

TABLE OF CONTENTS

1. SCOPE OF DOCUMENT	1
2. REFERENCES	1
3. EQUIPMENT SETUP	1
3.1 UNIT CONFIGURATION	1
3.2 AUTOMATED ALIGNMENT EQUIPMENT SETUP	1
3.2.1 <i>Automated Alignment Equipment List</i>	1
3.2.2 <i>Automated Alignment Equipment Setup Diagram</i>	2
3.2.3 <i>Automated Alignment Equipment Setup Procedure</i>	2
3.3 MANUAL ALIGNMENT EQUIPMENT SETUP	2
3.3.1 <i>Manual Alignment Equipment List</i>	2
3.3.2 <i>Manual Alignment Equipment Setup Diagram</i>	2
3.3.3 <i>Manual Alignment Equipment Setup Procedure</i>	2
4. AUTOMATED ALIGNMENT PROCEDURE	3
4.1 AUTOMATED ALIGNMENT PROCEDURE	3
4.1.1 <i>GDR66 Automated Ambient Alignment Procedure</i>	3
4.1.2 <i>GDR66 Automated COLD Alignment Procedure</i>	4
5. MANUAL ALIGNMENT PROCEDURE	5
5.1 MANUAL ALIGNMENT UNIT SETUP PROCEDURE	5
5.2 GDR66 MANUAL AMBIENT ALIGNMENT PROCEDURE	6
5.2.1 <i>GDR66 COM Configuration Parameters Initialization Procedure</i>	6
5.2.2 <i>GDR66 COM Digital Board Manual Alignment Procedure</i>	6
5.2.2.1 Reference Oscillator Frequency Adjustment	6
5.2.3 <i>GDR66 COM Receiver Manual Alignment Procedure</i>	7
5.2.3.1 Receiver Preselect Filter # 1 Alignment	7
5.2.3.2 Receiver Preselect Filter # 2 Alignment	8
5.2.3.3 Receiver Preselect Filter # 3 Alignment	11
5.2.3.4 Receiver Signal Strength Alignment	11
5.2.3.5 Receiver Audio / ACARS Output Alignment	12
5.2.3.6 Receiver Squelch Alignment	13
5.2.3.7 Receiver Correlation Threshold Adjustment	15
5.2.3.8 Remote Transfer Mode	15
5.2.4 <i>GDR66 COM Transmitter Manual Alignment Procedure</i>	15
5.2.4.1 DC-DC Converter Alignment	15
5.2.4.2 Transmitter IQ Offset Alignment	16
5.2.4.3 Transmitter Channel Spacing	17
5.2.4.4 Audio Input Gain Adjustments	17
5.2.4.5 Transmitter Power Alignment	17
5.2.4.6 Transmitter Sidetone Level	19
5.2.4.7 CSMA Offset Adjustment	20
5.3 GDR66 MANUAL COLD ALIGNMENT PROCEDURE	20
5.3.1 <i>Receiver Signal Strength Alignment</i>	20

1. SCOPE OF DOCUMENT

This document describes the necessary equipment and procedures required to properly align a set of GDR66 COM Digital and GDR66 COM RF boards installed in the GDR66 assemblies. Both automated alignment and manual alignment procedures are presented. For each case, the alignment is to be performed after board assembly and before Final Test. It should be followed in the sequence presented.

Unit Part Number:	COM Digital Board Part Number:	COM RF Board Part Number:
011-02303-()	012-01836-()	012-01837-()

2. REFERENCES

- 1) 004-00501-00, "MPS, GDR66"
- 2) 005-00548-00, "GDR66 Test Procedure"
- 3) 005-00548-80, "GDR66 Sub-System Requirements"
- 4) 005-00548-04, "GDR66 Sub-System HW Requirements"

3. EQUIPMENT SETUP

3.1 Unit Configuration

In order to perform alignment of the GDR66 COM Digital and RF modules in the GDR66, the unit must be assembled and configured per the unit assembly BOM:

- 011-02303-() – Sub-Assy, GDR66, Final

3.2 Automated Alignment Equipment Setup

This section describes the equipment setup necessary to perform an automated alignment of the COM Digital and RF boards in the GDR66.

3.2.1 Automated Alignment Equipment List

The equipment list for automated alignment can be found in the following documents:

- T00-00415-00, "GDR66 ATE/MNL Test Setup"

Additionally, the following software must be installed on the auto-align rack's PC:

- T06-A0247-00, "GDR66 Production ATE Software"

3.2.2 Automated Alignment Equipment Setup Diagram

The setup diagram for automated alignment can be found in the following document:

- T00-00415-00, “GDR66 ATE/MNL Test Setup”

3.2.3 Automated Alignment Equipment Setup Procedure

The setup procedure for automated alignment is to connect the equipment as shown in the following document:

- T00-00415-00, “GDR66 ATE/MNL Test Setup”

3.3 Manual Alignment Equipment Setup

This section describes the equipment setup necessary to perform a manual alignment of the COM Digital and RF boards in the GDR66

3.3.1 Manual Alignment Equipment List

The equipment list for manual alignment can be found in the following documents:

- T00-00415-00, “GDR66 ATE/MNL Test Setup”

Additionally, the following software must be installed on the auto-align rack’s PC:

- “GDRMON SW”

Click on the following link for more information: [GDR Mon Installation and Usage Instructions.docx](#)

3.3.2 Manual Alignment Equipment Setup Diagram

The setup diagram for manual alignment can be found in the following document:

- T00-00415-00, “GDR66 ATE/MNL Test Setup”

Each manual alignment procedure sub-section will specify any deviations from the setup in T00-00415-00.

3.3.3 Manual Alignment Equipment Setup Procedure

The setup procedure for manual alignment is to connect the equipment as shown in the following document:

- T00-00415-00, “GDR66 ATE/MNL Test Setup”

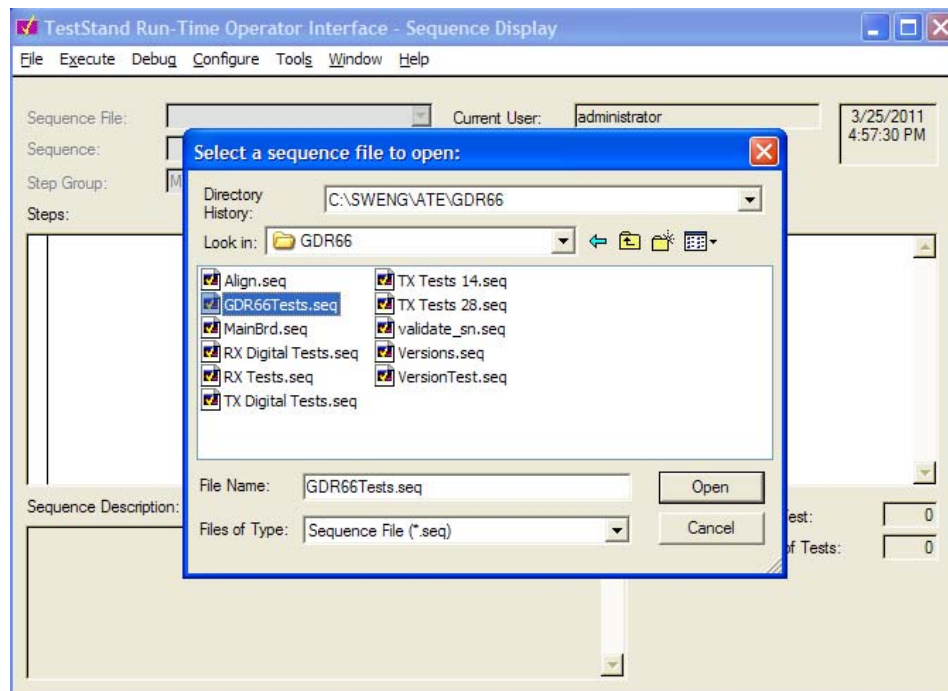
Each manual alignment procedure sub-section will specify any deviations from the setup procedure in T00-00415-00.

4. AUTOMATED ALIGNMENT PROCEDURE

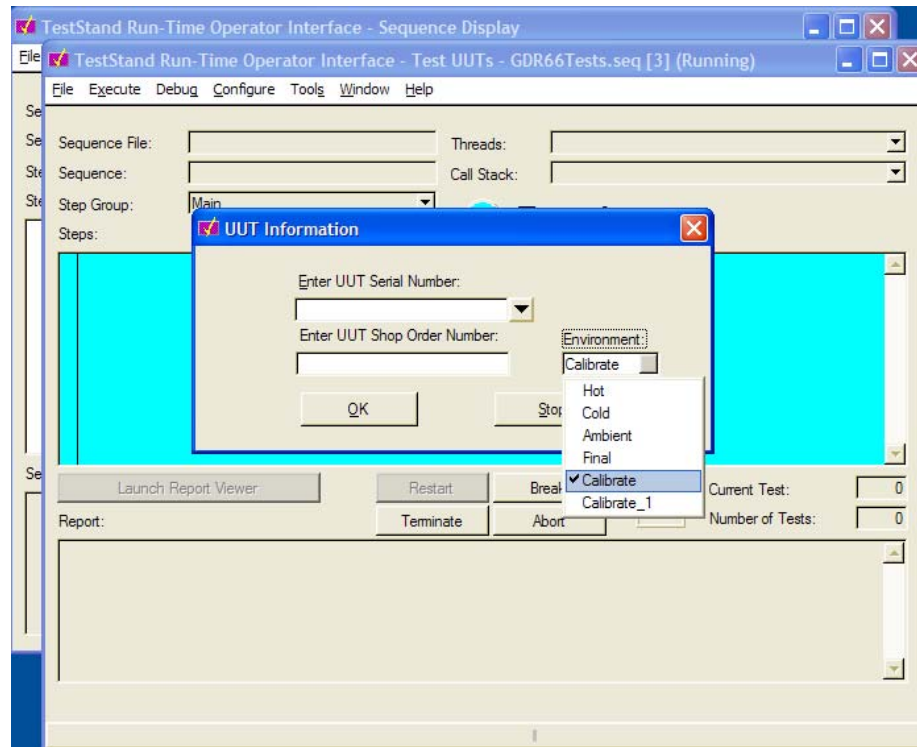
4.1 Automated Alignment Procedure

4.1.1 GDR66 Automated Ambient Alignment Procedure

- 1) Open TestStand on the ATE computer.
- 2) From TestStand, open the “GDR66Test.seq” sequence file from the C:\SWENG\ATE\GDR66 directory.



- 3) From the TestStand main screen select "Test UUTs (F5)".
- 4) On the TestStand “UUT Information” screen enter the unit Serial Number, select the “**Calibrate**” environment, then select “OK” to start the alignment sequence.

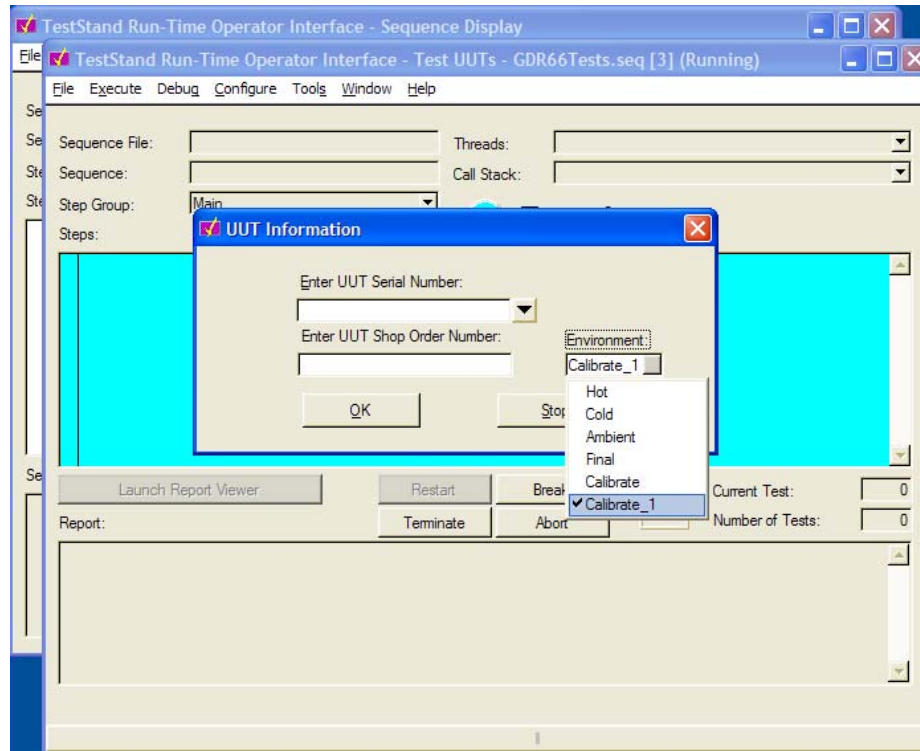


- 5) The unit must be powered on for at least 10 minutes prior to executing the receiver signal strength alignment to allow sufficient temperature stabilization, so a pop-up window may appear to halt unit alignment until the user verifies that the necessary time has elapsed.
- 6) A green "PASSED" screen should appear when ambient alignment is complete.

4.1.2 GDR66 Automated COLD Alignment Procedure

Following Ambient alignment, the following COLD alignment must be performed before testing. The UUA should be soaked for 1hr at -40C+/-3C with the power off before performing the COLD alignment.

- 1) Open TestStand on the ATE computer.
- 2) From TestStand, open the "GDR66Test.seq" sequence file from the C:\SWENGATE\GDR66 directory.
- 3) From the TestStand main screen select "Test UUTs (F5)".
- 4) On the TestStand "UUT Information" screen enter the unit Serial Number, select the "**Calibrate_1**" environment, then select "OK" to start the alignment sequence.



- 5) The unit must be powered on for at least 10 minutes prior to executing the receiver signal strength alignment to allow sufficient temperature stabilization, so a pop-up window may appear to halt unit alignment until the user verifies that the necessary time has elapsed.
- 6) A green “PASSED” screen should appear when COLD alignment is complete.

5. MANUAL ALIGNMENT PROCEDURE

5.1 Manual Alignment Unit Setup Procedure

This section contains the procedure necessary to set the unit to test mode so that the alignment described in the remainder of this section may be performed.

- 1) Turn on the Power Supply and set output voltage to 27.5 Vdc.
- 2) Turn on the Manual Test Panel Power by toggling the PANEL_POWER switch to the ON state. Verify that the PANEL_POWER LED lights up.
- 3) Turn on the UUA by toggling the AMB/HOT – COLD switch to the AMB/HOT position.
- 4) Start the GDRMON software and place the UUA into Test Mode by sending the following commands:
 - “SYS_COM TST”
 - “SYS_MAIN TST”

5.2 GDR66 Manual Ambient Alignment Procedure

The following subsections describe the ambient alignment procedure for the GDR66 sub-assembly.

5.2.1 GDR66 COM Configuration Parameters Initialization Procedure

- 1) Initialize the UUA's configuration parameters using GDRMON
 - "CFG INIT"
- 2) Initialize the UUA's undefined calibration parameters using GDRMON
 - "CAL 29 0"
 - "CAL 30 0"
 - "CAL 31 0"
 - "CAL 32 0"
 - "CAL 33 0"
 - "CAL 34 0"

5.2.2 GDR66 COM Digital Board Manual Alignment Procedure

This section describes the procedure to perform a full manual alignment of the GDR66 COM Digital Board.

5.2.2.1 Reference Oscillator Frequency Adjustment

NOTE: Reference Oscillator Frequency Adjustment must be performed while the unit is at ambient temperature.

- 1) Connect the UUA's RF port to the 3920's "T/R" port by disconnecting the co-axial cable from the rear of the ATE/MNL box's "RF IN/OUT" connector and connecting it to the 3920's "T/R" port. A 330-00139-05 adaptor may be needed to complete the connection.
- 2) Configure the 3920 to measure TX Frequency Error at 127.5 MHz.
 - Analyzer = Manual
 - Analyzer RF In = T/R
 - Analyzer RF Freq = 127.5 MHz
 - Demod = AM
 - Generator A1, A2, and A3 all OFF
- 3) Tune the UUA to 127.5 MHz using the GDRMON software:
 - "TUNE 127.5"
- 4) Key the transmitter using the GDRMON software.
 - "PTT 1"
- 5) Adjust the reference oscillator frequency using GDRMON until the frequency error is minimized. Verify the error is below 12Hz (0.1ppm)
 - "TCXO X" where X = 0-255

NOTE: The TCXO parameter can be incremented or decremented using the following steps:

- a) Issue the command "TCXO"
- b) Note the value of the response, for instance "TCXO cal: tag= 7 value=152 (present)"
- c) Issue the command using the current value, for instance "TCXO 152"

- d) Use “Ctrl + Up Arrow” to increment the value or “Ctrl + Down Arrow” to decrement
- 6) Key down the transmitter using the GDRMON software.
 - “PTT 0”

5.2.3 GDR66 COM Receiver Manual Alignment Procedure

This section describes the procedure to perform a full manual alignment of the GDR66 COM Receiver.

5.2.3.1 Receiver Preselect Filter # 1 Alignment

NOTE: The “Receiver Signal Strength Alignment” must be performed at both AMBIENT and COLD after any changes to the Receiver Preselect Filter (#1, #2, or #3) calibration parameters.

- 1) Connect the UUA’s RF port to the 3920’s “T/R” port by disconnecting the co-axial cable from the rear of the ATE/MNL box’s “RF IN/OUT” connector and connecting it to the 3920’s “T/R” port. A 330-00139-05 adaptor may be needed to complete the connection.
- 2) Configure the 3920 as follows:
 - RF Gen = ON
 - Generator Modulation = AM
 - Generator M1 (Modulation Frequency) = 1 kHz, 30% mod, and ON
 - Generator Level = -33 dBm
 - RF Output Port = T/R Port
- 3) Turn on RSSI reporting with GDRMON.
 - “RSSI ON”
- 4) Tune the UUA to 118 MHz using GDRMON.
 - “TUNE 118”
- 5) Change the 3920 RF Frequency to 118 MHz.
- 6) Tune Preselector 1 Pole 0 Index 0 to obtain a maximum dBm reading on GDRMON.
 - “PRE 1 0 0 X” where X = 0 to 255
- 7) Tune Preselect 1 Pole 1 Index 0 to obtain a maximum dBm reading on GDRMON.
 - “PRE 1 1 0 X” where X = 0 to 255
- 8) Tune the UUA to 123.000 MHz using GDRMON.
 - “TUNE 123”
- 9) Change the 3920 RF Frequency to 123 MHz..
- 10) Tune Preselector 1 Pole 0 Index 1 to obtain a maximum dBm reading on GDRMON.
 - “PRE 1 0 1 X” where X = 0 to 255

- 11) Tune Preselect 1 Pole 1 Index 1 to obtain a maximum dBm reading on GDRMON.
 - “PRE 1 1 1 X” where X = 0 to 255
- 12) Tune the UUA to 127.000 MHz using GDRMON.
 - “TUNE 127”
- 13) Change the 3920 RF Frequency to 127 MHz.
- 14) Tune Preselector 1 Pole 0 Index 2 to obtain a maximum dBm reading on GDRMON.
 - “PRE 1 0 2 X” where X = 0 to 255
- 15) Tune Preselect 1 Pole 1 Index 2 to obtain a maximum dBm reading on GDRMON.
 - “PRE 1 1 2 X” where X = 0 to 255
- 16) Tune the UUA to 132.000 MHz using GDRMON.
 - “TUNE 132”
- 17) Change the 3920 RF Frequency to 132 MHz.
- 18) Tune Preselector 1 Pole 0 Index 3 to obtain a maximum dBm reading on GDRMON.
 - “PRE 1 0 3 X” where X = 0 to 255
- 19) Tune Preselect 1 Pole 1 Index 3 to obtain a maximum dBm reading on GDRMON.
 - “PRE 1 1 3 X” where X = 0 to 255
- 20) Tune the UUA to 136.975 MHz using GDRMON (TUNE 136.975).
 - “TUNE 136.975”
- 21) Change the 3920 RF Frequency to 136.975 MHz.
- 22) Tune Preselector 1 Pole 0 Band 4 to obtain a maximum dBm reading on GDRMON.
 - “PRE 1 0 4 X” where X = 0 to 255
- 23) Tune Preselect 1 Pole 1 Band 4 to obtain a maximum dBm reading on GDRMON.
 - “PRE 1 1 4 X” where X = 0 to 255
- 24) Turn off RSSI reporting with GDRMON.
 - “RSSI OFF”

5.2.3.2 Receiver Preselect Filter # 2 Alignment

NOTE: The “Receiver Signal Strength Alignment” must be performed at both AMBIENT and COLD after any changes to the Receiver Preselect Filter (#1, #2, or #3) calibration parameters.

- 1) Connect the UUA's RF port to the 3920's “T/R” port by disconnecting the co-axial cable from the rear of the ATE/MNL box's “RF IN/OUT” connector and connecting it to the 3920's “T/R” port. A

330-00139-05 adaptor may be needed to complete the connection.

- 2) Configure the 3920 as follows:
 - RF Gen = ON
 - Generator Modulation = AM
 - Generator M1 (Modulation Frequency) = 1 kHz, 30% mod, and ON
 - Generator Level = -33 dBm
 - RF Output Port = T/R Port
- 3) Turn on RSSI reporting with GDRMON.
 - "RSSI ON"
- 4) Tune the UUA to 118 MHz using GDRMON
 - "TUNE 118"
- 5) Change the 3920 RF Frequency to 118 MHz.
- 6) Tune Preselector 2 Pole 0 Band 0 Index 0 to obtain a maximum dBm reading on GDRMON.
 - "PRE 2 0 0 0 X" where X = 0 to 255
- 7) Tune Preselect 2 Pole 1 Band 0 Index 0 to obtain a maximum dBm reading on GDRMON.
 - "PRE 2 1 0 0 X" where X = 0 to 255
- 8) Tune the UUA to 122.975 MHz using GDRMON.
 - "TUNE 122.975"
- 9) Change the 3920 RF Frequency to 122.975 MHz. Tune Preselector 2 Pole 0 Band 0 Index 1 to obtain a maximum dBm reading on GDRMON.
 - "PRE 2 0 0 1 X" where X = 0 to 255
- 10) Tune Preselect 2 Pole 1 Band 0 Index 1 to obtain a maximum dBm reading on GDRMON.
 - "PRE 2 1 0 1 X" where X = 0 to 255
- 11) Tune the UUA to 123 MHz using GDRMON.
 - "TUNE 123"
- 12) Change the 3920 RF Frequency to 123 MHz.
- 13) Tune Preselector 2 Pole 0 Band 1 Index 0 to obtain a maximum dBm reading on GDRMON.
 - "PRE 2 0 1 0 X" where X = 0 to 255
- 14) Tune Preselect 2 Pole 1 Band 1 Index 0 to obtain a maximum dBm reading on GDRMON.
 - "PRE 2 1 1 0 X" where X = 0 to 255
- 15) Tune the UUA to 126.975 MHz using GDRMON.
 - "TUNE 126.975"

- 16) Change the 3920 RF Frequency to 126.975 MHz.
- 17) Tune Preselector 2 Pole 0 Band 1 Index 1 to obtain a maximum dBm reading on GDRMON.
 - “PRE 2 0 1 1 X” where X = 0 to 255
- 18) Tune Preselect 2 Pole 1 Band 1 Index 1 to obtain a maximum dBm reading on GDRMON.
 - “PRE 2 1 1 1 X” where X = 0 to 255
- 19) Tune the UUA to 127 MHz using GDRMON.
 - “TUNE 127”
- 20) Change the 3920 RF Frequency to 127 MHz.
- 21) Tune Preselector 2 Pole 0 Band 2 Index 0 to obtain a maximum dBm reading on GDRMON.
 - “PRE 2 0 2 0 X” where X = 0 to 255
- 22) Tune Preselect 2 Pole 1 Band 2 Index 0 to obtain a maximum dBm reading on GDRMON.
 - “PRE 2 1 2 0 X” where X = 0 to 255
- 23) Tune the UUA to 131.975 MHz using GDRMON.
 - “TUNE 131.975”
- 24) Change the 3920 RF Frequency to 131.975 MHz.
- 25) Tune Preselector 2 Pole 0 Band 2 Index 1 to obtain a maximum dBm reading on GDRMON.
 - “PRE 2 0 2 1 X” where X = 0 to 255
- 26) Tune Preselect 2 Pole 1 Band 2 Index 1 to obtain a maximum dBm reading on GDRMON.
 - “PRE 2 1 2 1 X” where X = 0 to 255
- 27) Tune the UUA to 132 MHz using GDRMON.
 - “TUNE 132”
- 28) Change the 3920 RF Frequency to 132 MHz.
- 29) Tune Preselector 2 Pole 0 Band 3 Index 0 to obtain a maximum dBm reading on GDRMON.
 - “PRE 2 0 3 0 X” where X = 0 to 255
- 30) Tune Preselect 2 Pole 1 Band 3 Index 0 to obtain a maximum dBm reading on GDRMON.
 - “PRE 2 1 3 0 X” where X = 0 to 255
- 31) Tune the UUA to 136.975 MHz using GDRMON.
 - “TUNE 136.975”
- 32) Change the 3920 RF Frequency to 136.975 MHz.
- 33) Tune Preselector 2 Pole 0 Band 3 Index 1 to obtain a maximum dBm reading on GDRMON.
 - “PRE 2 0 3 1 X” where X = 0 to 255

34) Tune Preselect 2 Pole 1 Band 3 Index 1 to obtain a maximum dBm reading on GDRMON.

- "PRE 2 1 3 1 X" where X = 0 to 255

5.2.3.3 Receiver Preselect Filter # 3 Alignment

NOTE: The "Receiver Signal Strength Alignment" must be performed at both AMBIENT and COLD after any changes to the Receiver Preselect Filter (#1, #2, or #3) calibration parameters.

- 1) Connect the UUA's RF port to the 3920's "T/R" port by disconnecting the co-axial cable from the rear of the ATE/MNL box's "RF IN/OUT" connector and connecting it to the 3920's "T/R" port. A 330-00139-05 adaptor may be needed to complete the connection.
- 2) Configure the 3920 as follows:
 - RF Gen = ON
 - Generator Modulation = AM
 - Generator M1 (Modulation Frequency) = 1 kHz, 30% mod, and ON
 - Generator Level = -33 dBm
 - RF Output Port = T/R Port
- 3) Turn on RSSI reporting with GDRMON.
 - "RSSI ON"
- 4) Tune the UUA to 118.500 MHz using GDRMON
 - "TUNE 118.5"
- 5) Change the 3920 RF Frequency to 118.5 MHz.
- 6) Tune Preselector 3 Index 0 to obtain a maximum dBm reading on GDRMON.
 - "PRE 3 Y X" where Y = 0 and X = 0 to 31
- 7) Repeat Steps 4) to 6) for each 1 MHz increment from 118.5MHz to 136.5MHz, where Y = 0 for 118.5 MHz, 1 for 119.5 MHz, ..., 18 for 136.5 MHz.
- 8) Turn off RSSI reporting with GDRMON.
 - "RSSI OFF"

5.2.3.4 Receiver Signal Strength Alignment

NOTE: The UUA must be powered on for at least ten minutes before alignment of the Receiver Signal Strength Alignment.

- 1) Connect the UUA's RF port to the 3920's "T/R" port by disconnecting the co-axial cable from the rear of the ATE/MNL box's "RF IN/OUT" connector and connecting it to the 3920's "T/R" port. A 330-00139-05 adaptor may be needed to complete the connection.
- 2) Configure the 3920 as follows:
 - RF Gen = ON
 - Generator Modulation = AM

- Generator M1 (Modulation Frequency) = 1 kHz, 30% mod, and ON
 - Generator Level = -53 dBm
 - RF Output Port = T/R Port
- 3) Set the UUA to 25kHz AM Mode using GDRMON.
 - "Mode AM"
 - "CH_SP 25"
 - 4) Tune the UUA to 118.000 MHz using GDRMON
 - "TUNE 118"
 - 5) Tune the 3920 to generate a 118.000 MHz signal.
 - 6) Calibrate the signal level at 118 using GDRMON.
 - "DBM -53"
 - 7) Tune the UUA to 118.975 MHz using GDRMON (TUNE 118.975).
 - 8) Tune the 3920 to generate a 118.975 MHz signal.
 - 9) Calibrate the signal level at 118.975 MHz using GDRMON.
 - "DMB -53"
 - 10) Repeat Steps 4) to 9) another 18 times for each 1MHz band up to 136.000 and 136.975 MHz (ex: 119 and 119.975, 120 and 120.975 ...).

5.2.3.5 Receiver Audio / ACARS Output Alignment

- 1) Connect the UUA's RF port to the 3920's "T/R" port by disconnecting the co-axial cable from the rear of the ATE/MNL box's "RF IN/OUT" connector and connecting it to the 3920's "T/R" port. A 330-00139-05 adaptor may be needed to complete the connection.
- 2) Configure the 3920 as follows:
 - RF Gen = ON
 - RF Frequency = 127 MHz
 - Generator Modulation = AM
 - Generator M1 (Modulation Frequency) = 1kHz, 30% mod, and ON
 - Generator RF Level = -53 dBm
 - RF Output Port = T/R Port
 - Set the Analyzer Audio Level Units to "W"
 - Audio Input Impedance = "Hi Z" (use the key sequence CONFIG -> CONFIG -> AF Measurements)
 - Audio External Load = 600 ohms (use the key sequence CONFIG -> CONFIG -> AF Measurements)
- 3) Set the ATE/MNL box's "AUDIO_OUT_SELECT" knob to the "COM_600_AUD_OUT" position.
- 4) Tune the UUA to 127 MHz in AM mode using GDRMON.

- "TUNE 127"
 - "MODE AM"
- 5) Use the 3920 Analyzer to measure received audio output level. Adjust the level of the UUA audio out using GDRMON until the audio level reads 45 mW + 5/-0 mW.
 - "CAL 4 X" where X = 0 to -800 in 0.1dB steps
 - 6) Change the ATE/MNL box's "AUDIO_OUT_SELECT" knob to the "ACARS_DATA_OUT" position.
 - 7) Use the 3920 Analyzer to measure ACARS audio output level. Adjust the level of the UUA audio out using GDRMON until the audio level reads 10.4 mW +1.3/-0.0 mW.
 - "CAL 3 X" where X = 0 to -800 in 0.1dB steps

5.2.3.6 Receiver Squelch Alignment

- 1) Connect the UUA's RF port to the 3920's "T/R" port by disconnecting the co-axial cable from the rear of the ATE/MNL box's "RF IN/OUT" connector and connecting it to the 3920's "T/R" port. A 330-00139-05 adaptor may be needed to complete the connection.
- 2) Configure the 3920 as follows:
 - RF Gen = ON
 - Generator Modulation = AM
 - Generator M1 (Modulation Frequency) = 1kHz, 30% mod, and ON
 - Generator RF Level = -107 dBm
 - RF Output Port = T/R Port
 - Analyzer Noise Meter: AF Meter = SINAD
- 2) Set the ATE/MNL box's "AUDIO_OUT_SELECT" knob to the "COM_600_AUD_OUT" position.
- 3) Set the squelch hysteresis using GDRMON.
 - "CAL 25 80"
- 4) Tune the UUA to 127.000 MHz, disable squelch and compressor, and set channel spacing to 25 kHz using GDRMON.
 - "TUNE 127"
 - "SQ 0"
 - "CMP 0"
 - "CH_SP 25"
- 5) Change the 3920 RF Frequency to 127 MHz.
- 6) Change the 3920 Generator RF Output Level in 0.5 dB steps until the SINAD reads 12dB.
- 7) Enable the UUA squelch using GDRMON
 - "SQ 1"
- 8) If squelch is closed, skip to step (9), otherwise, decrease the 25 kHz squelch setting using GDRMON until the squelch closes.

- “CAL 18 X”, where X = -400 to +400 in 0.1 dB steps

NOTE: The CAL 18 parameter can be decremented using the following steps:

- Issue the command “CAL 18”
- Note the value of the response, for instance ” CAL 18 cal: tag= 18 value= 0 (present)”
- Issue the command using the current value, for instance “CAL 18 0”
- Use “Ctrl + Down Arrow” to decrement the value

9) Increase the 25 kHz squelch setting using GDRMON until the squelch just opens.

- “CAL 18 X”, where X = -400 to +400 in 0.1 dB steps

NOTE: The CAL 18 parameter can be incremented using the following steps:

- Issue the command “CAL 18”
- Note the value of the response, for instance ” CAL 18 cal: tag= 18 value= 0 (present)”
- Issue the command using the current value, for instance “CAL 18 0”
- Use “Ctrl + Up Arrow” to increment the value

10) Tune the UUA to 118.000 using GDRMON (TUNE 118) and tune the 3920 to generate a 118 MHz signal at -113 dBm. Increase the 3920’s RF output level in 0.5 dB steps until the squelch just opens. The squelch must open at ≤ -101 dBm to pass. If the squelch opens at > -101 dBm, then increment the cal value by 10 (1 dB) and repeat this step.

11) Repeat Step 10) at 127.000 MHz and 136.975 MHz and verify that the squelch opens at ≤ -101 dBm to pass at each frequency. If the squelch opens at > -101 dBm, then increment the cal value by 10 (1 dB) and repeat this step.

12) Tune the UUA to 127.000 MHz, disable squelch, and set channel spacing to 8.33 kHz using GDRMON.

- “TUNE 127”
- “SQ 0”
- “CH_SP 8”

13) Change the 3920 RF Frequency to 127 MHz.

14) Decrease the 3920 Generator RF Output Level in 0.5 dB steps until the SINAD reads 12 dB.

15) Enable the UUA squelch using GDRMON.

- “SQ 1”

16) If squelch is closed, skip to step (17), otherwise, decrease the 8 kHz squelch setting using GDRMON until the squelch closes.

- “CAL 17 X”, where X = -400 to +400 in 0.1 dB steps

NOTE: The CAL 17 parameter can be decremented using the following steps:

- Issue the command “CAL 17”
- Note the value of the response, for instance ” CAL 17 cal: tag= 17 value=0 (present)”
- Issue the command using the current value, for instance “CAL 17 0”
- Use “Ctrl + Down Arrow” to decrement the value

17) Increase the 8 kHz squelch setting using GDRMON until the squelch just opens.

- “CAL 17 X”, where X = -400 to +400 in 0.1 dB steps

NOTE: The CAL 17 parameter can be incremented using the following steps:

- a) Issue the command “CAL 17”
- b) Note the value of the response, for instance “CAL 17 cal: tag= 17 value= 0 (present)”
- c) Issue the command using the current value, for instance “CAL 17 0”
- d) Use “Ctrl + Up Arrow” to increment the value

18) Tune the UUA to 118.000 using GDRMON (TUNE 118) and tune the 3920 to generate a 118 MHz signal at -113 dBm. Increase the 3920's RF output level in 0.5 dB steps until the squelch just opens. The squelch must open at ≤ -101 dBm to pass. If the squelch opens at > -101 dBm, then increment the cal value by 10 (1 dB) and repeat this step.

19) Repeat Step 10) at 127.000 MHz and 136.975 MHz and verify that the squelch opens at ≤ -101 dBm to pass at each frequency. If the squelch opens at > -101 dBm, then increment the cal value by 10 (1 dB) and repeat this step.

5.2.3.7 Receiver Correlation Threshold Adjustment

- 1) Set the Receiver's Correlation Threshold Offset to the default value using the GDRMON software:
 - “CAL 27 0”

5.2.3.8 Remote Transfer Mode

- 1) Set the Remote Transfer Mode to the default value using the GDRMON software:
 - “CAL 28 0”

5.2.4 GDR66 COM Transmitter Manual Alignment Procedure

This section describes the procedure to perform a full manual alignment of the GDR66 COM Transmitter.

5.2.4.1 DC-DC Converter Alignment

- 1) Issue the calibration commands listed in the following table to set the PA DC-DC Converter voltage for the listed input conditions.

Input Condition	Voltage Set Point	Calibration Command
AM 20W	28.0V	CAL 8 32
AM 10W	17.5V	CAL 19 213
AM 5W	15.0V	CAL 21 255
VDL 20W	20.0V	CAL 9 169
VDL 10W	15.0V	CAL 20 255
VDL 5W	15.0V	CAL 22 255

NOTE: Calibration Value = (Voltage – 29.9) / -0.0583333

5.2.4.2 Transmitter IQ Offset Alignment

- 1) Connect the UUA's RF port to the 3920's "T/R" port by disconnecting the co-axial cable from the rear of the ATE/MNL box's "RF IN/OUT" connector and connecting it to the 3920's "T/R" port. A 330-00139-05 adaptor may be needed to complete the connection.
- 2) Configure the 3920 to measure TX Power at 127.5 MHz.
 - Analyzer RF In = T/R
 - Analyzer = Manual
 - Analyzer RF Freq = 127.5 MHz
 - Demod = AM
 - Generator A1, A2, and A3 all OFF
- 3) Tune the UUA to AM mode and 127.5 MHz using the GDRMON software:
 - "MODE AM"
 - "TUNE 127.5"
- 4) Start the alignment using the GDRMON software:
 - "OFFSET_CAL 1"

NOTE: Do not leave the unit unattended in this calibration state as the software is not monitoring the PA bias settings and thermal runaway is possible. Try to complete this alignment within 2 minutes.
- 5) Adjust the I Offset using GDRMON until the transmitter power is minimized.
 - "OFFSET_I X" where X = -64 to 64

NOTE: The OFFSET_I parameter can be incremented or decremented using the following steps:

- a) Issue the command "OFFSET_I"
- b) Note the value of the response, for instance "OFFSET_I cal: tag= 1 value=-14 (present)"
- c) Issue the command using the current value, for instance "OFFSET_I -14"
- d) Use "Ctrl + Up Arrow" to increment the value or "Ctrl + Down Arrow" to decrement

- 6) Adjust the Q Offset using GDRMON until the transmitter power is minimized.
 - "OFFSET_Q X" where X = -64 to 64

NOTE: The OFFSET_Q parameter can be incremented or decremented using the following steps:

- a) Issue the command "OFFSET_Q"
 - b) Note the value of the response, for instance "OFFSET_Q cal: tag= 2 value=3 (present)"
 - c) Issue the command using the current value, for instance "OFFSET_Q 3"
 - d) Use "Ctrl + Up Arrow" to increment the value or "Ctrl + Down Arrow" to decrement
- 7) Repeat steps 5) and 6) again to insure the power is truly nulled and is below -10dBm.
 - 8) Stop the alignment using the GDRMON software.
 - "OFFSET_CAL 0"

5.2.4.3 Transmitter Channel Spacing

- 1) Tune the UUA to AM mode and set the default channel spacing to 25KHz using the GDRMON software:
 - "MODE AM"
 - "CH_SP 25"

5.2.4.4 Audio Input Gain Adjustments

- 1) Set the microphone gain to the default value using the GDRMON software:
 - "CAL 16 0"
- 2) Set the ACARS input gain to the default value using the GDRMON software:
 - "CAL 24 0"

5.2.4.5 Transmitter Power Alignment

- 1) Connect the UUA's RF port to the 3920's "T/R" port by disconnecting the co-axial cable from the rear of the ATE/MNL box's "RF IN/OUT" connector and connecting it to the 3920's "T/R" port. A 330-00139-05 adaptor may be needed to complete the connection.
- 2) Put the UUA in AM mode and initialize the power setting and calibration factors using the GDRMON software:
 - "MODE AM"
 - "PWR 12000"
 - "CAL 13 32767"
 - "CAL 14 32767"
 - "CAL 15 32767"
- 3) Configure the 3920 to measure TX Power at 118 MHz.
 - Analyzer RF In = T/R
 - Analyzer = Manual
 - Analyzer RF Freq = 118 MHz

- Demod = AM
 - Power = Watts
 - IF BW = 25kHz
 - Generator A1, A2, and A3 all OFF
- 4) Tune the UUA to 118 MHz using the GDRMON software:
- “TUNE 118”
- 5) Key the transmitter using the GDRMON software:
- “PTT 1”
- 6) Measure the CW power as reported by the 3920 and record in the following table:

Table 1 Power Scaling Over Frequency

Test Frequency	Measured Power	Scale Factor	CAL Command
118.000 MHz			CAL 13 X
127.500 MHz			CAL 14 X
136.975 MHz			CAL 15 X

- 7) Key down the transmitter using the GDRMON software:
- “PTT 0”
- 8) Repeat steps 3) through 7) using the following frequencies: 127.500 MHz and 136.975MHz
- 9) Calculate the appropriate scale factor for each of the test frequencies using the following formula:

$$Scale_{test} = int \left[32767 * \sqrt{\left(\frac{P_{min}}{P_{test}} \right)} \right]$$

Where Pmin = minimum power measured (scale factor for this power should be 32767), int[] refers to the nearest integer, and “test” refers to the values at each test frequency. See the following table for an example.

Table 2 Example Power Scaling

<i>Test Frequency</i>	<i>Measured Power</i>	<i>Scale Factor</i>
118.000 MHz	22.9	$\text{Int}[\text{Sqrt}(15.8/22.9) * 32767] = 27217$
127.500 MHz	19.3	$\text{Int}[\text{Sqrt}(15.8/19.3) * 32676] = 29647$
136.975 MHz	15.8 (Pmin)	32767

- 10) Use the commands listed in Table 1 to store the calibration scale factors
- 11) Key the transmitter using the GDRMON software:
 - “PTT 1”
- 12) Use the 3920 Analyzer to measure transmitter power level. Adjust the level of the UUA power out using GDRMON until the power level reads $20\text{W} \pm 0.5\text{W}$.
 - “PWR X” where X = 1000 to 32000

NOTE: This adjustment is usually done in steps of 1000 for course alignment and steps of 100 for fine.
- 13) Put the UUA in VDL mode and initialize the power setting using the GDRMON software:
 - “MODE VDL”
 - “PWR 12000”
- 14) Key up the digital transmitter using the GDRMON software. Note that the transmitter will be on for about 3 seconds then off for about 3 seconds.
 - “BER CONT 50”
- 15) Use the 3920 Analyzer to measure the transmitter power level at the end of each 3 second burst.
- 16) Adjust the level of the UUA power out using GDRMON until the power level reads $20\text{W} \pm 0.5\text{W}$.
 - “PWR X” where X = 1000 to 32000

NOTE: This adjustment is usually done in steps of 1000 for course alignment and steps of 100 for fine.
- 17) Key down the digital transmitter using the GDRMON software:
 - “BER OFF”

5.2.4.6 Transmitter Sidetone Level

- 1) Connect the UUA’s RF port to the 3920’s “T/R” port by disconnecting the co-axial cable from the rear of the ATE/MNL box’s “RF IN/OUT” connector and connecting it to the 3920’s “T/R” port. A 330-00139-05 adaptor may be needed to complete the connection.
- 2) Configure the 3920 as follows:

- RF Gen = OFF
 - Audio Generator A1 = 1kHz, 250mV, Sine and ON
 - Set the Analyzer Audio Level Units to "W"
 - Audio Input Impedance = "Hi Z" (use the key sequence CONFIG -> CONFIG -> AF Measurements)
 - Audio External Load = 600 ohms (use the key sequence CONFIG -> CONFIG -> AF Measurements)
- 3) Set the ATE/MNL box's "AUDIO_OUT_SELECT" knob to the "COM_600_AUD_OUT" position.
 - 4) Tune the UUA to 127.5 MHz in AM mode using GDRMON.
 - "TUNE 127.5"
 - "MODE AM"
 - 5) Key the transmitter using the GDRMON software
 - "PTT 1"
 - 6) Use the 3920 Analyzer to measure received audio output level. Adjust the level of the UUA audio out using GDRMON until the audio level reads 3.27 mW \pm 0.87 mW.
 - "CAL 23 X" where X = 0 to -800 in 0.1dB steps
 - 7) Key down the transmitter using the GDRMON software
 - "PTT 0"

5.2.4.7 CSMA Offset Adjustment

- 2) Set the CSMA Offset to the default value using the GDRMON software:
 - "CAL 26 0"

5.3 GDR66 Manual COLD Alignment Procedure

Following Ambient alignment, the following COLD alignment must be performed before testing. The UUA should be soaked for 1hr at -40C \pm -3C with the power off before performing the COLD alignment.

5.3.1 Receiver Signal Strength Alignment

NOTE: The UUA must be powered on for at least ten minutes before alignment of the Receiver Signal Strength Alignment.

- 1) Repeat Receiver Signal Strength Alignment specified in Section 5.2.3.4.