Mode 2 Tx faults
VSWR Fault Threshold	64	Tx	15000	3A98	VSWR limit for reporting of faults
PA Over Temperature Threshold	65	Tx	1900	076C	PA temperature limit at which Tx is aborted
+3.3 VDC Upper Threshold	66	Rx/Tx	2501	09C5	fault upper limit for +3.3 VDC input value
+3.3 VDC Lower Threshold	67	Rx/Tx	1688	0698	fault lower limit for +3.3 VDC input value
+8.0 VDC Upper Threshold	68	Rx/Tx	2682	0A7A	fault upper limit for +8.0 VDC input value
+8.0 VDC Lower Threshold	69	Rx/Tx	1609	0649	fault lower limit for +8.0 VDC input value
-8.0 VDC Upper Threshold	70	Rx/Tx	2405	0965	fault upper limit for -8.0 VDC input value
-8.0 VDC Lower Threshold	71	Rx/Tx	1443	05A3	fault lower limit for -8.0 VDC input value
+5.0 VDC Upper Threshold	72	Rx/Tx	3318	0CF6	fault upper limit for +5.0 VDC input value
+5.0 VDC Lower Threshold	73	Rx/Tx	1786	06FA	fault lower limit for +5.0 VDC input value
+15.0 VDC Upper Threshold	74	Rx/Tx	2681	0A79	fault upper limit for +15.0 VDC input value
+15.0 VDC Lower Threshold	75	Rx/Tx	1787	06FB	Fault lower limit for +15.0 VDC input value
Tx Timeout Threshold	76	Tx	16383	3FFF	limit at which Tx is aborted
TFM Temperature Boundary A	77	Rx/Tx	449	01C1	Sets TFM temperature zones 1 & 2 boundary
TFM Temperature Boundary B	78	Rx/Tx	869	0365	Sets TFM temperature zones 2 & 3 boundary
TFM Temperature Boundary C	79	Rx/Tx	1289	0509	Sets TFM temperature zones 3 & 4 boundary
TFM Temperature Hysteresis	80	Rx/Tx	51	0033	Hysteresis for descending temp zone transits
VSWR Scaling Coefficient	81	Tx	22300	571C	Power reduction to apply for VSWR scaling
Analog Data Audio Level Adjust	82	Rx	22100	5654	Level adjust for analog data audio DAC output
Low V IQ Phase Adj. Upper Threshold	83	Tx	0	0000	28V val. to start Low Voltage IQ Phase Adjust
Low V IQ Phase Adj. Lower Threshold	84	Tx	0	0000	28V val. to end Low Voltage IQ Phase Adjust
SW AGC Selftest Limit On Threshold	85	Rx	32767	7FFF	SW AGC level max limit with signal present
SW AGC Selftest Limit Off Threshold	86	Rx	0	0000	SW AGC level min limit with signal absent
HW AGC Selftest Limit On Threshold	87	Rx	32767	7FFF	HW AGC level max limit with signal present
HW AGC Selftest Limit Off Threshold	88	Rx	0	0000	HW AGC level min limit with signal absent
Beep Tone Level Adj.	89	Rx/Tx	300	012C	Audio level of fault
D8PSK Low Voltage Scaling Threshold	90	Tx	16535	4097	Low volt limit for signals scaling in transmit in D8PSK modes.
I Q Ref	91	TX	0	0000	Not Used
Mode 3 TX Audio Level	92	TX	8	0008	Mode 3 transmit audio level
Mode 3 RX Audio Level	93	RX	17000	4268	Mode 3 receive audio level
Co-site Noise Level	94	RX	0	0000	Injected noise level to mask co-site "clicking"
28_VDC_OV_Threshold	95	Rx/Tx	2340	0924	Fault limit for +28 VDC input value

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6.2.2 Initialization of TFM Parameters

Store into FLASH memory the hex values for TFM parameters listed in Table 6-3 or the nominal value for 118 MHz (nominal values derived from trend data).

Table 6-3: TFM Parameters

TFM Parameter	#	Applicable Mode	Value (hex)	Notes
I Phase Adjust	1	Tx	0000	normal setting for I phase adjustment DACs
Q Phase Adjust	2	Tx	2048	normal setting for Q phase adjustment DACs
Simulcomm 0	3	Rx	00FF	sets SCOM Thresh DAC when Simulcomm discretes = 00
Simulcomm 1	4	Rx	00FF	sets SCOM Thresh DAC when Simulcomm discretes = 01
Simulcomm 2	5	Rx	00FF	sets SCOM Thresh DAC when Simulcomm discretes = 10
Simulcomm 3	6	Rx	00FF	sets SCOM Thresh DAC when Simulcomm discretes = 11
Preselector 1	7	Rx/Tx	0000	sets Presel_1 DAC
Preselector 2	8	Rx/Tx	0000	sets Presel_2 DAC
Preselector 3	9	Rx/Tx	0000	sets Presel_3 DAC
Preselector 4	10	Rx/Tx	0000	sets Presel_4 DAC
PA Drive Bias for D8PSK	11	Rx/Tx	0000	sets PA Drive Bias DAC when in ARINC 750 Mode 2
PA Drive Bias for all but D8PSK	12	Rx/Tx	0000	sets PA Drive Bias DAC when not in ARINC 750 Mode 2
PA Final Bias for D8PSK	13	Rx/Tx	0000	sets PA Final Bias DAC when in ARINC 750 Mode 2
PA Final Bias for all but D8PSK	14	Rx/Tx	0000	sets PA Final Bias DAC when not in ARINC 750 Mode 2
D8PSK I Channel Gain	15	Tx	6590	sets I channel gain for D8PSK transmissions
D8PSK Q Channel Gain	16	Tx	6590	sets Q channel gain for D8PSK transmissions
AM I Channel Carrier Power	17	Tx	0000	sets I channel offset (carrier power) for AM transmissions
AM Q Channel Carrier Power	18	Tx	0000	sets Q channel offset (carrier power) for AM transmissions
D8PSK I Channel Carrier Null (offset)	19	Tx	2050	sets I channel offset (carrier null) for D8PSK transmissions
D8PSK Q Channel Carrier Null (offset)	20	Tx	2050	sets Q channel offset (carrier null) for D8PSK transmissions
Mode A I Channel Carrier Power (offset)	21	Tx	0000	sets I channel offset (carrier power) for Mode A transmissions
Mode A Q Channel Carrier Power (offset)	22	Tx	0000	sets Q channel offset (carrier power) for Mode A transmissions
AM I Channel Mod % (gain)	23	Tx	0000	Sets I channel mod % (gain) for AM Tx
AM Q Channel Mod % (gain)	24	Tx	0000	Sets Q channel mod % (gain) for AM transmissions
Mode A I Channel Mod % (gain)	25	Tx	0000	Sets I channel mod % (gain) for Mode A transmissions
Mode A Q Channel Mod % (gain)	26	Tx	0000	Sets Q channel mod % (gain) for Mode A transmissions
AM Voice Rx Audio Phase Shift	27	Rx	0006	Adjusts phase of Rx audio output relative to input RF modulation
D8PSK Quadrature Mismatch	28	Tx	0000	compensates transmit signal for feedback modulator mismatch
Rx Synthesizer Adjust	29	Rx	0055	CN count for receiver synthesizer tuning
Tx Synthesizer Adjust	30	Tx	008C	CN count for transmitter synthesizer tuning
I Low Voltage Phase Adjust	31	Tx	0000	normal setting for I phase adjustment DACs
Q Low Voltage Phase Adjust	32	Tx	07FF	normal setting for Q phase adjustment DACs
Mode 2 -90.5 dBm Level	33	Rx	0000	normal setting for -90.5 dBm Mode 2 Rx level
Mode 2 -91.5 dBm Level	34	Rx	0000	normal setting for -91.5 dBm Mode 2 Rx level
AM I Channel Carrier Null (offset)	35	Tx	07FF	sets I channel offset null for AM transmissions
AM Q Channel Carrier Null (offset)	36	Tx	07FF	sets Q channel offset null for AM transmissions
Spur Suppression Noise Level	37	Tx	0000	8.3 kHz synthesizer spur adj.
Spare 6	38	N/A		
Spare 7	39	N/A		
Spare 8	40	N/A		
Spare 9	41	N/A		
Spare 10	42	N/A		

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SCALE: NONE		MSWD 97	SHEET 14

6.3 Alignment Procedures

6.3.1 Receiver Analog Audio Output Level [Rx Cal]

- 1) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” on channel 118.500.
- 2) Set Standard RF Generator Setting with frequency of 118.5 MHz.
- 3) Set Discrete Configuration for Alignment.
- 4) Set the generator to 85% modulation and -40 dBm RF level.
- 5) Monitor the receiver audio output and adjust calibration parameter #43 (Combined audio level adjust) for $2.45 \text{ Vrms} \pm 0.05 \text{ Vrms}$.
- 6) Store the value used for calibration parameter #43 in Flash memory.

6.3.2 Analog Data Audio Output Level [Rx Cal]

- 1) Set the generator to 80% at 1800 Hz modulation and -40 dBm RF level.
- 2) Monitor the analog data audio output and adjust calibration parameter #82 (analog data audio) for $1.05 \text{ Vrms} \pm 0.1 \text{ Vrms}$.
- 3) Store the value used for calibration parameter #82 in Flash memory.

6.3.3 Voice Carrier Null [Tx TFM]

- 1) Set Discrete Configuration for Alignment.
- 2) Connect 50 ohm load to antenna cable.
- 3) Ground the PTT (MP 1C), monitor RF Transmitter power.
- 4) Simultaneously vary TFM parameters #35 and #36 (AM I and Q channel offset) to get lowest possible power output. The null power out must be less than -15 dBm.
- 5) Unground the PTT.
- 6) Store the values used for TFM parameters #35 and #36 in the Flash memory locations for all temperature zones and channels (value for 118.5 MHz channel is sufficient for all other channels).

6.3.4 Voice/Analog Data Bias Adjustment [Tx TFM]

- 1) Set Discrete Configuration for Alignment.
- 2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” on channel 118.500.
- 3) Connect 50 ohm load to antenna cable.
- 4) Set TFM parameters #12 and #14 (PA drive bias and final driver bias) to \$0000h.
- 5) Ground the PTT (MP 1C), and monitor the input current to the UUT.
- 6) Adjust TFM parameter #12 until the current increases by $600 \text{ ma} \pm 50 \text{ ma}$ over the original value.
- 7) Adjust TFM parameter #14 until the current increases by an additional $500 \text{ ma} \pm 50 \text{ ma}$ over the value in step 7.
- 8) Unground the PTT.
- 9) Store the values used for TFM parameters #12 and #14 in the Flash memory locations for all temperature zones and channels (value for 118.5 MHz channel is sufficient for all other channels).

6.3.5 +28 V Transmitter Phasing Adjustment [Tx TFM]

- 1) Set Discrete Configuration for Alignment.

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SCALE: NONE		MSWD 97	SHEET 15

- 2) Verify power supply input voltage is 27.5 +/- 0.2 Vdc.
- 3) Apply 0.7 Vrms, 1 kHz tone to Microphone Audio input.
- 4) Set I & Q channel carrier offset to 0
- 5) Set Q Channel Gain to 0.
- 6) Set I Channel Gain to get 4 - 6 watts RF output power
- 7) Monitor the Q_Detector Output of the RF Card
- 8) Ground the PTT and vary TFM parameters #1 & #2 (I & Q phase adjust) up or down from initial value as necessary to null the Q detector. Final value must be less than \$02Fh.

Note: The I & Q Phase Adjust values are calculated as a function of the phase angle using the following formula:

$$Q \text{ bits} = ((1.25 \times \sin(\text{Angle}) + 1.25)) / (2.5/4095)$$

$$I \text{ bits} = ((1.25 \times \cos(\text{Angle}) + 1.25)) / (2.5/4095)$$

- 9) Unground the PTT.
- 10) Store the values for TFM parameters #1 and #2 in Flash memory.
- 11) Repeat for every 1 MHz step up to 136.500 MHz.

6.3.6 +20 V Transmitter Phasing Adjustment [Tx TFM]

- 1) Store the same +28 V Phasing Adjustment values determined above into TFM parameters #31 and #32 in Flash memory.

6.3.7 Preselector Adjustments [Rx Cal]

- 1) Set Standard RF Generator setting at current frequency (starting at 118.5 MHz).
- 2) Set Discrete Configuration for Alignment.
- 3) Monitor the SW AGC.
- 4) Adjust preselectors for maximum SW AGC level.
- 5) Iteratively adjust TFM parameters #7 - #10 from initial values for the best SINAD while reducing the RF level to maintain 12 dB. The final SINAD after adjustment must be at least 8 dB with -103.5 dBm input RF level.
- 6) Store the values used for TFM parameters #7 - #10 in Flash memory.
- 7) Repeat for every 1 MHz step up to 136.500 MHz.

6.3.8 Analog Voice/Data Unmodulated Tx RF Power [Tx TFM]

- 1) Set Standard ARINC Configuration at current frequency (starting at 118.5 MHz).
- 2) Set Discrete Configuration for Alignment.
- 3) Set TFM parameters #17 & #18 (AM I and Q channel carrier power) to \$0000h.
- 4) Ground the PTT and increment TFM parameter #17 until the RF wattmeter indicates 15.0 W ± 0.3 W.
- 5) Increment TFM parameter #18 until the RF wattmeter indicates 30.0 W ± 0.3 W.
- 6) Unground the PTT.
- 7) Store the values for TFM parameters #17 and 18 in Flash memory.
- 8) Repeat for every 1 MHz step up to 136.500 MHz.

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 16

6.3.9 Simulcomm Adjustment (-20 dBm threshold) [Rx TFM]

- 1) Set Standard RF Generator setting at current frequency (starting at 118.5 MHz).
- 2) Set Discrete Configuration for Alignment.
- 3) Set the generator RF level to -20 dBm and 90% modulation.
- 4) Monitor the AGC_Level output of the RF Card.
- 5) Take a reference AGC reading, AGC-REF. Set the generator level to -15dBm and 90% modulation.
- 6) Decrease TFM parameter #3 until the AGC_Level rises above AGC-REF.
- 7) Store the value used for TFM variable #3 in the Flash memory for all 118-125 MHz channels.
- 8) Repeat at 126.5 MHz channel and store the value used for TFM variable #3 in the Flash memory for all 126-136 MHz channels.

6.3.10 Analog Voice/Data Transmitter Modulation [Tx TFM]

- 1) Set Discrete Configuration for Alignment.
- 2) Apply a 1.0 Vrms audio signal at 1.0 kHz to the microphone input.
- 3) Ground the PTT and simultaneously increment TFM parameters #23 and #24 (AM I and Q Channel Mod) to obtain modulation of the negative peaks at $90.0 \pm 2.0\%$.
- 4) Unground the PTT.
- 5) Store the value used for TFM parameters #23 and #24 in the Flash memory.
- 6) Repeat for every 1 MHz step up to 136.500 MHz.

6.3.11 Analog Sidetone Levels [Tx Cal]

- 1) Set Discrete Configuration for Alignment.
- 2) Apply a 1.0 Vrms audio signal to the microphone input.
- 3) Ground the PTT and monitor the combined receiver audio output.
- 4) Adjust calibration parameter #55 (combined sidetone level adjust) for 2.45 ± 0.1 Vrms.
- 5) Unground the PTT.
- 6) Store the value use for calibration parameter #55 in Flash memory.

6.3.12 Squelch Adjustment

6.3.12.1 25 kHz Noise Quieting Squelch [Rx Cal]

- 1) Set the ARINC control data to "Standard 25 kHz ARINC Configuration" on channel 126.500.
- 2) Set Standard RF Generator Setting with frequency of 126.5 MHz.
- 3) Set Discrete Configuration for Alignment.
- 4) Enable squelch by opening MP 13C.
- 5) Set calibration parameter #48 (25 kHz noise squelch mute threshold) to \$0000h.
- 6) Set calibration parameter #49 (25 kHz noise squelch unmute threshold) to \$0000h.
- 7) Set calibration parameter #48 (25 kHz noise squelch mute threshold) to \$7530h.
- 8) Set the generator RF level to -103.5 dBm.
- 9) Monitor the receiver audio output.
- 10) Increase the value of calibration parameter #49 (25 kHz noise squelch unmute) from \$0000h until receiver audio is present (1.00 to 2.6 Vrms).

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SCALE: NONE		MSWD 97	SHEET 17

- 11) Reduce the RF generator output by 4 dB.
- 12) Decrease calibration parameter #48 (25 kHz noise squelch mute) from \$0258h until the receiver audio is muted (0.0 to 1.00 Vrms).
- 13) Store the values for calibration parameters #48 and #49 in Flash memory.

6.3.12.2 8.33 kHz Noise Quieting Squelch [Rx Cal]

- 1) Set the ARINC control data to “Standard 8.33 kHz ARINC Configuration” on channel 126.500
- 2) Set Standard RF Generator Setting with frequency of 126.5 MHz.
- 3) Set Discrete Configuration for Alignment.
- 4) Enable squelch by opening MP 13C.
- 5) Set Cal Parameter #50 (8.33kHz Noise Squelch Mute Threshold) to \$0000h.
- 6) Set Cal Parameter #51 (8.33kHz Noise Squelch Unmute Threshold) to \$0000h.
- 7) Set Cal Parameter #50 (8.33kHz Noise Squelch Mute Threshold) to \$0FA0h.
- 8) Set the generator RF level to -103.5 dBm.
- 9) Monitor the receiver audio output.
- 10) Increase value of calibration parameter #51 (8.33 kHz Noise Squelch Unmute) from \$0000h until receiver audio is present (1.00 to 2.60 Vrms).
- 11) Reduce the RF generator output by 4 dB.
- 12) Decrease calibration parameter #50 (8.33 kHz Noise Squelch Mute Threshold) from \$03FFh until the receiver audio is muted (0.00 to 1.00 Vrms).
- 13) Store the values for calibration parameters #50 and #51 in Flash memory.

6.3.12.3 Carrier Squelch

- 1) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” on channel 126.500
- 2) Set Standard RF Generator Setting with frequency of 126.5 MHz.
- 3) Set the UUT discrete inputs to Discrete Configuration for Alignment.
- 4) Enable squelch by opening MP 13C.
- 5) Set the generator to 30% modulation by 1 kHz at -87 dBm.
- 6) Disable noise squelch by setting calibration parameters #48 & #49 to \$0000h (do not change values in Flash).
- 7) Set calibration parameter #46 (carrier squelch mute threshold) to \$FFFFh.
- 8) Set calibration parameter #47 (carrier squelch unmute threshold) to \$0000h.
- 9) Increase value of calibration parameter #47 (carrier squelch unmute threshold) from \$0000h until receiver audio is present (0.05 to 2.6 Vrms).
- 10) Reduce the RF generator output by 4 dB.
- 11) Decrease calibration parameter #46 (carrier squelch mute threshold) from \$FFFFh until the receiver audio is muted (0.0 to 0.05 Vrms).
- 12) Store the values for calibration parameters #46 and #47 in Flash memory.

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 18

6.3.13 Mode A Alignment

6.3.13.1 Mode A Receiver

Reserved.

6.3.13.2 Mode A Transmitter

After Completion of 6.3.8 and 6.3.10, load the same values for all frequency ranges for Mode A TFMs #21, #22, #25, and #26 as are used for AM TFMs.

AM Mode TFMs		Mode A TFMs	
	TFM #		TFM #
AM I Channel Carrier Power	17	Mode A I Channel Carrier Power	21
AM Q Channel Carrier Power	18	Mode A Q Channel Carrier Power	22
AM I Channel Mod %	23	Mode A I Channel Mod %	25
AM Q Channel Mod %	24	Mode A Q Channel Mod %	26

6.3.14 Mode 2 Alignment

6.3.14.1 Mode 2 Carrier Null

- 1) Set the UUT discrete inputs to Discrete Configuration for Alignment.
- 2) Tune the UUT to Channel 118.500.
- 3) Set TFM parameters #15 and #16 (D8PSK I_Channel Gain and Q_Channel Gain) to \$00h.
- 4) Set TFM parameters #11 and #13 to hex \$96h and \$64h, respectively.
- 5) Ground the PTT line (MP 1C), and adjust TFMs #19 and #20 (I_Offset and Q_Offset) alternately to null the carrier as detected on a selective measuring receiver or power meter. The null shall be less than -4 dBm at the sampled port.
- 6) Unground the PTT line.
- 7) Store the values used for TFM parameters #19 and #20 in FLASH memory locations for all temperature zones and channels (value for 118.5 MHz channel is sufficient for all other channels).

6.3.14.2 Mode 2 Bias Adjustment

- 1) Set the UUT discrete inputs to Discrete Configuration for Alignment.
- 2) Set the ARINC data to "Standard 25 kHz ARINC Configuration" on channel 118.500.
- 3) Connect 50 ohm load to antenna cable
- 4) Set TFM parameters #19 and #20 (D8PSK I and Q channel offset) and #15 and #16 (D8PSK Channel Gains) to \$00h to set transmitter power to 0 watts.
- 5) Set TFM parameters #11 and #13 (D8PSK Drive bias and D8PSK Final bias) to \$0000h.

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 19

- 6) Ground the PTT (MP 1C), and monitor the input current to the UUT.
- 7) Adjust TFM parameter #11 until the current increases by $600 \text{ mA} \pm 120 \text{ mA}$ over the value obtained in step 6.
- 8) Adjust TFM parameter #13 until the current increases by an additional $500 \text{ mA} \pm 120 \text{ mA}$ over the value in step 6.
- 9) Unground the PTT.
- 10) Convert the TFM parameters to those required for the four temperature bins by using the PA temperature sense data (broadcast on the 353 word) and the temperature slope data (see appendix E) for both the driver and the final.
- 11) Store the values determined for TFM parameters #11 and #13 in Flash memory locations for all channels (value for 118.5 MHz channel is sufficient for all other channels).

6.3.14.3 Mode 2 RF Power

- 1) Tune the UUT to Channel 118.500.
- 2) Verify UUT is in SSB mode.
- 3) Set TFM parameters #15 and #16 (D8PSK I_Channel Gain and Q_Channel Gain) to \$00h.
- 4) Increase the I_Mod TFM (#15) until 10 ± 0.2 Watts is measured at the RF output and record value.
- 5) Set TFM parameters # 15 (D8PSK I_Channel Gain) to \$00h.
- 6) Increase the Q_Mod TFM (#16) until 10 ± 0.2 watts is measured at the RF output and record value.
- 7) Store the values used for TFM parameters #15 and #16 in Flash memory.
- 8) Repeat for every 1 MHz step through 136.500 MHz.

6.3.14.4 D8PSK Quadrature Mismatch

- 1) Tune the UUT to 118.5 MHz.
- 2) Verify UUT is in SSB Mode
- 3) Ground the PTT line (MP 1C). Null the lower amplitude sideband of the RF output by adjusting the D8PSK Quadrature Mismatch TFM (#28) while monitoring the output on a spectrum analyzer. The lower amplitude sideband must be at least -40 dBc relative to the higher amplitude sideband. The Q mod TFM (#16) determined in earlier adjustments may be adjusted as required to aid in achieving the required null value of -45 dBc for the lower sideband.
- 4) Store the values used for TFM parameters #28 and #16 (if changed from initial value) in Flash memory.
- 5) Repeat for every 1 MHz step through 136.500 MHz using the previous band values as the initial values for TFM #28.

6.3.15 Mode 2 AGC Calibration

- 1) Set Standard ARINC Configuration at 118.5 MHz.
- 2) Set Standard RF Generator setting at current frequency (starting at 118.5 MHz) with CW signal at -90.5 dBm .
- 3) Set Discrete Configuration for Alignment.
- 4) Read receiver AGC value (input power level).

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 20

- 5) Store this value in Flash memory for TFM parameter #33 (Mode 2 -90.5 dBm level)
- 6) Readjust generator RF level for -91.5 dBm.
- 7) Read receiver AGC value (input power level).
- 8) Store this value in Flash memory for TFM parameter #34 (Mode 2 -91.5 dBm level)
- 9) Repeat for every 1 MHz step through 136.500 MHz.

6.3.16 Flash Update

- 1) If not previously performed, write all TFMs that have been adjusted during previous alignment steps to Flash Memory.

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 21

7. Temperature Testing

Perform Section 8.0, Final Tests, prior to Temperature Testing. Test limits and temperature profile to be determined by Test Engineering. Prior to starting temperature testing, fault memory should be cleared so that any intermittent faults that occur during Temperature Testing can be viewed after completion of testing.

7.1 Rapid cycle portion of ESS

7.1.1 Self Test

- 1) Set the UUT discrete inputs to "standard discrete configuration".
- 2) Set the ARINC data to "Standard 25 kHz ARINC Configuration" on channel 128.500.
- 3) Place the Air/Ground discrete in the "Open" position, i.e. "on the ground".
- 4) Command Selftest
- 5) Monitor bits 11 through 26 in the label 350 word on the OMS/CFDS Output bus for zeros (no trouble found). Note: If ESS chamber does not allow all ARINC input buses to be exercised, just bit 11 should be monitored.
- 6) Reset Air/Ground discrete to grounded condition ("in-air")

7.1.2 28 Vdc Monitoring

- 1) With the UUT powered monitor the 28 Vdc current draw.

Production Limit: ≥ 0.5 and ≤ 1.0 amp

7.2 Extended Dwell portion of ESS

7.2.1 Sensitivity

- 1) Set the UUT discrete inputs to "standard discrete configuration" (squelch disabled).
- 2) Apply a -95.0 dBm signal at a frequency of 118 MHz, modulated 30% with a 1 kHz tone.
- 3) Set the ARINC control data to "Standard 25 kHz ARINC Configuration" on channel 118.000.
- 4) Set the RF generator output level to -95.0 dBm.
- 5) Verify the S+N/N ratio at the received audio output (MP 15A, MP 15B).
- 6) Repeat steps 1- 6 at 126, 131, and 136 MHz

Production Limit: S+N/N ratio ≥ 8.0 dB but LT 20 dB

7.2.2 Audio Output Level

- 1) Set the UUT discrete inputs to "standard discrete configuration".
- 2) Apply a -54 dBm level signal at 126.600 MHz, modulated 30% by a 1 kHz sine wave.
- 3) Set the ARINC control data to "Standard 25 kHz ARINC Configuration" on channel 126.600.

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 22

4) Verify the analog audio output level at the received audio output (MP 15A, MP 15B).

Production Limit: 2.45 ± 0.6 Vrms

7.2.3 Audio Output Distortion

- 1) Set the UUT discrete inputs to "standard discrete configuration".
- 2) Apply a -20 dBm signal at a frequency of 118.000 MHz, modulated 90% with a 1 kHz tone.
- 3) Set the ARINC control data to "Standard 25 kHz ARINC Configuration" on channel 118.000.
- 4) Adjust the distortion analyzer connected to the received audio output (MP 15A, MP 15B) and measure audio distortion.
- 5) Repeat steps 1-4 at 126, 131, and 136 MHz

Production Limit: Audio distortion: ≤ 5%

7.2.4 Unmodulated RF Power Output/Current

- 1) Set the UUT discrete inputs to "standard discrete configuration".
- 2) Set the ARINC control data to "Standard 25 kHz ARINC Configuration".
- 3) Tune the UUT to Channel 118.000.
- 4) Ground the PTT line (MP 1C), measure and verify the output power and input current
- 5) Unground the PTT line.
- 6) Repeat steps 1-5 at 126, 131, and 136 MHz

Production Limit: 25 - 40 watts

Production Limit: ≤ 7.5 amps

7.2.5 Modulation Distortion

- 1) Set the UUT discrete inputs to "standard discrete configuration".
- 2) Set the ARINC control data to "Standard 25 kHz ARINC Configuration".
- 3) Tune UUT to 118.000 MHz.
- 4) Apply an audio input of 1.25 Vrms at 1 kHz at mic input.
- 5) Ground the PTT line (MP 1C) and measure the demodulated RF distortion
- 6) Unground the PTT line.
- 7) Repeat steps 1- 6 at 126, 131, and 136 MHz

Production Limit: ≤ 7% distortion

7.2.6 Analog Input Compressor Range

- 1) Tune UUT to 118.000 MHz.
- 2) Set the mic audio voltage to 1.25 Vrms.
- 3) Ground the PTT line (MP 1C)
- 4) Verify the percentage of negative modulation. Unkey the PTT line.

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 23

5) Repeat steps 1- 4 at 126, 131, and 136 MHz

Production Limit: $\geq 70\%$ but LT 99%.

7.2.7 Frequency Accuracy

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration”.
- 3) Tune the UUT to 135.000 MHz.
- 4) With no modulation applied, ground the PTT line (MP 1C) and verify the frequency error between tuned and measured frequencies.
- 5) Unground the PTT.

Production Limit: ± 3 PPM (± 405 Hz)

7.2.8 Fault Memory

- 1) Following completion of Temperature Testing, use OMS bus to examine ground scan and fault memory
- 2) Verify that no faults are present.

Production Limit: No Faults in memory

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 24

8. Final Test Requirements

Final Test may be performed manually or with the automatic test system.

NOTE: If necessary due to interference experienced during testing (and as a result of the testing environment), a frequency on an adjacent channel not more than 100 kHz away from the specified frequency may be used for testing receive mode parameters.

8.1 Power Supplies [Entry]

8.1.1 Current Drain at 27.5 Vdc

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” on channel 128.5
- 3) Set the input voltage to 27.5 Vdc.
- 4) Measure the DC input current.

Production Limit: 0.6 +/- 0.2 amp

Abort Test Limit: ≥ 1.1 amp

CMM Limit: N/A

8.1.2 Current Drain at 18.0 Vdc

- 1) Decrease the input voltage to 18.0 ± 0.5 Vdc and measure the input current.

Production Limit: 0.8 +/- 0.3 amp

CMM Limit: N/A

8.1.3 Internal Power Supplies

- 1) Reset the input voltage to 27.5 +/- 0.6 Vdc.
- 2) Set Discrete Configuration for Alignment and send in a label 277 on the Dataload Input Bus (must be in Alignment mode in order to get label 353 on the Dataload Output Bus).
- 3) Measure the outputs of the following internal supplies using label 353 on the Dataload Output Bus:

a) +3.3 Volt Supply

Production Limit: +3.3 Vdc to 3.55 Vdc

CMM Limit: N/A

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SCALE: NONE		MSWD 97	SHEET 25

b) +8.0 Volt Supply

Production Limit: +7.3 Vdc to 8.90 Vdc

CMM Limit: N/A

c) +15.0 Volt Supply

Production Limit: +14.5 Vdc to 17.5 Vdc

CMM Limit: N/A

See Appendix D for conversion values.

8.2 Voice/Analog Data Mode Tests

8.2.1 Voice/Analog Data Receiver Tests

8.2.1.1 Simulcomm [Entry]

8.2.1.1.1 -20 dBm threshold

- 1) Set Standard ARINC Configuration at 118.500 MHz.
- 2) Set Discrete Configuration for Alignment and send in a label 277 on the Dataload Input Bus (must be in Alignment mode in order to get label 353 on the Dataload Output Bus).
- 3) Set the generator RF level to -8 dBm and 90% modulation, 1 kHz Tone.
- 4) Monitor the AGC_Level output of the RF Card or the label 353 AGC Level.
- 5) Decrease the RF level in 1 dB steps.
- 6) Verify the RF level required to cause a 2% change in AGC Level.
- 7) Repeat steps 4 through 6 for channel 136.500 MHz.
- 8) Set Standard Discrete Configuration and cycle power to exit Alignment mode.

Production Limit: -20 dBm +/- 10 dBm

CMM Limit: -20 dBm +/- 10 dBm

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 26

8.2.1.2 Sensitivity [Entry]

8.2.1.2.1 Sensitivity 25 kHz mode Channel 118.000 (Band 1 low side)

- 1) Set the UUT discrete inputs to “standard discrete configuration” (squelch disabled).
- 2) Set the RF Generator to “standard RF generator configuration” at 118.000 MHz.
- 3) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” on channel 118.000 MHz.
- 4) Set the RF generator output level to -103.5 dBm.
- 5) Verify the SINAD at the combined audio output

Production Limit: ≥ 8.5 dB but LT 20 dB

CMM Limit: nlt 6 dB

8.2.1.2.2 Sensitivity 25 kHz mode Channel 118.975 (Band 1 high side)

- 1) Set the ARINC control data to channel 118.975.
- 2) Set the RF Generator frequency to 118.975 MHz and output level to -103.5 dBm.
- 3) Verify the SINAD ratio at the combined audio output.

Production Limit: ≥ 8.5 dB but LT 20 dB

CMM Limit: nlt 6 dB

8.2.1.2.3 Sensitivity 25 kHz mode Channel 119.500 Through 135.500 (Bands 2 – 17 centers)

- 1) Set the RF Generator frequency to 119.550, 120.550, 121.550, ..., 135.550 MHz and output level to -103.5 dBm.
- 2) Set the ARINC control data to channel to 119.550, 120.550, 121.550, ..., 135.550 MHz.
- 3) Verify the SINAD at the combined audio output.

Production Limit: ≥ 8.5 dB but LT 20 dB

CMM Limit: nlt 6 dB

8.2.1.2.4 Sensitivity 25 kHz mode Channel 136.000 (Band 18 Low Side)

- 1) Set the RF Generator frequency to 136.000 MHz and output level to -103.5 dBm.
- 2) Set the ARINC control data to channel 136.000.
- 3) Verify the SINAD at the combined audio output.

Production Limit: ≥ 8.5 dB but LT 20 dB

CMM Limit: nlt 6 dB

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 27

8.2.1.2.5 Sensitivity 25 kHz mode Channel 136.975 (Band 18 High Side)

- 1) Set the RF Generator frequency to 136.975 MHz and output level to -103.5 dBm.
- 2) Set the ARINC control data to channel 136.975.
- 3) Verify the SINAD at the combined audio output.

Production Limit: ≥ 8.5 dB but LT 20 dB

CMM Limit: ≤ 6 dB

8.2.1.2.6 Sensitivity 8.3 kHz mode Channel 126.005

- 1) Set the RF Generator frequency to 126.000 MHz and output level to -103.5 dBm.
- 2) Set the ARINC control data to “Standard 8.33 kHz ARINC Configuration” on channel 126.005.
- 3) Verify the SINAD at the combined audio output.

Production Limit: ≥ 8.5 dB but LT 20 dB

CMM Limit: ≤ 6 dB

8.2.1.3 Sensitivity During Low Line Voltage [Entry]

8.2.1.3.1 Sensitivity During Low Line Voltage Channel 118.000

- 1) Set the UUT power input to $+18 \pm 0.2$ Vdc.
- 2) Set the UUT discrete inputs to “standard discrete configuration”.
- 3) Set the RF Generator to “standard RF generator configuration” at 118.000 MHz.
- 4) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” on channel 118.000 MHz.
- 5) Set the RF generator output level to -103.5 dBm.
- 6) Verify the SINAD at the combined audio output.

Production Limit: ≥ 8.5 dB but LT 20 dB

CMM Limit: N/A

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8.2.1.3.2 Sensitivity During Low Line Voltage Channel 136.975

- 1) Set the RF Generator frequency to 136.975 MHz and output level to -103.5 dBm.
- 2) Set the ARINC control data to channel 136.975.
- 3) Verify the SINAD at the combined audio output.
- 4) Reset the UUT power input to $+27.5 \pm 0.1$ Vdc.

Production Limit: ≥ 8.5 dB but LT 20 dB

CMM Limit: N/A

8.2.1.4 Receiver Quieting [Entry]

- 1) Set the UUT discrete inputs to “standard discrete configuration”
- 2) Set the RF generator to “standard RF generator configuration” at 126.000 MHz.
- 3) Set the ARINC control data to channel 126.000.
- 4) Set the RF generator output level to -53 dBm.
- 5) Establish a 0 dB reference for the combined audio output level.
- 6) Remove the modulation from the RF generator.
- 7) Verify the change in the level of the combined audio output signal.

Production Limit: ≤ 42 dB

CMM Limit: ≤ 40 dB

8.2.1.5 Image Rejection [Entry]

- 1) Set the UUT discrete inputs to “standard discrete configuration.”
- 2) Set the ARINC control data to channel 135.975 MHz.
- 3) Set the RF Generator to “standard RF generator configuration” at 135.975 MHz.
- 4) Record the SINAD level for an input of -107 dBm.
- 5) Set the RF Generator to 194.775 MHz.
- 6) Increase the level out of the RF Generator until the SINAD level is the same as obtained in step 3.

Production Limit: ≥ 80 dB

CMM Limit: N/A

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8.2.1.6 Squelch Operation

8.2.1.6.1 25 kHz Noise Squelch Operation [Entry]

8.2.1.6.1.1 25 kHz Noise Squelch Closure

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Enable squelch by opening MP 13C.
- 3) Set the RF Generator to “standard RF generator configuration” at 126.600 MHz.
- 4) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” on channel 126.600.
- 5) Set the RF Generator output level to -115 dBm.
- 6) Verify the combined audio output.

Production Limit: ≤ 0.1 Vrms

CMM Limit: ≤ 0.1 Vrms

8.2.1.6.1.2 25 kHz Noise Squelch Opening RF Level

- 1) Increase the RF generator output level until the audio out is > 0.5 Vrms at MP 15A and MP 15B.
- 2) Verify the noise squelch opening RF level.
- 3) Record the RF level as Ref_{sq}.

Production Limit: -103.5 ± 1.5 dB

CMM Limit: -103.5 ± 2.0 dB

8.2.1.6.1.3 25 kHz Noise Squelch RF Level Change for Closure

- 1) Decrease the RF generator output level until the audio out is < 0.5 Vrms.
- 2) Verify the change in RF level from Ref_{sq} to obtain noise squelch closure.

Production Limit: -3 ± 1 dB

CMM Limit: -3 ± 1 dB

8.2.1.6.1.4 8.33 kHz Noise Squelch Closed at -115 dBm

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Enable squelch by opening MP 13C.
- 3) Set the RF Generator to “standard RF generator configuration” at 126.600 MHz.
- 4) Set the ARINC control data to “Standard 8.33 kHz ARINC Configuration” on channel 126.605.
- 5) Set the RF Generator output level to -115 dBm.
- 6) Verify the combined audio output.

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SCALE: NONE		MSWD 97	SHEET 30

Production Limit: ≤ 0.1 Vrms

CMM Limit: ≤ 0.1 Vrms

8.2.1.6.1.5 8.33 kHz Noise Squelch Opening RF Level

- 1) Increase the RF generator output level until the audio out is > 0.5 Vrms.
- 2) Verify the noise squelch opening RF level
- 3) Record the RF level as Ref.

Production Limit: -103.5 ± 1.5 dB

CMM Limit: -103.5 ± 2.0 dB

8.2.1.6.1.6 8.33 kHz Noise Squelch RF Level Change for Closure

- 1) Decrease the RF generator output level until the audio out is < 0.5 Vrms.
- 2) Verify the change in RF level from Ref. to obtain noise squelch closure.

Production Limit: -3 ± 1 dB

CMM Limit: -3 ± 1 dB

8.2.1.6.2 Carrier Squelch Operation

8.2.1.6.2.1 Carrier Squelch Open

- 1) Set the UUT discrete inputs to "standard discrete configuration".
- 2) Enable squelch by opening MP 13C.
- 3) Set the RF Generator to "standard RF generator configuration" at 126.600 MHz.
- 4) Set the ARINC control data to "Standard 25 kHz ARINC Configuration" on channel 126.600.
- 5) Set the RF generator for simultaneous modulation with a 6 kHz sine wave at 60% AM and a 1 kHz sine wave at 30% AM at an RF level of -105 dBm.
- 6) Slowly increase the RF level (approx. 1 dB per 2 sec) until the audio out is > 0.5 Vrms.
- 7) Verify the carrier squelch opening RF level.
- 8) Record the RF level as Ref_{sq2}.

Production Limit: -87.5 ± 2 dB

CMM Limit: -88.0 ± 5 dB

8.2.1.6.2.2 Carrier Squelch Closure

- 1) Slowly decrease the RF level (approx. -1 dB per 2 sec) until the audio out is < 0.5 Vrms.
- 2) Verify the change in RF level from Ref_{sq2} to obtain carrier squelch closure.

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SCALE: NONE		MSWD 97	SHEET 31

Production Limit: -4.0 +/- 2 dB

CMM Limit: -4.0 +/- 2 dB

8.2.1.7 AGC Characteristics [Entry]

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the RF Generator to “standard RF generator configuration” at 126.600 MHz and -50 dBm.
- 3) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” on channel 126.600.
- 4) Establish a 0 dB reference Ref_{AGC}.

8.2.1.7.1 AGC Tracking @ 0 dBm

- 1) Set the RF generator output level to 0 dBm.
- 2) Verify the change in audio output level from Ref_{AGC} in dB.

Production Limit: <= 3 dB

CMM Limit: <= 6 dB

8.2.1.7.2 AGC Tracking @ -10 dBm

- 1) Set the RF generator output level to -10 dBm.
- 2) Verify the change in audio output level from Ref_{AGC} in dB.

Production Limit: <= 3 dB

CMM Limit: N/A

8.2.1.7.3 AGC Tracking @ -20 dBm

- 1) Set the RF generator output level to -20 dBm.
- 2) Verify the change in audio output level from Ref_{AGC} in dB.

Production Limit: <= 3 dB

CMM Limit: N/A

8.2.1.7.4 AGC Tracking @ -30 dBm

- 1) Set the RF generator output level to -30 dBm.
- 2) Verify the change in audio output level from Ref_{AGC} in dB.

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SCALE: NONE		MSWD 97	SHEET 32

Production Limit: ≤ 3 dB

CMM Limit: N/A

8.2.1.7.5 AGC Tracking @ -40 dBm

- 1) Set the RF generator output level to -40 dBm.
- 2) Verify the change in audio output level from Ref_{AGC} in dB.

Production Limit: ≤ 3 dB

CMM Limit: N/A

8.2.1.7.6 AGC Tracking @ -60 dBm

- 1) Set the RF generator output level to -60 dBm.
- 2) Verify the change in audio output level from Ref_{AGC} in dB.

Production Limit: ≤ 3 dB

CMM Limit: N/A

8.2.1.7.7 AGC Tracking @ -70 dBm

- 1) Set the RF generator output level to -70 dBm.
- 2) Verify the change in audio output level from Ref_{AGC} in dB.

Production Limit: ≤ 3 dB

CMM Limit: N/A

8.2.1.7.8 AGC Tracking @ -80 dBm

- 1) Set the RF generator output level to -80 dBm.
- 2) Verify the change in audio output level from Ref_{AGC} in dB.

Production Limit: ≤ 3 dB

CMM Limit: N/A

8.2.1.7.9 AGC Tracking @ -90 dBm

- 1) Set the RF generator output level to -90 dBm.
- 2) Verify the change in audio output level from Ref_{AGC} in dB.

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SCALE: NONE		MSWD 97	SHEET 33

Production Limit: ≤ 3 dB

CMM Limit: N/A

8.2.1.7.10 AGC Tracking @ -99 dBm

- 1) Set the RF generator output level to -99 dBm.
- 2) Verify the change in audio output level from Ref_{AGC} in dB.

Production Limit: ≤ 4 dB

CMM Limit: ≤ 6 dB

8.2.1.8 Voice Audio Output

8.2.1.8.1 Audio Output Level [Entry]

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the RF Generator to -54 dBm output level at 126.600 MHz, modulated 30% by a 1 kHz sine wave.
- 3) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” on channel 126.600.
- 4) Verify the analog audio output level at the combined audio output (MP 15A, MP 15B).

Production Limit: 2.4 ± 0.1 Vrms

CMM Limit: 2.4 ± 0.5 Vrms

8.2.1.8.2 Audio Output Phasing (Performed on a sample basis)

- 1) Apply a -54 dBm signal at 126.600 MHz, modulated 30% at 1 kHz.
- 2) Verify that the phase of the received combined audio output signal with respect to the envelope of the RF input signal is within +20 to -90 degrees.

Production Limit: Audio output to envelope phase shift: +20 to -90 degrees at 1000 Hz.

CMM Limit: N/A

8.2.1.8.3 Audio Frequency Response

- 1) Apply a -54 dBm signal at 126.600 MHz, modulated 30% at 1 kHz.
- 2) Adjust the distortion analyzer connected to the combined audio output to establish a 0 dB reference.
- 3) Change the modulating frequency to 300 Hz and verify the change in level in dB of the audio output and repeat for a modulating frequency of 2500 Hz

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SCALE: NONE		MSWD 97	SHEET 34

Production Limit: ≤ 6 dB variation 300 to 2500 Hz

CMM Limit: ≤ 6 dB variation 300 to 2500 Hz

4) Change the modulating frequency to 4000 Hz and verify the change in level in dB of the audio output

Production Limit: ≥ 42 dB attenuation at 4 kHz.

CMM Limit: ≥ 40 dB attenuation at 4 kHz

8.2.1.8.4 Audio Output Distortion

1) Apply a -54 dBm signal at 126.600 MHz, modulated 80% at 1 kHz.

2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” on channel 126.600.

3) Adjust the distortion analyzer connected to the combined audio output (MP 15A, MP 15B) and measure audio distortion.

Production Limit: Audio distortion: $\leq 5\%$

CMM Limit: Audio distortion: $\leq 7\%$

8.2.1.8.5 RX Audio Compressor

1) Apply a -54 dBm signal at 126.600 MHz, modulated 50% at 1 kHz.

2) Note the audio output level.

3) Increase the modulation depth to 90% and measure the change in combined audio output level.

Production Limit: Audio variation: ≤ 1 dB.

CMM Limit: Audio variation: ≤ 1 dB.

8.2.1.9 Data Audio Output [Entry]

8.2.1.9.1 Output Level

1) Set the UUT discrete inputs to “standard discrete configuration”.

2) Set the RF Generator to “standard RF generator configuration” at 126.600 MHz.

3) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” on channel 126.000.

4) Ground the Voice/Data line (MP 7C).

5) Apply -54 dBm signal at 126.600 MHz, modulated 80% at 1.8 kHz to the antenna port.

6) Verify the data audio output level (MP 13A, MP 13B).

Production Limit: Data audio output: 1.0 ± 0.2 Vrms

CMM Limit: Data audio output level: 1.0 ± 0.2 Vrms

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SCALE: NONE		MSWD 97	SHEET 35

8.2.1.9.2 Data Audio Frequency Response

- 1) Apply a –54 dBm signal at 126.600 MHz, modulated 30% at 1 kHz.
- 2) Adjust the audio distortion analyzer connected to the combined analog data audio output to establish a 0 dB reference.
- 3) Change the modulating frequency from 300 Hz to 6600 Hz and verify the change in level of the audio output from the reference value

Production Limit: ≤ 6 dB variation 300 to 6600 Hz

CMM Limit: ≤ 6 dB variation 300 to 6600 Hz

8.2.1.9.3 Data Audio Output Distortion

- 1) Apply a –54 dBm signal at 126.600 MHz, modulated 80% at 1 kHz.
- 2) Adjust the distortion analyzer connected to the Data audio output and measure audio distortion.

Production Limit: Audio distortion: $\leq 5\%$

CMM Limit: Audio distortion: $\leq 5\%$

8.2.2 Voice/Analog Data Mode Transmitter Tests [Entry]

Unless otherwise specified, the tests are to be performed at 126.500 MHz. Always keep the antenna port connected to a 50 ohm load.

8.2.2.1 Unmodulated RF Power Output/Current

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration”.
- 3) Tune the UUT to Channel 118.500.
- 4) Ground the PTT line (MP 1C), measure and verify the output power and input current
- 5) Unground the PTT line.
- 6) Repeat for every 1 MHz step through 136.500 MHz.

Production Limit: 26 - 33 watts

Production Limit: ≤ 7.5 amps

CMM Limit: ≥ 25 watts at 118.500, 126.500, and 136.500 MHz

CMM Limit: ≤ 7.6 amps at 118.500, 126.500, and 136.500 MHz

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SCALE: NONE		MSWD 97	SHEET 36

8.2.2.2 Power Output During Low Line Voltage

- 1) Tune radio to 126.500 MHz.
- 2) Set the UUT power input for +18 +/- 0.2 Vdc.
- 3) AC couple an audio oscillator to the mic audio input hi and low (MP 1A, MP 1B).
- 4) Set audio oscillator frequency to 1 kHz with amplitude of +1.25 Vrms.
- 5) Ground the PTT line.
- 6) Verify the total RF output power including modulation sidebands at 126.500 MHz.
- 7) Unground the PTT line.
- 8) Set input line voltage to 27.5 Vdc.

Production Limit: 10 - 20 watts

CMM Limit: 10 - 20 watts

8.2.2.3 TX Compressor [Entry]

8.2.2.3.1 Analog Input Compressor Threshold

- 1) Set the UUT discrete inputs to "standard discrete configuration".
- 2) Set the ARINC control data to "Standard 25 kHz ARINC Configuration" and tune UUT to 126.500 MHz.
- 3) Connect the RF output to an AM modulation analyzer through a 30 dB pad.
- 4) AC couple the output of the audio oscillator to the mic audio input hi and low (MP 1A, MP 1B).
- 5) Ground the PTT line and increase the mic audio (1 kHz) from 0 volts until the negative modulation stops increasing.
- 6) Unground the PTT line.
- 7) Verify the audio input voltage (Note: The actual input voltage may be less than the output voltage displayed by the audio analyzer due to the impedance mismatch).

Production Limit: 0.1 to 0.15 Vrms

CMM Limit: 0.08 to 0.175 Vrms

8.2.2.3.2 Analog Input Compressor Range

- 1) Tune UUT to 126.500 MHz.
- 2) Ground the PTT line and increase the mic audio voltage to 1.25 Vrms.
- 3) Verify the percentage of negative modulation. Unkey the PTT line.

Production Limit: >= 85% but LT 95%

CMM Limit: >= 70% but LT 100%

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SCALE: NONE		MSWD 97	SHEET 37

8.2.2.4 25 kHz Transmitter Modulation Distortion (25 kHz mode) [Entry]

- 1) Set the UUT discrete inputs to "standard discrete configuration".
- 2) Set the ARINC control data to "Standard 25 kHz ARINC Configuration" and tune UUT to 126.500 MHz.
- 3) Apply an audio input of 1.25 Vrms at 1 kHz at mic input.
- 4) Ground the PTT line and measure the demodulated RF distortion using a 15 KHz Low Pass filter on the baseband audio output of the modulation analyzer
- 5) Unground the PTT line.
- 6) Repeat steps 3-5 using 350 and 2500 Hz.

Production Limit: $\leq 5\%$ distortion.

CMM Limit: $\leq 10\%$ distortion.

8.2.2.5 25 kHz Voice Audio Frequency Response (25 kHz mode)

- 1) Set the UUT discrete inputs to "standard discrete configuration."
- 2) Set the ARINC control data to "Standard 25 kHz ARINC Configuration" and tune unit to 126.500 MHz
- 3) Apply a 1.25 Vrms at 1 kHz audio signal to the mic audio input.
- 4) While the PTT line is grounded, measure the variation in dB of the audio out of the modulation meter as the audio input frequency is set to 300 and 2500 Hz.
- 5) Unground the PTT line.

Production Limit: ≤ 4 dB variation.

CMM Limit: ≤ 6 dB variation.

8.2.2.6 8.33 kHz Transmitter Modulation Distortion (8.33 kHz mode) [Entry]

- 1) Set the UUT discrete inputs to "standard discrete configuration."
- 2) Tune UUT to channel 126.430 MHz.
- 3) Apply an audio input of 1.25 Vrms at 1 kHz to the mic input.
- 4) Ground the PTT line and measure the demodulated RF distortion using a 3 KHz Low Pass filter on the baseband audio output of the modulation analyzer
- 5) Unground the PTT line.
- 4) Repeat steps 3-5 using 350 and 2500 Hz

Production Limit: $\leq 5\%$ distortion.

CMM Limit: $\leq 7\%$ distortion.

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SCALE: NONE		MSWD 97	SHEET 38

8.2.2.7 8.33 kHz Voice Audio Frequency Response (8.33 kHz mode)

- 1) Set the UUT discrete inputs to “standard discrete configuration.”
- 2) Tune unit to channel 126.430 MHz
- 3) Apply a 1.25 Vrms at 1 kHz audio signal to the mic audio input.
- 4) Connect a distortion analyzer to the modulation output of the modulation meter.
- 5) While the PTT line is grounded, measure the variation in dB of the audio out of the modulation meter with the audio input frequency set to 300, 2500, and 3200 Hz.
- 6) Unground the PTT line.

Production Limit: ≤ 4 dB variation 300 to 2500 Hz, -30 dB or less at 3200 Hz

CMM Limit: ≤ 6 dB variation 300 to 2500 Hz

8.2.2.8 Microphone Bias [Entry]

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” at 126.500 MHz.
- 3) With no audio applied, ground the PTT line and measure open circuit voltage at mic audio input hi (MP 1A).
- 4) Unground the PTT line.

Production Limit: 16.0 ± 1.5 Vdc.

CMM Limit: 16.0 ± 1.5 Vdc.

8.2.2.9 Sidetone [Entry]

8.2.2.9.1 Sidetone Frequency Response

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” and tune UUT to 126.500 MHz.
- 3) Connect the combined audio out (MP 15A, MP 15B) to the distortion analyzer.
- 4) Apply 1.25 Vrms at 1 kHz signal to the mic audio input
- 5) Ground the PTT line.
- 6) Obtain a 0 dB reference on the audio analyzer.
- 7) Set the modulating frequency to 300 and 2500 Hz; verify the change in the audio out level measured on the audio analyzer.
- 8) Unground the PTT line.

Production Limit: ≤ 6 dB.

CMM Limit: ≤ 6 dB.

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SCALE: NONE		MSWD 97	SHEET 39

8.2.2.9.2 Sidetone Distortion

- 1) Apply 1.000 Vrms at 1 kHz to the mic audio input
- 2) Ground the PTT line.
- 3) Measure and verify the audio output distortion
- 4) Repeat using 300, 1000, and 2500 Hz at mic audio input.
- 5) Unground the PTT line.

Production Limit: $\leq 7\%$.

CMM Limit: $\leq 10\%$.

8.2.2.9.3 Sidetone Level

- 1) Apply 1.25 Vrms at 1 kHz to the mic audio input
- 2) Ground the PTT line.
- 3) Measure the audio level at Sidetone audio output (MP 15A, MP 15B)
- 4) Unground the PTT line.

Production Limit: 2.5 ± 0.3 Vrms

CMM Limit: 2.5 ± 0.5 Vrms

8.2.2.10 Transmit Carrier Noise Level [Entry]

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” at 126.500 kHz.
- 3) Apply a 1.0 Vrms at 1 kHz audio signal to the mic audio input.
- 4) Connect the modulation analyzer to the antenna port through a 40 dB attenuator.
- 5) Ground the PTT line.
- 6) Establish a 0 dB reference on the distortion analyzer.
- 7) Remove the modulation and verify the change in level of the modulation meter’s modulation output.
(Use 300 Hz - 3 kHz filtering on the modulation meter and disable any auto ranging function).
- 8) Unground PTT line.

Production Limit: ≥ 38 dB.

CMM Limit: > 35 dB.

8.2.2.10.1 Data Audio Modulation

- 1) Tune UUT to 126.500 MHz.

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- 2) Ground the Voice/Data line (MP 7C)
- 3) Ground the data key line (MP 7D)
- 4) Apply 1.0 Vrms, 1800 Hz audio to the data audio input (MP 5A, MP 5B)
- 5) Verify the percentage of negative modulation. Unkey the data key line.

Production Limit: $\geq 85\%$ but LT 95%.

CMM Limit: $\geq 70\%$ but LT 100%.

8.2.2.11 Data Audio Frequency Response [Entry]

- 1) Tune UUT to 126.500 MHz.
- 2) Ground the Voice/Data line (MP 7C)
- 6) Ground the data key line (MP 7D)
- 7) Apply 1.0 Vrms, 600 Hz audio to the data audio input (MP 5A, MP 5B)
- 8) Establish a 0 dB reference on the modulation meter monitoring transmitter modulation.
- 9) Measure the variation in dB of the audio out of the modulation meter as the audio input frequency is set to 300, 2500, and 6600 Hz.
- 9) Unground the data key line.

Production Limit: ≤ 4 dB variation.

CMM Limit: ≤ 6 dB variation.

8.2.2.12 8.33 kHz Spectrum Test (Performed on a sample basis)

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the ARINC control data to “Standard 8.33 kHz ARINC Configuration”.
- 3) Set UUT to Channel 126.430.
- 4) Apply an 800 Hz, 0.125 Vrms audio signal to the mic audio input.
- 5) Ground the PTT line and adjust level of audio signal so as to achieve 80 +/- 2% modulation on combined positive and negative peaks.
- 6) With a spectrum analyzer connected so as to measure the RF output, measure level of modulation sidebands at +/- 3200 Hz relative to the carrier level.
- 7) Unground the PTT line.

Production Limit: ≥ 50 dB.

CMM Limit: N/A.

8.2.2.13 3:1 VSWR Test (Performed on a sample basis)

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration”.
- 3) Tune the UUT to channel 118.500.

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SCALE: NONE		MSWD 97	SHEET 41

- 4) Apply 1.0 Vrms at 1 kHz to the mic audio input.
- 5) Connect UUT to 3:1 VSWR simulator
- 6) Ground the PTT line while monitoring RF envelope with oscilloscope connected to test port on 3:1 VSWR simulator
- 7) Rotate VSWR simulator through all phase angles and verify that no oscillations are present. Note: power levels may vary.
- 8) Unground the PTT line.
- 9) Repeat for every 1 MHz step through 136.5 MHz.

Production Limit: No oscillations evident

CMM Limit: N/A

8.2.2.14 Broadband Noise Test (Performed on a sample basis)

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration”.
- 3) Tune the UUT to channel 119.000.
- 4) Apply 1.0 Vrms at 1 kHz to the mic audio input.
- 5) Connect UUT to 30 dB In-line pad and then to a bandpass filter tuned to 114.000 MHz. (The bandpass filter must have at least 50 dB attenuation at 119.000 MHz)
- 6) Connect spectrum analyzer to output of bandpass filter.
- 7) Ground the PTT line while monitoring channel power with spectrum analyzer.
- 8) Measure the total power in a 30 kHz bandwidth (IF BW and Video BW on analyzer must be adjusted so noise floor is no more than –80 dBm)

Production Limit: ≤ -65 dBm (-150 dBc/Hz).

CMM Limit: N/A

8.2.2.15 Transmitter Discrete Spurious

Reserved.

8.2.2.16 Frequency Accuracy [Entry]

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” and tune the UUT to 136.000 MHz.
- 3) With no modulation applied, ground the PTT (MP 1C) line and verify the frequency error between tuned and measured frequencies.
- 4) Unground the PTT.

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SCALE: NONE		MSWD 97	SHEET 42

Production Limit: +/- 3 PPM (+/-405 Hz)

CMM Limit: +/- 5 PPM (+/-675 Hz)

8.2.2.17 Transmitter FM [Entry]

8.2.2.17.1 Transmitter Incidental FM

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” and tune UUT to 118.000 MHz.
- 3) Set the modulation meter to measure FM deviation and enable the 15 kHz low pass and 300 Hz high pass filters.
- 4) Connect the audio oscillator to the UUT’s mic audio input and set it to 1 kHz at 1.2 Vrms.
- 5) Ground the PTT line and measure the transmitted incidental FM.
- 6) Unground the PTT line.
- 7) Repeat at 127.000 and 136.975 MHz.

Production Limit: <=1000 Hz

CMM Limit: <=3000 Hz

8.2.2.17.2 Transmitter FM During Low Line Voltage

- 1) Tune UUT to 118.000 MHz.
- 2) Set the input line voltage to $+18 \pm 0.2$ Vdc
- 3) Set the modulation meter to measure FM deviation and enable the 15 kHz low pass and 30 Hz high pass filters.
- 4) Connect the audio oscillator to the UUT’s mic audio input and set to 1 kHz at 1.2 Vrms.
- 5) Ground the PTT line and measure the transmitted incidental FM $((\text{PEAK}^- + \text{PEAK}^+)/2)$
- 6) Unground the PTT line.
- 7) Repeat at 127.000 and 136.975 MHz.
- 8) Return the input line voltage to 27.5 ± 0.5 Vdc.

Production Limit: <=1000 Hz

CMM Limit: <=3000 Hz

8.2.2.18 Keyline Timer [Entry]

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration”.
- 3) Key the PTT line and measure time for transmission to automatically terminate.
- 4) Unkey the transmitter.
- 5) Cycle the power to the UUT to clear out the transmitter time-out fault.

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SCALE: NONE		MSWD 97	SHEET 43

Production Limit: 34.5 ± 1.5 seconds

CMM Limit: 34.5 ± 1.5 seconds

8.2.2.19 Keyline Timer Disable [Entry]

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration”.
- 3) Ground Transmit Timer Disable discrete (MP 2A)
- 4) Key the PTT line and verify transmission time is at least 40 seconds
- 5) Unkey the transmitter.

Production Limit: NLT 40 seconds

CMM Limit: NLT 40 seconds

8.2.3 Data Bus Operation [Entry]

8.2.3.1 CMU Data In A and CMU Data Out

- 1) With no high-speed input data to CMU Data In A (MP 12A and MP 12B), wait at least five seconds and verify that an ARINC label 270 word is broadcast on the CMU Data Out Bus (MP 10C and MP 10D) at a rate of at least once per second whose bits 15 and 16 are both “1”. These bit settings indicate the absence of an active CMU on Port A.
- 2) With a 270 word being input only to CMU Data In A (MP 12A and MP 12B) at a rate of at least once per second and whose bit 9 is “1” and bit 10 is “0”, wait at least five seconds and verify that an ARINC label 270 word is broadcast on the CMU Data Out Bus (MP 10C and MP 10D) at a rate of at least once per second whose bit 15 is “1” and bit 16 is “0”.

8.2.3.2 CMU Data In B and CMU Data Out

- 1) With no high-speed input data to CMU Data In B (MP 12C and MP 12D), wait at least five seconds and verify that an ARINC label 270 word is broadcast on the CMU Data Out Bus (MP 10C and MP 10D) at a rate of at least once per second whose bits 15 and 16 are both “1”. These bit settings indicate the absence of an active CMU on Port B.
- 2) With a 270 word being input only to CMU Data In B (MP 12C and MP 12D) at a rate of at least once per second and whose bit 9 is “0” and bit 10 is “1”, wait at least five seconds and verify that an ARINC label 270 word is broadcast on the CMU Data Out Bus (MP 10C and MP 10D) at a rate of at least once per second whose bit 15 is “0” and bit 16 is “1”.

8.2.3.3 Port A Frequency Control

- 1) Ground Freq/Func Data Select (MP 11D).
- 2) Apply Label 030 ARINC 429 frequency word to Freq/Func Select A (MP 11A, MP 11B) with frequency of 124.725 MHz.

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 44

- 3) Verify Label 350 ARINC 429 word on OMS/CFDS Output bus (MP 14C, MP 14D) indicates that Freq/Func Select A input is active (bit 14 is set to 1 and bit 15 is set to 0).

8.2.3.4 Port B Frequency Control

Proven by previous tests.

8.2.3.5 ICAO Input Bus A

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Disable ICAO Bus A and B information to the UUT.
- 3) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” at 118 MHz.
- 4) Monitor Label 350 on OMS output bus and verify bits 21 and 22 are 1.
- 5) Enable ICAO Bus A information to UUT (transmit valid labels 275 and 276)
- 6) Monitor Label 350 on OMS output bus and verify bit 21 is 0 and bit 22 is 1.

Production Limit: Bits 21 and 22 are 1 with no ICAO address input present, and bit 21 is 0 and bit 22 is 1 with only ICAO Bus A address input present

CMM Limit: Bits 21 and 22 are 1 with no ICAO address input present, and bit 21 is 0 and bit 22 is 1 with only ICAO Bus A address input present

8.2.3.6 ICAO Input Bus B

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Disable ICAO Bus A and B information to the UUT.
- 3) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” at 118 MHz.
- 4) Monitor Label 350 on OMS output bus and verify bits 21 and 22 are 1.
- 5) Enable ICAO Bus B information to UUT (transmit valid labels 275 and 276)
- 6) Monitor Label 350 on OMS output bus and verify bit 21 is 1 and bit 22 is 0.

Production Limit: Bits 21 and 22 are 1 with no ICAO address input present, and bit 21 is 1 and bit 22 is 0 with only ICAO Bus B address input present

CMM Limit: Bits 21 and 22 are 1 with no ICAO address input present, and bit 21 is 1 and bit 22 is 0 with only ICAO Bus B address input present

8.2.4 Data Load Input Bus

Verified by tests during alignment phase.

8.2.5 Data Load Output Bus

Verified by tests during alignment phase.

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 45

8.2.6 Front Panel Operation [Entry]

8.2.6.1 Front Panel Self Test Button

- 1) Set the UUT discrete inputs to “standard discrete configuration”.
- 2) Press the UUT’s front panel test button and verify that the front panel LEDs light in the proper sequence.

Phase	LRU	Control	Antenna	Duration
1	Red	Red	Red	1-3 sec
2	Green	Red	Red	1-3 sec
3	Off	Off	Off	1-3 sec
4	Green	Off	Off	20-40 sec

Production Limit: LED operation per chart

CMM Limit LED operation per chart

8.2.6.2 Front Panel Jack Operation

- 1) Set the UUT discrete inputs to “standard discrete configuration”
- 2) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” at 120 MHz
- 3) Connect audio analyzer to the front panel phone jack
- 4) Apply a 1000 Hz, 1.25 Vrms signal to the UUT’s front panel mic jack
- 5) Key the UUT via front panel mic jack
- 6) Verify that the audio sidetone at the UUT’s front panel phone jack is 2.0 – 3.0 VRMS.

Production Limit: Sidetone level : 2.0 to 3.0 vrms

CMM Limit Sidetone level : 2.0 to 3.0 vrms

8.2.7 Power Interrupt Play-Though [Entry]

- 1) Set the UUT discrete inputs to “standard discrete configuration” (squench disabled).
- 2) Set the RF Generator to “standard RF generator configuration” at 118.000 MHz.
- 3) Set the ARINC control data to “Standard 25 kHz ARINC Configuration” on channel 118.000 MHz.
- 4) Set the RF generator output level to –47dBm at 30% and 1 kHz.
- 5) Verify the audio output is 2 to 3 Vrms
- 6) Momentarily interrupt the +28 V power to the UUT for 100-200 msec
- 7) Verify that audio output is uninterrupted and remains at 2 to 3 V rms

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 46

Production Limit: No reset during momentary power drop out

CMM Limit: No reset during momentary power drop out

8.3 Discrete I/O Tests [Entry]

8.3.1 Muting

- 1) Set the UUT discrete inputs to "standard discrete configuration".
- 2) Set the ARINC control data to "Standard 25 kHz ARINC Configuration" at 120 MHz.
- 3) Ground the PTT line (MP 1C).
- 4) Verify that the voltage at the Muting pin (MP 15C) is 0-3.0 VDC.
- 5) Open the PTT line unkeying the transmitter.
- 6) Verify that the voltage at the Muting pin is 25-30 VDC.

Production Limit: Keyed: 0-3 VDC
 Unkeyed: 25-30 VDC

CMM Limit: Keyed: 0-3 VDC
 Unkeyed: 25-30 VDC

8.3.2 Key Event

- 1) Set the UUT discrete inputs to "standard discrete configuration".
- 2) Set the ARINC control data to "Standard 25 kHz ARINC Configuration" at 120 MHz.
- 3) Ground the PTT line (MP 1C).
- 4) Verify that the voltage at the Key Event pin (MP D1) is 0-3.0 VDC.
- 5) Open the PTT line unkeying the transmitter.
- 6) Verify that the voltage at the Key Event pin (MP D1) is 25-30 VDC.

Production Limit: Keyed: 0-3 VDC
 Unkeyed: 25-30 VDC

CMM Limit: Keyed: 0-3 VDC
 Unkeyed: 25-30 VDC

8.3.3 8.33 kHz Select Pin

No specific test needed; hard-wired to ground in UUT.

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 47

8.3.4 Data Load Enable

No specific test needed; tested by ability to data load UUT.

8.3.5 Normal/Align Enable

No specific test needed; tested by ability to align UUT.

8.3.6 CFDS Select

- 1) Set the UUT discrete inputs to "standard discrete configuration".
- 2) Select Airbus OMS Mode (MP 11C and MP 14A ground)
- 3) Verify that Labels 350 and 356 are present on the OMS output bus
- 4) Select Boeing OMS Mode (MP 11C and MP 14A open)
- 5) Cycle power to UUT
- 6) After UUT resumes normal operation, verify Label 350 is present on the OMS output bus and label 356 is not present.

Production Limit: Labels 350 and 356 present with MP 11C and MP 14A ground and only Label 350 present when MP 11C and MP 14A are open.

CMM Limit: Labels 350 and 356 present with MP 11C and MP 14A ground and only Label 350 present when MP 11C and MP 14A are open

8.3.7 Selftest [Entry]

- 1) Set the UUT discrete inputs to "standard discrete configuration".
- 2) Set ARINC data to "Standard 25 kHz ARINC Configuration" on channel 128.500
- 3) Place the Air/Ground discrete in the "Open" position, i.e. "on the ground".
- 4) Command Selftest by grounding MP 4A.
- 5) Monitor Label 350 on the OMS/CFDS Output Bus and verify that bits 11, 12, and 15 are set to zero (no faults found).

Production Limit: Label 350 present with no faults

CMM Limit: Label 350 present with no faults

8.4 ARINC 429 I/O Tests [Entry]

8.4.1 VHF ARINC 429 Low Speed OMS/RTP Bus Output Operation

8.4.1.1 VHF ARINC 429 OMS/RTP Bus Output Rise Time

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 48

1) Verify the rise time (10 - 90%) of a “HI” on the VHF ARINC 429 OMS/CFDS Output (MP 14C).

Production Limit: = 10.0 +/- 5.0 uS

CMM Limit: N/A

8.4.1.2 VHF ARINC 429 OMS/RTP Bus Output Fall Time

1) Verify the fall time (90 - 10%) of a “HI” on the VHF ARINC 429 OMS/CFDS Output (MP 14C).

Production Limit: = 10.0 +/- 5.0 uS

CMM Limit: N/A

8.4.1.3 VHF ARINC 429 OMS/RTP Bus Output HI Level

1) Verify the dc voltage (ref to gnd) of a “HI” on the VHF ARINC 429 OMS/CFDS Output (MP 14C).

Production Limit: = 5.25 +/- 0.75 VDC

CMM Limit: N/A

8.4.1.4 VHF ARINC 429 OMS/RTP Bus Output LO Level

1) Verify the dc voltage (ref to gnd) of a “LO” on the VHF ARINC 429 OMS/CFDS Output (MP 14C).

Production Limit: = -5.25 +/- 0.75 VDC

CMM Limit: N/A

8.4.1.5 VHF ARINC 429 OMS/RTP Bus Output Rise Time

1) Verify the rise time (10 - 90%) of a “LO” on the VHF ARINC 429 OMS/CFDS Output (MP 14D).

Production Limit: = 10.0 +/- 5.0 uS

CMM Limit: N/A

8.4.1.6 VHF ARINC 429 OMS/RTP Bus Output Fall Time

1) Verify the fall time (90 - 10%) of a “LO” on the VHF ARINC 429 OMS/CFDS Output (MP 14D).

Production Limit: = 10.0 +/- 5.0 uS

CMM Limit: N/A

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 49

8.4.1.7 VHF ARINC 429 OMS/RTP Bus Output HI Level

1) Verify the dc voltage (ref to gnd) of a “HI” on the VHF ARINC 429 OMS/CFDS Output (MP 14D).

Production Limit: = 5.25 +/- 0.75 VDC

CMM Limit: N/A

8.4.1.8 VHF ARINC 429 OMS/RTP Bus Output LO Level

1) Verify the dc voltage (ref to gnd) of a “LO” on the VHF ARINC 429 OMS/CFDS Output (MP 14D).

Production Limit: = -5.25 +/- 0.75 VDC

CMM Limit: N/A

8.4.2 VHF ARINC 429 High Speed Data Load Output Operation

This is a shop mode output therefore no need to test. There is no output on this bus unless dataloading is in process.

8.4.3 VHF ARINC 429 High Speed CMU Data Output

8.4.3.1 VHF ARINC 429 CMU Data Output Rise Time

1) Verify the rise time (10 - 90%) of a “HI” on the VHF ARINC 429 CMU Data Output (MP 10C).

Production Limit: = 1.5 +/- 0.75 uS

CMM Limit: N/A

8.4.3.2 VHF ARINC 429 CMU Data Output Fall Time

1) Verify the fall time (90 - 10%) of a “HI” on the VHF ARINC 429 CMU Data Output (MP 10C).

Production Limit: = 1.5 +/- 0.75 uS

CMM Limit: N/A

8.4.3.3 VHF ARINC 429 CMU Data Output HI Level

1) Verify the dc voltage (ref to gnd) of a “HI” on the VHF ARINC 429 CMU Data Output (MP 10C).

Production Limit: = 5.25 +/- 0.75 VDC

CMM Limit: N/A

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 50

8.4.3.4 VHF ARINC 429 CMU Data Output LO Level

1) Verify the dc voltage (ref to gnd) of a “LO” on the VHF ARINC 429 CMU Data Output (MP 10C).

Production Limit: = -5.25 +/- 0.75 VDC

CMM Limit: N/A

8.4.3.5 VHF ARINC 429 CMU Data Output Rise Time

1) Verify the rise time (10 - 90%) of a “LO” on the VHF ARINC 429 CMU Data Output (MP 10D).

Production Limit: = 1.5 +/- 0.75 uS

CMM Limit: N/A

8.4.3.6 VHF ARINC 429 CMU Data Output Fall Time

1) Verify the fall time (90 - 10%) of a “LO” on the VHF ARINC 429 CMU Data Output (MP 10D).

Production Limit: = 1.5 +/- 0.75 uS

CMM Limit: N/A

8.4.3.7 VHF ARINC 429 CMU Data Output HI Level

1) Verify the dc voltage (ref to gnd) of a “HI” on the VHF ARINC 429 CMU Data Output (MP 10D).

Production Limit: = 5.25 +/- 0.75 VDC

CMM Limit: N/A

8.4.3.8 VHF ARINC 429 CMU Data Output LO Level

1) Verify the dc voltage (ref to gnd) of a “LO” on the VHF ARINC 429 CMU Data Output (MP 10D).

Production Limit: = - 5.25 +/- 0.75 VDC

CMM Limit: N/A

8.5 Mode A Tests

Reserved.

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 51

8.6 Mode 2 Tests

8.6.1 Mode 2 Receiver Tests [Entry]

8.6.1.1 VDL Mode 2 Sensitivity

- 1) Tune UUT to Channel 118.425 with the UUT operating in VDL Mode 2.
- 2) Apply a – 100 dBm (measured at receiver antenna input) VDL Mode 2 BFR (Block Failure Rate) message per Appendix C at 118.425 MHz.
- 3) Measure the BFR of 100 messages.
- 4) Repeat the measurement at 126.425 MHz and 136.975 MHz.

Production Limit: -100 dBm: NMT .159 BFR (Equivalent to .001 BER)

CMM Limit: -98 dBm: NMT .159 BFR (Equivalent to .001 BER)

8.6.1.2 Mode 2 Receiver Dynamic Range

- 1) Tune UUT to Channel 118.425 with the UUT operating in VDL Mode 2.
- 2) Apply a -87 dBm (at receiver antenna input) VDL Mode 2 BFR (Block Failure Rate) message per Appendix C at 118.425 MHz.
- 3) Measure the BFR of 100 messages.
- 4) Repeat the measurement at -67, -47, -27 and -7 dBm.

Production Limit: NMT .159 BFR (equivalent to .001 BER)

CMM Limit: NMT .159 BFR (equivalent to .001 BER)

8.6.2 Mode 2 Transmitter Tests

8.6.2.1 Transmit Power Output (Performed on a sample basis)

Reserved.

8.6.2.2 IQ Mismatch

Covered by EVM test below (performed on a sample basis).

8.6.2.3 EVM (Performed on a sample basis)

Reserved.

8.6.2.4 ACI (Performed on a sample basis)

Reserved.

8.6.2.5 2:1 VSWR Test (Performed on a sample basis)

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 52

Reserved.

8.7 Mode 3 Tests

- 1) Set the UUT discrete inputs to "Standard Discrete Configuration".
- 2) Set the ARINC control data to "Standard Mode 3 ARINC Configuration" at 118.001 MHz.
- 3) Wait 5 seconds and then verify that the UUT has entered Mode 3 by confirming that the SSM of label 055 on the OMS/CFDS output bus is Normal Op ("00").
- 4) Verify that the UUT reports no internal faults by confirming that label 350 bit 11 is set to zero on the OMS/CFDS output bus.

Note: Since VDL Mode 3 does not utilize any VHF-2100 hardware not already exercised in Analog Voice and Mode 2, other than the Vocoder DSP, there is no need for extensive Mode 3 testing in this PTR. To verify basic Mode 3 functionality and ensure proper Vocoder DSP operation, a Mode 3 spot-check is performed here and in the Talk Out/Voice test (see section 8.10). If more extensive Mode 3 tests are ever added in the future, a 40 dB pad must be used between the RF generator and the UUT antenna because the UUT will automatically transmit under some Mode 3 receiver test conditions.

8.8 OMS Tests [Entry]

When a test needs to verify a bit, it refers to a specific bit in the 350 output word on the OMS output bus.

8.8.1 Fault Memory

- 1) Examine ground scan and flight fault memory locations to verify that no faults were logged during Final Tests, (except TX Timeout).

8.8.2 Label 350 Word

- 1) Select Boeing OMS mode (MP 11C gnd and MP 14A open)
- 2) Turn power off to the UUT for 5 seconds.
- 3) Reapply power with the 'standard discrete configuration'.
- 4) Select Frequency Tuning port B and tune the UUT to 126.425 MHz via port B - do not send data on port A.
- 5) Verify that the following bits are set to 0 on OMS output port.

<u>BIT No.</u>	<u>Function</u>
11	TRANSCIEVER FAULT
12	ANTENNA FAULT
13	OMS INPUT BUS INACTIVE
15	CONTROL SOURCE FAULT

8.8.3 OMS Bus Select

- 1) Send only a label 377 word with the equipment code set to 154 to the UUT on OMS port A input.

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 53

- 2) Wait 25 sec for the OMS to recognize a dual bus system and to determine that there is no active data on either port. Verify that bits 13 and 16 in the 350 output word are set to 1 on OMS output port.
- 3) Send a null command with equipment code 016 on label 227 to OMS port 2.
- 4) Wait 10 seconds and verify bit 16 in the 350 word is clear.

8.8.4 OMS Bus Active Test

- 1) Send a NULL command with equipment code 016 on label 227 to OMS port 1.
- 2) Wait 10 seconds and verify that bit 13 is clear in the 350 word on OMS output port.
- 3) Stop sending the label 227 word to the OMS port 1 input.
- 4) Allow the UUT 25 seconds to recognize the loss of data on the active port.
- 5) Verify that bit 13 is set in the 350 word output.

8.8.5 Control Bus Select

- 1) Stop sending data on port A frequency.
- 2) Select port B and tune the UUT to 126.425 MHz via port B frequency.
- 3) Verify that bits 14 and 15 are clear on OMS output port.
- 4) Stop sending data on port B frequency and select port A.
- 5) Wait 10 seconds and verify that bits 14 and 15 are set on OMS output port.
- 6) Send data on port A frequency and verify bit 15 is clear.

8.8.6 Strut Switch

- 1) Ground the "Air/Ground" discrete, delay 20 seconds and verify that bit 28 is set
- 2) Remove the ground from the "Air/Ground" discrete, delay 20 seconds and verify bit 28 is clear.

8.8.7 SDI Select

- 1) With SDI1 (MPA) and SD10 (MPB9) discretes open, verify that bits 9 and 10 are clear.
- 2) Open SDI_1, ground SDI_0, delay 2 seconds and verify bit 9 is set and bit 10 is clear.
- 3) Ground SDI_1, open SDI_0, delay 2 seconds and verify bit 9 is clear and bit 10 is set.
- 4) Ground SDI_1, ground SDI_0, delay 2 seconds and verify bit 9 is set and bit 10 is set.

8.8.8 Data Initialization [Entry]

The following section is used to verify the CFDS menu response and to load the serial number into the NVM. A print out of the menus is at the end of this section. Commands are sent to the OMS in a label 227 word.

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 54

- 1) Set Normal/Shop discrete to SHOP and the Air/Ground discrete to GROUND.
- 2) Command the VHF-2100 into OMS interactive mode via label 227 on OMS input port A.
- 3) Verify that MENU #1 is displayed.
- 4) Select Airbus OMS Mode (MP 11C gnd and MP 14A gnd).
- 5) Cycle Power to unit and wait 30 seconds for unit to re-initialize.
- 6) Verify that MENU #1.1 is displayed.
- 7) Select McDonnell OMS Mode (MP 11C open and MP 14A gnd).
- 8) Cycle Power to unit and wait 30 seconds for unit to re-initialize.
- 9) Verify that MENU #1.2 is displayed.
- 10) Select SHOP and verify that MENU #2 is displayed.
- 11) Select CLEAR MEMORY and verify that MENU #3 is displayed.
- 12) Select CLEAR ALL MEMORY and verify that MENU #4 is displayed.
- 13) Select CLEAR MEMORY, wait 30 seconds and confirm that MENU #5 is displayed.
- 14) Send the desired serial number of the UUT via labels 301, 302, and 303 on OMS input port A.
- 15) Press RETURN until MENU #3 is displayed, then select "LOAD SERIAL NUMBER".
- 16) Verify that MENU #6 is displayed and that the correct serial number is displayed. Select "LOAD DISPLAYED S/N". Press RETURN three times, then exit OMS interactive mode.
- 17) Set Normal/Shop discrete to normal.

```

                                MENU # 1
                                111111111122222
                                123456789012345678901234
                                *****
1      *          VHF-SDI          *
2      *LAST LEG                    *
3      1L    *<REPORT                *    1R
4      *PREVIOUS LEGS                *
5      2L    *<REPORT                TEST>*    2R
6      *                                           *
7      3L    *<LRU IDENT                SHOP>*    3R
8      *                                           *
9      4L    *<GROUND SCAN                *    4R
10     *TROUBLESHOOTING    GROUND*
11     5L    *<DATA                REPORT>*    5R
12     *                                           *
13     6L    *<RETURN                DATA>*    6R
14     *****

```

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 55

```

MENU # 1.1
111111111122222
123456789012345678901234
*****
1      *          VHF-SDI          *
2      *LAST LEG          CLASS 3*
3      1L    *<REPORT          FAULTS>*      1R
4          *PREVIOUS LEGS          *
5      2L    *<REPORT          TEST>*      2R
6          *          *
7      3L    *<LRU IDENT          SHOP>*      3R
8          *          LRU*
9      4L    *<GROUND SCAN          STATUS>*      4R
10         *TROUBLESHOOTING          GROUND*
11      5L    *<DATA          REPORT>*      5R
12         *          *
13      6L    *<RETURN          *      6R
14         *****

```

```

MENU # 1.2
111111111122222
123456789012345678901234
*****
1      *          VHF-SDI          *
2      *LAST LEG          CLASS 3*
3      1L    *<REPORT          FAULTS>*      1R
4          *PREVIOUS LEGS          *
5      2L    *<REPORT          TEST>*      2R
6          *          *
7      3L    *<LRU IDENT          SHOP>*      3R
8          *          LRU*
9      4L    *<CURRENT FAULTS          STATUS>*      4R
10         *TROUBLESHOOTING          GROUND*
11      5L    *<DATA          REPORT>*      5R
12         *          *
13      6L    *<RETURN          *      6R
14         *****

```

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 56


```

MENU # 2
111111111122222
123456789012345678901234
*****
1      *          VHF-SDI          *
2      *          SHOP MENU        *
3      1L      *<CLEAR MEMORY      *      1R
4      *          *                  *
5      2L      *<SYSTEM STATISTICS *      2R
6      *          *                  *
7      3L      *<VIEW SHOP VISITS  *      3R
8      *          *                  *
9      4L      *<RECORD SHOP VISIT *      4R
10     *          *                  *
11     5L      *          *          *      5R
12     *          *                  *
13     6L      *<RETURN            *      6R
14     *****

```

```

MENU # 3
111111111122222
123456789012345678901234
*****
1      *          VHF-SDI          *
2      *      CLEAR FAULT MEMORY  *
3      1L      *<CLEAR ALL MEMORY  *      1R
4      *          *                  *
5      2L      *<CLEAR FLIGHT MEMORY *      2R
6      *          *                  *
7      3L      *<CLEAR GROUND MEMORY *      3R
8      *          *                  *
9      4L      *<LOAD SERIAL NUMBER *      4R
10     *          *                  *
11     5L      *<CLEAR SHOP VISIT MEMORY*      5R
12     *          *                  *
13     6L      *<RETURN            PRINT**      6R
14     *****

```

SIZE	CAGEC	DWG NO.	REV
A	4V792	815-3620-001	-
SCALE: NONE		MSWD 97	SHEET 57

```

MENU # 4
111111111122222
123456789012345678901234
*****
1      *          VHF-SDI          *
2      *    CLEAR FAULT MEMORY    *
3      1L      *                  *      1R
4      *                  *
5      2L      *                  *      2R
6      * TO CLEAR ALL MEMORY      *
7      3L      * <PRESS LEFT FUNCTION 3 *      3R
8      *                  *
9      4L      *                  *      4R
10     *                  *
11     5L      *                  *      5R
12     *                  *
13     6L      * <RETURN          PRINT**      6R
14     *****

```

```

MENU # 5
111111111122222
123456789012345678901234
*****
1      *          VHF-SDI          *
2      *    CLEAR FAULT MEMORY    *
3      1L      *                  *      1R
4      *                  *
5      2L      *                  *      2R
6      * TO CLEAR ALL MEMORY      *
7      3L      * <PRESS LEFT FUNCTION 3 *      3R
8      *                  *
9      4L      *    MEMORY CLEARED    *      4R
10     *                  *
11     5L      *                  *      5R
12     *                  *
13     6L      * <RETURN          PRINT**      6R
14     *****

```

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 58

```

                MENU # 6
                111111111122222
                123456789012345678901234
                *****
1      *          VHF-SDI          *
2      * RECORD SERIAL NUMBER    *
3      *                          *      1R
3      1L  *
4      *DDDDD TTTT                *
5      2L  *SERVICE ORDER #:      *      2R
6      *SHOP CODE 1:              *
7      3L  *SERIAL NUMBER: XXXXXX   *      3R
8      *                          *
9      4L  *                          *      4R
10     *TO LOAD DISPLAYED S/N      *
11     5L  *<PRESS SELECT LEFT 5   *      5R
12     *                          *
13     6L  *<RETURN                PRINT** 6R
14     *****
                NOTE: DDDDDTTTTT IS DATE/TIME

```

8.8.9 Serial Number Identification

The following section is used to identify and verify the LRU serial number of the VHF-2100

- 1) Set Normal/Shop discrete to SHOP (TP 6A grounded) and the Air/Ground discrete to GROUND (MP 14B open circuit).
- 2) Command the VHF-2100 into OMS interactive mode via label 227 on OMS input port A.
- 3) Verify that MENU #1 is displayed.
- 4) Select LRU IDENT and verify that the serial number and part number of the LRU are correct.

8.9 Vibration (Performed on a sample basis)

- 1) Mount the UUT on the vibration table.
- 2) Perform 8.2.1.4, Receiver Quieting, and 8.2.2.10, Transmit Carrier Noise Level, tests.

Production Limit: Receiver quieting: >= 35 dB.
 Transmitter noise level: >= 35 dB.

CMM Limit: N/A.

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SCALE: NONE		MSWD 97	SHEET 59

8.10 Talk Out/Voice

- 1) Connect a headset & microphone to the UUT.
- 2) Place Air/Ground discrete in "ground" position (MP 14B open circuit).
- 3) Enable squelch by opening MP 13C.
- 4) Connect to another VHF radio using approximately 100 dB of RF attenuation between antennas of the units.
- 5) Operate at 118.205, 123.250, and 136.975 MHz (AM voice) and verify clear reception from each unit.
- 6) Tune both radios to Mode 3 channel 118.001 (switch to label 046 tuning word) and verify clear reception from each unit.
- 7) Set RF attenuation between units to approximately 40 dB.
- 8) Set one unit to receive on 123.25 MHz (AM voice; switch back to label 030 tuning word).
- 9) Key the other unit on 121.800, 125.10, and 130.5 MHz (AM voice) and verify that the squelch does not open on the unit tuned to 123.25 MHz. (Note: Steps 7-9 may be performed using an RF generator as the signal source to generate more consistent results).
- 10) Press Self Test Button on Front Panel and, after execution of self test, verify that no faults are indicated on the front panel indicators.

Production Limit: Clear transmission and reception, no squelch breaks on 123.25 MHz, and no self test faults.

CMM Limit: N/A

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 60

Appendix A Alignment Formats

The ARINC 429 Label 277 Diagnostic Request input word is used during Alignment Mode to send commands to the LRU to set Calibration and TFM parameters.

Table A-1: Label 277 Diagnostic Request Word Format

Bit(s)	Description	Comments															
8-1	Label 277 (octal)	11111101 (binary)															
27-9	Data Field	Request Type specific data															
29, 28	Sequence Number	Identifies which word in a group this word is															
31, 30	Request Type	<table> <tr> <th>31</th><th>30</th><th>Definition</th></tr> <tr> <td>0</td><td>0</td><td>Unused</td></tr> <tr> <td>0</td><td>1</td><td>Memory Access Request</td></tr> <tr> <td>1</td><td>0</td><td>Alignment Data</td></tr> <tr> <td>1</td><td>1</td><td>Diagnostic Data</td></tr> </table> <p>Memory Access Request is used for program memory, data memory, or serial EEPROM memory modification</p>	31	30	Definition	0	0	Unused	0	1	Memory Access Request	1	0	Alignment Data	1	1	Diagnostic Data
31	30	Definition															
0	0	Unused															
0	1	Memory Access Request															
1	0	Alignment Data															
1	1	Diagnostic Data															
32	Parity (odd)																

Since requests may require up to eight input Label 277 words to complete, the Sequence Number field is used to specify which word in the request is being used. For example, a Memory Access word requesting a read from Program memory requires an input sequence of two Label 277 words. The first word has a Sequence Number of 00b and specifies the Memory Type as “Program”, specifies the Access Type as “Read”, and provides the desired “page number” of the segment of Program Space in which the memory location to be read resides. The second word provides the 16-bit address within the requested Program Space page number of the memory location to be read and will have a Sequence Number of 01 (binary).

Every Label 277 input word will be answered with a Label 351 output word that contains a Response Type that corresponds to the input Label 277 word’s Request Type and a Sequence Number that reflects the input Label 277 word’s Sequence Number.

Table A-2: Label 351 Diagnostic Response Word Format

Bit(s)	Description	Comments															
8-1	Label 351 (octal)	10010111 (binary)															
27-9	Response Parameters	Response Type specific data															
29-28	Sequence Number	Reflection of corresponding Label 277 word’s Sequence Number															
31-30	Response Type	<table> <tr> <th>31</th><th>30</th><th>Definition (reflects Label 277 word’s Request)</th></tr> <tr> <td>0</td><td>0</td><td>Unused</td></tr> <tr> <td>0</td><td>1</td><td>Memory Access Response</td></tr> <tr> <td>1</td><td>0</td><td>Alignment Data Response</td></tr> <tr> <td>1</td><td>1</td><td>Diagnostic Data Response</td></tr> </table>	31	30	Definition (reflects Label 277 word’s Request)	0	0	Unused	0	1	Memory Access Response	1	0	Alignment Data Response	1	1	Diagnostic Data Response
31	30	Definition (reflects Label 277 word’s Request)															
0	0	Unused															
0	1	Memory Access Response															
1	0	Alignment Data Response															
1	1	Diagnostic Data Response															
32	Parity (odd)	Set for odd parity															

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 61

Appendix B Rear Connector Pins by Function

Table B-1: VHF-2100 Connector Pins

Pin Name	Variable Setting/Contents	Signal Type	Pin Number
OMS/CFDS #1 Input		Differential LS ARINC 429 input	MP 6A, 6B
OMS/CFDS #2 Input			MP 6C, 6D
Freq/Func Select Port A		Differential LS ARINC 429 input	MP 11A, 11B
Freq/Func Select Port B			MP 7A, 7B
CMU A Data Input		Differential HS ARINC 429 input	MP 12A, 12B
CMU B Data Input			MP 12C, 12D
Data Load Input		Differential HS ARINC 429 input	MP 2C, 2D
Reserved VDR X-Link A	Reserved	Differential LS ARINC 429 input	TP 3A, 3B
Reserved VDR X-Link B	Reserved		TP 9A, 9B
ICAO Address A Input		Differential HS ARINC 429 input	TP 3C, TP 3D
ICAO Address B Input			TP 9C, 9D
Analog Data Input		Analog Input	MP 5A, 5B
Microphone Input HI		Analog Input	MP 1A
Microphone Input LO			MP 1B
Microphone Input PTT			MP 1C
Microphone Input GND			MP 2B
Microphone Output		Analog Output	MP 1D
Remote Squelch Input HI	Reserved	Analog Input	MP 3A
Remote Squelch Input ARM			MP 3B
Remote Squelch Input LO			MP 3C
Transmit Timer Disable	"Open" – Inactive "GND" – Active	Discrete Input	MP 2A
Self Test	"Open" – Inactive "GND" – Active	Discrete Input	MP 4A
Data Key Line	"Open" – Inactive "GND" – Active	Discrete Input	MP 7D
Data Key Line Return		Discrete Input	MP 8D
Data Load Enable	"Open" – Inactive "GND" – Active	Discrete Input	MP 8B
Freq/Func Data Select	"Open" – Freq/Func Port B "GND" – Freq/Func Port A	Discrete Input	MP 11D
Squelch Disable	"Open" – Inactive "GND" – Active	Discrete Input	MP 13C
Squelch Disable Return		Discrete Input	MP 13D
Air/Ground	"Open" – On the ground "GND" – In the air	Discrete Input	MP 14B
Maint. Sys ID #1	See Table B-3	Discrete Input	MP 14A
Maint. Sys ID #2		Discrete input	MP 11C
SDI_1	See Table B-2	Discrete Input	MP 9A
SDI_0		Discrete Input	MP 9B
Shop Mode	"Open" – Inactive "GND" – Active	Discrete Input	TP 6A

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SCALE: NONE		MSWD 97	SHEET 62

Pin Name	Variable Setting/Contents	Signal Type	Pin Number
Voice/Data Select	"Open" – Voice "GND" – Data	Discrete Input	MP 7C
Program Common		Discrete input	MP 10A
Antenna Monitor Program	Reserved	Discrete input	MP 8A
Frequency Offset	Reserved	Discrete input	MP 8C
DC Ground		Ground	MP 3D
Audio Ground		Ground	MP 4B
Discrete Input	Reserved for A716 compatibility	Discrete input	MP 5C
Discrete Input	Spare	Discrete input	MP 10B
Data Load Output		Differential HS ARINC 429 Output	MP 4C, 4D
CMU Data Output		Differential HS ARINC 429 Output	MP 10C, 10D
OMS/CFDS Output		Differential LS ARINC 429 Output	MP 14C, 14D
Muting	"Open" – Disable Muting "Gnd" – Enable Muting	Discrete Output	MP 15C
Muting Return		Ground	MP 15D
8.33 kHz	Always grounded	Discrete Output	MP 5D
Analog Data Output		Analog Output	MP 13A, 13B
Automatic Gain Control	Reserved	Analog Output	MP 9D
Audio Output		Analog Output	MP 15A, 15B
RF VHF Antenna	Size 5	RF Input	BP 1
+27.5 Vdc	Size 16	Power Input	BP 2
Ground	Size 16	Ground	BP 4

Table B-2: SDI Strapping

SDI_1	SDI_0	Unit's SDI Setting
Open	Open	All Call
Open	Ground	Left / VHF 1
Ground	Open	Right / VHF 2
Ground	Ground	Center / VHF 3

Table B-3: Maintenance System Configuration

Maintenance System ID #2	Maintenance System ID #1	CFDS Type
Ground	Ground	Airbus CFDS
Ground	Open	Boeing CFDS
Open	Ground	McDonnell-Douglas CFDS
Open	Open	Default to Boeing CFDS

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 63

Appendix C VDL Mode 2 Operation

The BFR test message is a VDL Mode 2 message containing 249 application bytes. The message also contains 6 Reed Solomon check bytes for a total of 255 bytes.

The VDL preamble containing the following segments must also be contained in the message:

- a) 12 bits (4 symbols) for transmitter power ramp up;
- b) 48 bits (16 symbols) for synchronization
- c) 3 bits as the reserved symbol
- d) 17 bits transmission length
- e) 5 bits header FEC.

Refer to DO-224A, "Signal-in-Space Minimum Aviation System Performance Standards (MASPS) for Advanced VHF Digital Data Communications Including Compatibility with Digital Voice Techniques", September 13, 2000, for specific details on the composition of VDL Mode 2 message and waveform.

A suitable test message for BFR measurements is shown in hex format as follows :

```
00000000h: 00 04 F0 37 18 FD F1 08 B3 E5 CD 2D 6C A0 5D 4C ;
00000010h: 1F DC E6 1D 92 97 3E 93 41 73 CC 2A 10 C7 1D 88 ;
00000020h: F9 05 92 BB 2F 22 A6 4C 1B FC DD F6 3A 00 97 6E ;
00000030h: CB C9 C6 61 DC 66 1E 3E C1 2F CE 5F 7B C7 A2 52 ;
00000040h: 90 71 0F D3 15 9B 11 58 E8 3A 51 11 D5 44 01 3A ;
00000050h: 6F 4B 93 BD 2D 1B 5C B4 2E EF 4A 17 CC D1 DF 8B ;
00000060h: C3 63 C9 4F 70 07 B8 AD 49 24 2C E0 91 DE E1 AA ;
00000070h: 56 83 F8 B3 B7 3C 86 64 64 53 88 22 F7 31 84 D2 ;
00000080h: F1 99 9E A1 02 98 C8 97 F7 4C 79 25 30 AF 46 8C ;
00000090h: 1E A7 19 1B 23 7B 58 27 F4 91 80 8B 17 62 F9 4C ;
000000a0h: CF CD ED F5 85 FA C2 36 07 17 28 B7 4A AF D7 23 ;
000000b0h: DD 03 E1 CF 11 C8 C5 F9 E5 EA 42 08 07 40 D7 82 ;
000000c0h: 1E E3 18 32 C9 3F D1 9F 51 08 3B 07 4C BC 21 3F ;
000000d0h: 7C F4 72 33 93 5E F5 9F A4 AC BC 5B C3 D9 FD BA ;
000000e0h: 45 10 3C AF 51 34 1F 33 00 A0 CF 37 FD 33 9E 70 ;
000000f0h: 44 43 F7 9D A2 B6 B2 1A 6E 33 9D C0 EF 9F E9 96 ;
00000100h: D2 21 E7 AB 9C DD 6F 65 C8 80 00 ;
```

For any transmit or receive tests in VDL Mode 2, the unit must first be placed in VDL Mode 2:

- 1) Ground the Voice/Data Discrete
- 2) Transmit 0008001D#, 8000235E# on CMU Port A input. This message must be sent at a rate of at least once a second to maintain VDL Mode 2 operation.

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 64

- 3) Monitor CMU output bus for a label 270 message. Bits 20 – 24 show the mode status of the radio, the status should be 0010.
- 4) Transmit 47000315# (ALO) on CMU Port A input.
- 5) Monitor CMU output bus for a label 270 message. Bits 20 – 24 show the mode status of the radio, the status should be 0110.
- 6) Transmit D2050015# (Mode_Set.request) on CMU Port A input.
- 7) Monitor CMU output bus for a label 270 message. Bits 20 – 24 show the mode status of the radio, the status should be 0111.
- 8) Transmit D201F115# (Pr_Set.request) on CMU Port A input.
- 9) Monitor CMU output bus for a label 270 message. Bit 11 should be set to 1 and Bit 14 11 should be set to 1 (Protocol Reset State).
- 10) Transmit one of the operating frequencies below on CMU Port A input.
- 11) Monitor CMU output bus for a label 270 message. Bit 11 should be set to 0 and Bit 14 11 should be set to 1 (Protocol Set State).

To set desired operating frequency in transmit and receive send the following message on the CMU Port A input for the desired frequency:

a) 118.000 MHz command words:

AF040715# 020F115# 1207015# 8C090015# 08700315# 99000C15# B1A55715#

b) 118.425 MHz command words:

AF040715# 0020F115# 81207015# 8C092A15# 08700315# 99000C15# B1093915#

c) 119.425 MHz command words:

AF040715# 0020F115# 01307015# 8C092A15# 08700315# 99000C15# B196EC15#

d) 120.425 MHz command words:

AF040715# 0020F115# 81407015# 8C092A15# 08700315# 99000C15# B151F415#

e) 121.425 MHz command words:

AF040715# 0020F115# 01507015# 8C092A15# 08700315# 99000C15# B1CE2115#

f) 122.425 MHz command words:

AF040715# 0020F115# 01607015# 8C092A15# 08700315# 99000C15# B1664F15#

g) 123.425 MHz command words:

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SCALE: NONE		MSWD 97	SHEET 65

AF040715#	0020F115#	81707015#	8C092A15#	08700315#	99000C15#	B1F99A15#
h) 124.425 MHz command words:						
AF040715#	0020F115#	81807015#	8C092A15#	08700315#	99000C15#	B1E06E15#
i) 125.425 MHz command words:						
AF040715#	0020F115#	01907015#	8C092A15#	08700315#	99000C15#	B17FBB15#
j) 126.000 MHz command words:						
AF040715#	0020F115#	01A07015#	8C090015#	08700315#	99000C15#	B17BBB15#
k) 126.425 MHz command words:						
AF040715#	0020F115#	01A07015#	8C092A15#	08700315#	99000C15#	B1D7D515#
l) 127.425 MHz command words:						
AF040715#	0020F115#	81B07015#	8C092A15#	08700315#	99000C15#	B1480015#
m) 128.425 MHz command words:						
AF040715#	0020F115#	01C07015#	8C092A15#	08700315#	99000C15#	B18F1815#
n) 129.425 MHz command words:						
AF040715#	0020F115#	81D07015#	8C092A15#	08700315#	99000C15#	B110CD15#
o) 130.425 MHz command words:						
AF040715#	0020F115#	81E07015#	8C092A15#	08700315#	99000C15#	B1B8A315#
p) 131.425 MHz command words:						
AF040715#	0020F115#	01F07015#	8C092A15#	08700315#	99000C15#	B1277615#
q) 132.425 MHz command words:						
AF040715#	0020F115#	02007015#	8C092A15#	08700315#	99000C15#	B1E8C815#
r) 133.425 MHz command words:						
AF040715#	0020F115#	82107015#	8C092A15#	08700315#	99000C15#	B1771D15#
s) 134.425 MHz command words:						
AF040715#	0020F115#	82207015#	8C092A15#	08700315#	99000C15#	B1DF7315#
t) 135.425 MHz command words:						
AF040715#	0020F115#	02307015#	8C092A15#	08700315#	99000C15#	B140A615#
u) 136.425 MHz command words:						
AF040715#	0020F115#	82407015#	8C092A15#	08700315#	99000C15#	B187BE15#
v) 136.975 MHz command words:						
AF040715#	0020F115#	82407015#	8C096115#	08700315#	99000C15#	B1A84A15#

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001		REV -
SCALE: NONE		MSWD 97	SHEET 66	

To verify receipt of a message transmitted to UUT by a VDL Mode 2 signal generator:

1) Send address request message after sending the frequency request :

2F 04 09 15# 80 22 F1 15# 00 10 D0 15# 05 55 55 15# 8F E5 55 15# 8E FE FE 15# 0F EF 2F 15#
1B FE FE 15# 31 D3 11 15#

2) Transmit VDL Mode 2 test message and monitor CMU output port for Label 304. Bytes 5 & 6 should have data 51# & F1# respectively to indicate a message was just received by UUT.

To Transmit the VDL Mode 2 test message from the UUT send the following message on the CMU Port A input to transmit a single message:

AF446615# 8021F115# 000F5015# 05555515# 05555515# 05555515# 03055515#
01303115# 83332315# 86353415# 03837315# 82413915# 04443415# 8D464515#
0300A015# 01303115# 83332315# 86353415# 03837315# 82413915# 04443415#
8D464515# 0300A015# 01303115# 83332315# 86353415# 03837315# 82413915#
04443415# 8D464515# 0300A015# 01303115# 83332315# 86353415# 03837315#
82413915# 04443415# 8D464515# 0300A015# 01303115# 83332315# 86353415#
03837315# 82413915# 04443415# 8D464515# 0300A015# 01303215# 83332315#
86353415# 03837315# 82413915# 04443415# 8D464515# 0300A015# 01303215#
83332315# 86353415# 03837315# 82413915# 04443415# 8D464515# 0300A015#
01303215# 83332315# 86353415# 03837315# 82413915# 04443415# 8D464515#
0300A015# 01303215# 83332315# 86353415# 03837315# 82413915# 04443415#
8D464515# 0300A015# 01303215# 83332315# 86353415# 03837315# 82413915#
04443415# 8D464515# 0300A015# 81303315# 83332315# 86353415# 03837315#
82413915# 04443415# 8D464515# 0300A015# 81303315# 03E32315# 8E3E3E15#
03E3E315# 8D3E3E15# 9A00A015# 3138B415#

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 67

Appendix D Power Supply Conversions

The voltage levels output by the Built-In Test (BIT) Mux that represent test voltages are derived from BIT circuitry that steps down the voltage levels supplied by the six standard power sources residing on the DSP's circuit card. Two resistors, R1 and R2, are used to step down the input voltages in the BIT circuitry. For all of the positive power source voltages, the voltage levels are stepped down according to the transfer function $V_{out} = V_{in} * (R2 / (R1 + R2))$. For the -8.0 V power source voltage, the voltage level is stepped down according to the transfer function $V_{out} = -V_{in} * (R1 / R2)$. The relationships between the nominal input voltage levels supplied by the standard power sources and the voltage levels provided to the BIT Mux by the BIT circuitry are defined as follows:

Table D-1: Power Supply Conversions

Test Data	Nominal Input from the Power Sources (Volts)	BIT Circuit Divider Resistors		Nominal Level at the BIT Mux (Volts)	Nominal Output from the ADC (HEX)
		R1 (Ohms)	R2 (Ohms)		
3.3 VDC	3.3	1620	1000	1.2595	080F
8.0 VDC	8	5110	1000	1.3093	0861
-8.0 VDC	-8	8250	56200	1.1744	0784
5.0 VDC	5	2210	1000	1.5576	09F7
15.0 VDC	15	10000	1000	1.3636	08BB
28 VDC Clamped	28	22100	1000	1.2121	07C1

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 68

Appendix E Temperature Slope Algorithm

- 1. Set bias TFMs - input is # of bits
- 2. Read PA_Temp sensor from broadcast ARINC 353 word - input is # of bits.
- 3. Convert bias TFM to voltage:

$$TFM_v = TFM \times (2.5/256)$$

- 4. Convert temp to degrees C

$$PA_Temp_C = (PA_Temp(2.5/4096))/0.00625$$

- 5. Correct TFMs for temperature bins

Driver_slope = -.0018
Final_slope = -.0026

Drivers:

$$TFM_TC1 = [TFM_v_dr - (PA_Temp_C - (-39.5)) * Driver_Slope] * 256/2.5$$
$$TFM_TC2 = [TFM_v_dr - (PA_Temp_C - (-3.5)) * Driver_Slope] * 256/2.5$$
$$TFM_TC3 = [TFM_v_dr - (PA_Temp_C - (37.5)) * Driver_Slope] * 256/2.5$$
$$TFM_TC4 = [TFM_v_dr - (PA_Temp_C - (64)) * Driver_Slope] * 256/2.5$$

Final:

$$TFM_TC1 = [TFM_v_f - (PA_Temp_C - (-39.5)) * Final_Slope] * 256/2.5$$
$$TFM_TC2 = [TFM_v_f - (PA_Temp_C - (-3.5)) * Final_Slope] * 256/2.5$$
$$TFM_TC3 = [TFM_v_f - (PA_Temp_C - (37.5)) * Final_Slope] * 256/2.5$$
$$TFM_TC4 = [TFM_v_f - (PA_Temp_C - (64)) * Final_Slope] * 256/2.5$$

SIZE A	CAGEC 4V792	DWG NO. 815-3620-001	REV -
SCALE: NONE		MSWD 97	SHEET 69