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CORPORATION LIMITED

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Model No: NT3

Title: **NT3 Alignment Procedure**

Drawing No: NT3-ALIGN-M-00

Customer: Midland

Rev. Date: Oct. 23, 2006



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CORPORATION LIMITED

**NT3**

# Alignment Procedure

Created by:

Approved by:

Rev. No: 00

For Stage :

Release Date : Oct. 23, 2006

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## 1. REFERENCE TEST EQUIPMENT

- 1) HP8921A Cell site test set or HP8921A,B Communication Test Set with Spectrum Analyzer option.
- 2) Fluke 187 Digital Voltmeter
- 3) HP E3615A Power supply

## 2. TEST POINT

- 1) Antenna : Test point is not prepared. Use antenna contact with Antenna\_GND\_T(antenna ground).
- 2) VCO reference voltage : Test point 1 is prepared.
- 3) TX Audio output : Test point SPKOUT is prepared or use ear-jack(3.5mm)
- 4) TX Mic. Input : Test point MICIN is prepared or use ear-jack(2.5mm) with 10uF coupling capacitor.
- 5) Battery Vcc : Test point is not prepared. Please use mechanical contact.
- 6) Up Key : Test point UP is prepared.
- 7) Down Key : Test point DW is prepared.
- 8) Function/Power Key : Test point POWER is prepared.
- 9) Monitor Key : Test point SCAN is prepared.
- 10) PTT Key : Test point PTT is prepared.
- 11) CALL Key : Test point CALL is prepared.

Note: All key can be activated when connect with ground.

## 3. VCO ALIGNMENT

- 1) Set unit to Channel 1 and connect a voltmeter to TP1 (VCO PD)
- 2) Press & hold PTT.
- 3) Extend L303 until the voltmeter reads 1.0V.
- 4) *Cover shield-plate on VCO can and monitor the voltage on TP1.* The voltage should be 1.5Vdc +/- 0.2Vdc. If the voltage is not 1.5Vdc +/- 0.2Vdc, realign L303 until meet to requirement.

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- 5) Release PTT button so units is in receiving mode and monitor the voltage on TP1. The voltage should be in the range 1.0Vdc +/- 0.5V.
- 6) Set unit to channel 88A.
- 7) Press & hold the PTT switch and observe the voltage on TP4. The voltage should be 2-3.5Vdc.
- 8) Release PTT and observe the voltage on TP4. The voltage should read between 2.0-3.5Vdc.

*Note: VCO shield-can should be soldered after VCO alignment is finished.*

#### 4. TRANSMITTER FREQUENCY ALIGNMENT

- 1) Press & hold the PTT button.
- 2) Align CT201 trimmer capacitor such that the output frequency is equal to the channel frequency with a maximum error of +/- 200Hz. CT201 is located on the near side of 20.95MHz X-tal.

#### 5. TRANSMITTER OUTPUT POWER CONFIRMATION

- 1) A. Set unit to channel 1 and power Hi mode.
- 2) Press & hold the PTT button.
- 3) Transmit power should normally be between 4.5W to 5.5W.
- 4) Set unit to power low mode.
- 5) Press & hold the PTT button. Ensure that TX power should be between 0.5-1.5W.

#### 6. TRANSMITTER DEVIATION ALIGNMENT

- 1) Connect an audio generator (600 ohms) to the ear jack. The audio frequency should be set at 1KHz with a level of 200mV RMS.
- 2) Connect an FM deviation meter (communications test set ) to Antenna contact. Set the monitor to read peak to peak divided by two [(pk-pk)/2] deviation. Set filter of equipment from 25Hz to 15KHz.
- 3) Press & hold the PTT button.
- 4) Align RV2 for +/-4.0KHz deviation (+/-0.1KHz).

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- 5) Decrease audio generator level until deviation reads +/-3KHz (approximately 4mV) and record generator level. Level should be between 2 mV and 8mV.
- 6) Connect that transmit audio distortion is less the 5%.

## 7. RECEIVER ALIGNMENT

- 1) Set the output level of the RF signal generator for -47dBm. The generator should be set for 3.0KHz deviation at 1 KHz audio.
- 2) Set volume position middle.
- 3) Connect Audio analyzer to SPKOUT.
- 4) Set equipment filter 25Hz to 15KHz.
- 5) Align CF2 to get a maximum output level & a minimum distortion and confirm that RX audio distortion is less than 3%.
- 6) Confirm that RX sensitivity is less than -120dBm (nominally -123dBm) by reducing the output level of the RF signal generator until a 12 dB SINAD reading is achieved.
- 7) Set SSG output level until 9dB SINAD sensitivity and align RV1 unit the unit is un-squelched.
- 8) Set signal generator level to -47dBm.
- 9) With 3.0KHZ deviation at 1KHz modulation, set volume for maximum audio. Audio level should be on over than 1.7 Vrms.

## 8. BATTERY INDICATOR CONFIRMATION

- 1) Set unit to receiving mode. Don't set transmitter mode.
- 2) Set power supply voltage to 6v.
- 3) Decrease power supply voltage until low battery icon blinks.

## 9. POWER OFF CURRENT CONSUMPTION

- 1) Set power supply voltage to 6v and connect to unit.
- 2) Confirm current. It must be less than 100uA.

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Model No: NT3

Title: **NT3 Laboratory Testing Procedure**

Drawing No: NT3-LAB-TAP-M-00

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# Laboratory Testing Procedure

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## UNIT TEST - (UNIT ASSEMBLED)

### 1. TEST PREPARATION

- 1) Install 4 "AA" alkaline batteries (observe polarity markings).
  - Left bottom terminal is the system plus polarity.
  - Right upper terminal is the system minus polarity.
  
- 2) Turn on unit by pressing the power button.

### 2. SYSTEM TEST

- 1) Radiated Transmit and Receive performance may be observed.
- 2) Audio out & Audio in are available at the Headset jack.

## LABORATORY TEST - (UNIT UN-ASSEMBLED)

### 1. TEST PREPARATION

- 1) Disassemble unit (4 screws - 3 behind batteries). Remove the PCB from the cabinet.
- 2) Remove the antenna and install a 50 ohm coax cable in its place.
- 3) Either clip alligator leads or solder test leads to the power supply connections. The Positive terminal is the lower left PCB mounting hole. The negative terminal is the lower right PCB mounting hole top of the 20.95MHz X-tal. (battery side view)
- 4) Connect 6VDC power source to the terminals, observing correct polarity.
- 5) Connect an 8-ohm load through the Headset jack(3.5mm mono-phone plug).
- 6) Connect a audio generator with 10uF coupling capacitor through the Headset jack (2.5mm mono-phone plug).
- 7) Select desired channels using CH up/down keypad switch. The rubber keypad maybe removed from the front cabined and used directly on the PCB.



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## SPECIFIC TEST METHODS AND GUIDANCE

### 1. Modulation Characteristics - *(paragraph 2.1047(a) of the Rules).*

#### *FOR TX AUDIO FILTER RESPONSE.*

- 1) Connect audio generator with 10uF coupling capacitor to microphone input jack. Press PTT button.
- 2) Connect RF output with modulation meter. (Filters of modulation meter should be set to a 50Hz to 15KHz).
- 3) Adjust audio generator about 1-3mVrms for 0.75KHz modulation.
- 4) While transmitting, sweep generator and note measurement.
- 5) Please compensate the back-ground noise level.

### 2. Modulation Characteristics - *(paragraph 2.1047(b) of the Rules).*

#### *FOR TX AUDIO LOW PASS FILTER RESPONSE.*

- 1) Connect audio generator with 10uF coupling capacitor to microphone input jack. Press PTT button.
- 2) Connect AC voltmeter or other test equipment via jumper wire to TP-9.
- 3) Adjust audio generator for 100mV.
- 4) While transmitting, sweep generator and note measurement.

### 3. Occupied Bandwidth - *(paragraph 2.1049(c) of the Rules).*

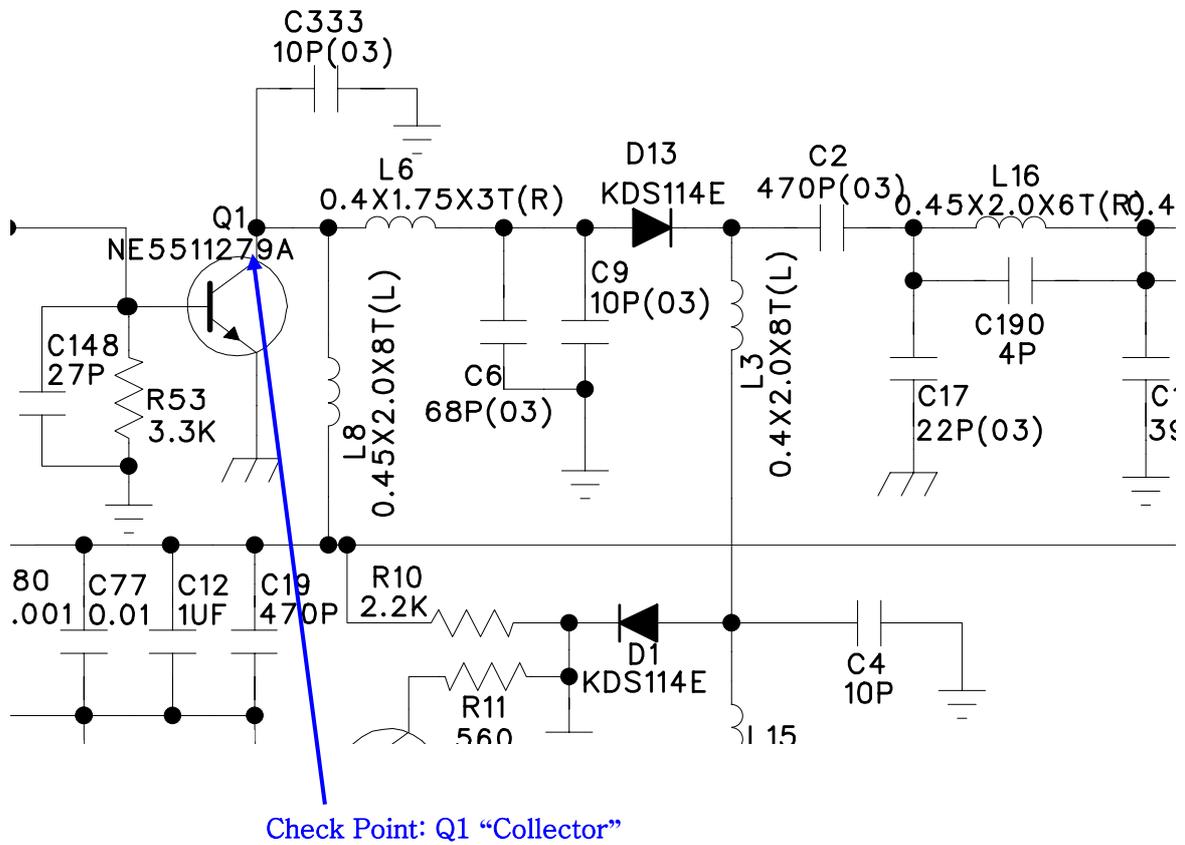
- 1) Connect an audio frequency sweep generator with 10uF coupling capacitor to microphone input jack.
- 2) Adjust audio generator to a frequency of 2500Hz and a level of 100mVrms (+16dB above 10-12mV per FCC).
- 3) With a spectrum analyzer, transmit the radio and monitor the transmitter through an antenna.
- 4) Note required measurements per FCC.

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# TX Current Consumption at end of party

1. Model: NT3

2. Test



3. Test Result

- Low power Mode: 350mA
- Hi power Mode : 905mA

## FREQUENCY TABLE FOR NT3

COUNTRY			FREQUENCY		MODE	REMARK
INT	CAN	US	TX	RX		
<b>01</b>	<b>01</b>	-	156.050	<b>160.650</b>	D	
-	-	01A	156.050	156.050	S	
<b>02</b>	<b>02</b>	-	156.100	<b>160.700</b>	D	
<b>03</b>	<b>03</b>	-	156.150	<b>160.750</b>	D	
<b>04</b>	-	-	156.200	<b>160.800</b>	D	
	<b>04A</b>	-	156.200	156.200	S	
<b>05</b>	-	-	156.250	<b>160.850</b>	D	
-	05A	05A	156.250	156.250	S	
06	06	06	156.300	156.300	S	
<b>07</b>	-	-	156.350	<b>160.950</b>	D	
-	<b>07A</b>	<b>07A</b>	156.350	156.350	S	
08	08	08	156.400	156.400	S	
09	09	09	156.450	156.450	S	
10	10	10	156.500	156.500	S	
11	11	11	156.550	156.550	S	
12	12	12	156.600	156.600	S	
13	13	13	156.650	156.650	S	
14	14	14	156.700	156.700	S	
15	15	-	156.750	156.750	S	*
-	-	15	-	156.750	R	
16	16	16	156.800	156.800	S	
17	17	17	156.850	156.850	S	*
<b>18</b>	-	-	156.900	<b>161.500</b>	D	
-	<b>18A</b>	<b>18A</b>	156.900	156.900	S	
<b>19</b>	-	-	156.950	<b>161.550</b>	D	
-	<b>19A</b>	<b>19A</b>	156.950	156.950	S	
<b>20</b>	<b>20*</b>	<b>20</b>	157.000	<b>161.600</b>	D	
		<b>20A</b>	157.000	157.000	S	
<b>21</b>	-	-	157.050	<b>161.650</b>	D	
-	<b>21A</b>	<b>21A</b>	157.050	157.050	S	
-	<b>21B</b>	-	-	<b>161.650</b>	R	
<b>22</b>	-	-	157.100	<b>161.700</b>	D	
-	<b>22A</b>	<b>22A</b>	157.100	157.100	S	
<b>23</b>	<b>23</b>	-	157.150	<b>161.750</b>	D	
-	-	<b>23A</b>	157.150	157.150	S	
<b>24</b>	<b>24</b>	<b>24</b>	157.200	<b>161.800</b>	D	

## FREQUENCY TABLE FOR NT3

<b>25</b>	<b>25</b>	<b>25</b>	157.250	<b>161.850</b>	D	
<b>26</b>	<b>26</b>	<b>26</b>	157.300	<b>161.900</b>	D	
<b>27</b>	<b>27</b>	<b>27</b>	157.350	<b>161.950</b>	D	
<b>28</b>	<b>28</b>	<b>28</b>	157.400	<b>162.000</b>	D	
<b>60</b>	<b>60</b>	-	156.025	<b>160.625</b>	D	
<b>61</b>	-	-	156.075	<b>160.675</b>	D	
-	<b>61A</b>	-	156.075	156.075	S	
<b>62</b>	-	-	156.125	<b>160.725</b>	D	
-	<b>62A</b>	-	156.125	156.125	S	
<b>63</b>	-	-	156.175	<b>160.775</b>	D	
-	-	<b>63A</b>	156.175	156.175	S	
<b>64</b>	<b>64</b>	-	156.225	<b>160.825</b>	D	
-	<b>64A</b>	-	156.225	156.225	S	
<b>65</b>	-	-	156.275	<b>160.875</b>	D	
-	<b>65A</b>	<b>65A</b>	156.275	156.275	S	
<b>66</b>	-	-	156.325	<b>160.925</b>	D	
-	<b>66A*</b>	<b>66A</b>	156.325	156.325	S	
67	67	67	156.375	156.375	S	
68	68	68	156.425	156.425	S	
69	69	69	156.475	156.475	S	
70	70	70	-	156.525	R	**
71	71	71	156.575	156.575	S	
72	72	72	156.625	156.625	S	
73	73	73	156.675	156.675	S	
74	74	74	156.725	156.725	S	
75	-	-	156.775	156.775	S	*
76	-	-	156.825	156.825	S	*
77	<b>77*</b>	<b>77*</b>	156.875	156.875	S	
<b>78</b>	-	-	156.925	<b>161.525</b>	D	
-	<b>78A</b>	<b>78A</b>	156.925	156.925	S	
<b>79</b>	-	-	156.975	<b>161.575</b>	D	
-	<b>79A</b>	<b>79A</b>	156.975	156.975	S	
<b>80</b>	-	-	157.025	<b>161.625</b>	D	
-	<b>80A</b>	<b>80A</b>	157.025	157.025	S	
<b>81</b>	-	-	157.075	<b>161.675</b>	D	
-	<b>81A</b>	<b>81A</b>	157.075	157.075	S	
<b>82</b>	-	-	157.125	<b>161.725</b>	D	
-	<b>82A</b>	<b>82A</b>	157.125	157.125	S	

## FREQUENCY TABLE FOR NT3

<b>83</b>	<b>83</b>	-	157.175	<b>161.775</b>	D	
-	<b>83A</b>	<b>83A</b>	157.175	157.175	S	
<b>84</b>	<b>84</b>	<b>84</b>	157.225	<b>161.825</b>	D	
<b>85</b>	<b>85</b>	<b>85</b>	157.275	<b>161.875</b>	D	
<b>86</b>	<b>86</b>	<b>86</b>	157.325	<b>161.925</b>	D	
-	<b>87</b>	-	157.375	<b>161.975</b>	D	
<b>87</b>	-	-	157.375	157.375	S	
-	<b>88</b>	-	157.425	<b>162.025</b>	D	
<b>88</b>	-	<b>88A</b>	157.425	157.425		

**S: Simplex**

**D: Duplex**

**\*: Obligatory low transmission power of 1W,**

**\*\* : Classified to DCS communication**

### << WX BAND >>

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
1	162.550	6	162.500
2	162.400	7	162.525
3	162.475	8	161.650
4	162.425	9	161.775
5	162.450	10	163.275