

# Boomerang waitercal TX TUNE UP PROCEDURE

## PERFORMANCE TEST

The procedure in this chapter allows the verification of the electrical performance of transmitter. These tests do not require access to the interior of the instrument.

### Recommended test equipment

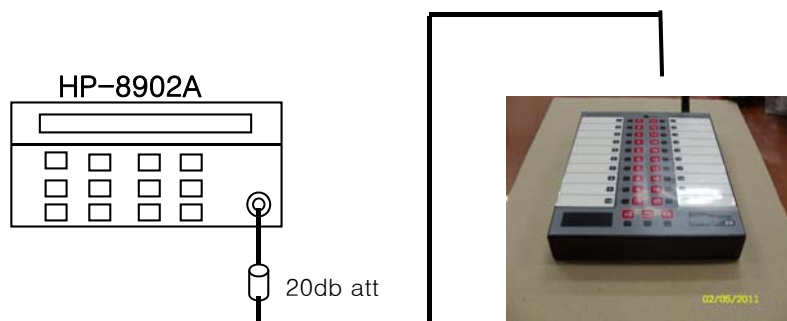
| Description        | Minimum specification                           | Model         |
|--------------------|---|---------------|
| Power meter        | + / - 0.2dB, - 60 to -20dBm. 100 KHz to 1GHz    | HP-436A/8481D |
| Spectrum analyzer  | 100KHz to 12GHz, up to -120 dBm                 | HP-8591E      |
| Measuring receiver | 0.2 to 1300MHz, 0 to -125dBm, Freq Counter      | HP-8902A      |
| Oscilloscope       | DC to 100MHz, 5mV to 1V/div, Rise Time capavity | TEK TDS360    |
| Frequency Counter  | + / - 0.1ppm, 10Hz ~ 1GHz, 9digit               | HP-53181A     |
| Attenuator         | 10W, 20dB Att, DC to 1GHz                       | Tescom 99910  |

### 1. Frequency Accuracy

Frequency : 457.5750MHz

Stability : Same as reference oscillator accuracy. Internal 1ppm 0 to 50degC

#### 1.Test Setup (Connect Boomerang BNC Jack without antenna)



#### Carrier frequency accuracy test

2. HP-8902A : auto tuning, frequency display

3. Boomerang waitercal TX

1) Connect 20dB Attenuators

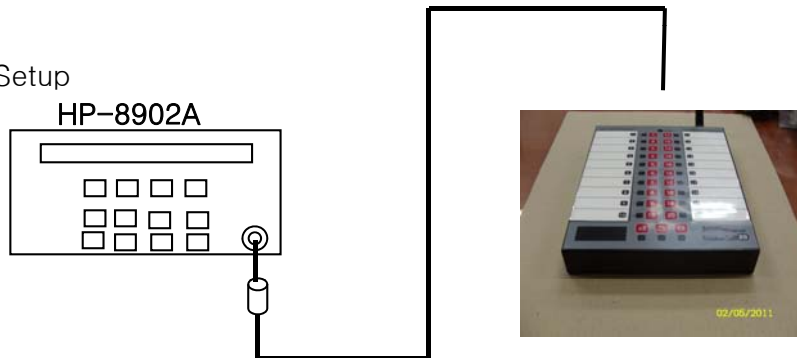
2) Power On

3) Setup key, enter, password 2386 key enter, Use # key to select " SYNC OFF, RF ON

| TC-1950A FREQ | Lower Limit | Actual | Upper Limit | Remarks |
|---------------|-------------|--------|-------------|---------|
| 457.5750MHz   | 457.5748    |        | 457.5752    |         |

2. RF Output Level Accuracy  
 RF level : 30dBm  
 Accuracy : +/-1dB

1. Test Setup



(Connect Boomerang BNC Jack without antenna)

2. HP-8902A : Auto-tuning, RF Power

3. Boomerang waitercal TX

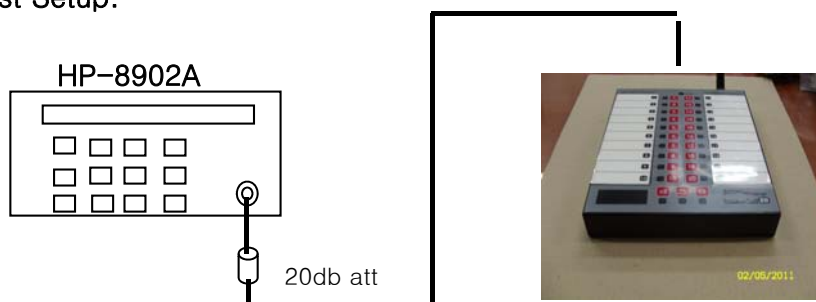
- 1) Connect 20dB Attenuators
- 2) Power On
- 3) Setup key, enter, password 2386 key enter, Use # key to select " SYNC OFF, RF ON

3. Spectral Purity

3.1. Residual FM Noise

RMS Noise : <10Hz Typ, 300Hz ~ 3KHz  
 <70Hz Typ, 50Hz ~ 3KHz

1. Test Setup.



(Connect Boomerang BNC Jack without antenna)

2. HP 8902A : FM, RMS, Filter BW 300Hz ~ 3KHz

3. Boomerang waitercal TX:

- 1) Connect 20dB Attenuators
- 2) Power On
- 3) Setup key, enter, password 2386 key enter, Use # key to select " SYNC OFF, RF ON

### TC-1950A Signal Generator Residual FM

| 8902 Filter BW |      | Actual | Limit (Hz) | Remark |
|----------------|------|--------|------------|--------|
| HPF            | LPF  |        |            |        |
| 300Hz          | 3KHz |        | 10Hz       |        |
| 50Hz           | 3KHz |        | 70Hz       |        |

### 3.2. Harmonic Spurious :

Harmonic Level at 2xFOUT : <-60dBc

#### 1. Test Setup.



#### Harmonice test

(Connect Boomerang BNC Jack without antenna)

2. HP 8591E : Span = 500KHz, RBW = 10KHz, VBW = 30KHz.

3. Boomerang waitercal TX:

1) Connect 20dB Attenuators

2) Power On

3) Setup key, enter, password 2386 key enter, Use # key to select " SYNC OFF, RF ON

### Boomerang waitercal TX Harmonic Spurious

| Fout(MHz) | Spurious(MHz) | Level(dBm) | Fout-2*Fout | Limit  | Remark |
|-----------|---------------|------------|-------------|--------|--------|
| 457.575   | 915.15        |            |             | -60dbc |        |

#### 4. Modulation

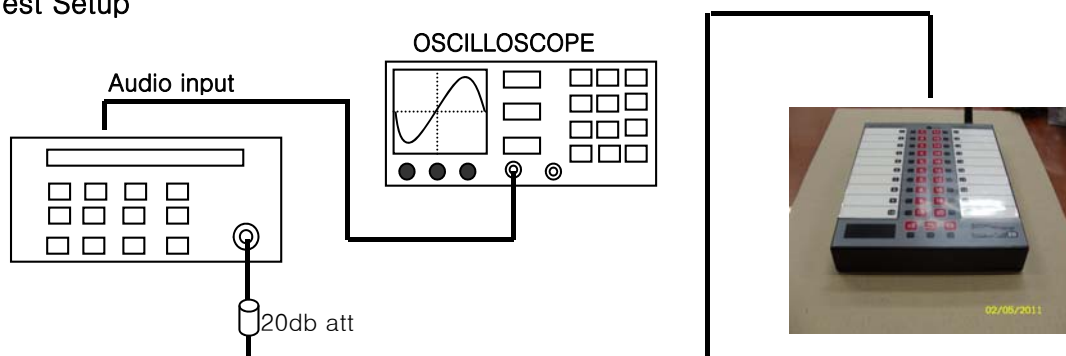
4.1. FM(RECT) (Internal FSK Test Patterns)

Deviation Accuracy

Deviation : 4.5KHz,

Accuracy : +/-5% (4.275 < FM < 4.725)@4.5KHz

#### 1.Test Setup



### FSK Deviation and Noise Test

(Connect Boomerang BNC Jack without antenna)

#### 2. Equipment

HP-8902A : FM, AVG, HPF=OFF, LPF=15KHz

TDS360 : 250us/div, 500mV/div Average : 16

#### 3. Boomerang waitercal TX:

- 1) Connect 20dB Attenuators
- 2) Power On
- 3) Setup key, enter, password 2386 key enter, Use # key to select " SYNC OFF, RF ON

#### 4. Read FM Deviation in RMS.

DEV(Boomerang )

4.5KHz

Limit

4.5KHz + - 5%

Table : FSK Deviation Accuracy

| Item            | Lower | Actual | Upper | Remark |
|-----------------|-------|--------|-------|--------|
| Deviation (AVG) | 4.275 |        | 4.725 |        |