

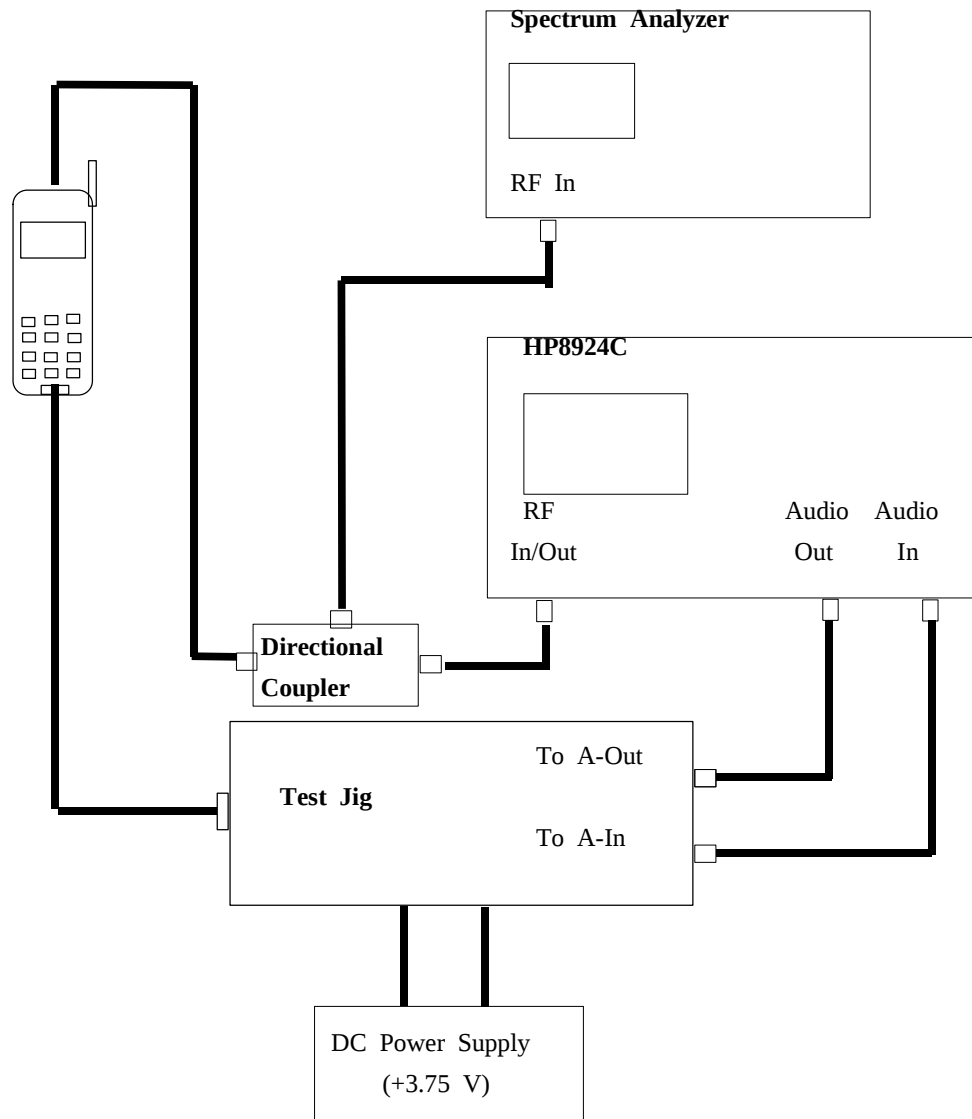
5. TEST PROCEDURE

TUNE-UP PROCEDURE

List of Equipment

- DC Power Supply
- Test Jig
- Test Cable
- CDMA Mobile Station Test Set HP8924C, HP83236A, CMD-80, etc
- Spectrum Analyzer(include CDMA test mode) HP8596E

Configuration of Test



FM

A. You must change the phone from Normal Mode to FM Test mode

B. The command [0 1] (suspend) is entered to start test.

C. You should enter the following keys.

[0 9 X X X X #, 0 7, 9 7 X X X]

- If you enter the command [0 9], You can select the channel.

- The command [0 7] means Carrier On (Carrier Off : 0 8)

- If you enter the command [9 7], You can control the power output level. Following under-bar means AGC code. And you can control the power output level using [SEND] or [END] key

ex) 9 7 4 5

D. Control the TX Power Output Level using [SEND] or [END] key.

When you press [OK] key to store Data in EEPROM, enter next power level control step automatically

LEVEL	LCD Display	TX OUTPUT POWER	STORE
2	TXpwr[02]	+26dBm +2/-4dB	OK
3	TXpwr[03]	+24dBm +2/-4dB	OK
4	TXpwr[04]	+20dBm +2/-4dB	OK
5	TXpwr[05]	+16dBm +2/-4dB	OK
6	TXpwr[06]	+12dBm +2/-4dB	OK
7	TXpwr[07]	+08dBm +2/-4dB	OK

Change to Test Mode

A. To change the phone from Normal Mode to test Mode, You should enter the following keys.

" * 7 5 9 # 8 1 3 5 8 0 "

B. The command ;0 1"(Suspend) is entered to start test.

C. To finish the Test Mode, You should enter the command "0 2".

Channel Selection and Tx Power Output level Control

1. CDMA

A. You should change the phone from Normal Mode to Test mode

B. The command ;0 1"(Suspend) is entered to start test.

C. You should enter the following keys.

" 0 9 X X X X #, 0 7, 3 4, 7 3, 9 2 "

- If you enter the command "0 9", You can select the channel

ex) 0 9 0 3 6 3 (under-bar means channel number)

- The command "0 7; means Carrier On (Carrier Off : ;0 8;)

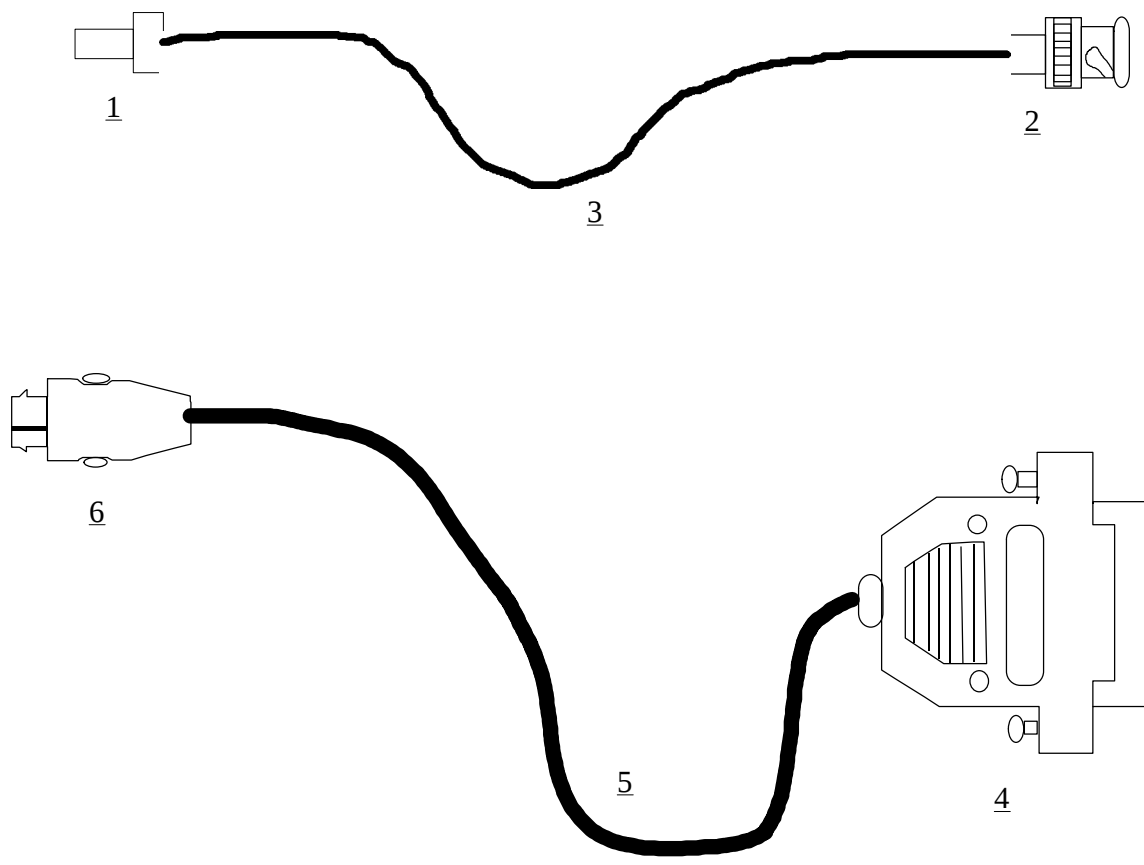
- If you enter the command "7 1", You can control the power output level. Following under-bar means AGC code, 000 to 511. And you can control the power output level using Volume Up/Down Keys.

ex) 7 1 4 7 5

- If you enter the command "3 4", You can spread spectrum to 1.23MHz bandwidth.

TEST CABLE DESCRIPTION FOR SCH-A105

1. TEST CABLE

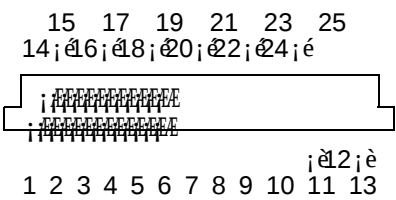


2. TEST CABLE CONNECTIONS

1	RF TEST CONNECTOR
2	BNC CONNECTOR (RF)
3	RF CABLE
4	Dsub 25PIN CONNECTOR (DATA)
5	DATA CABLE
6	PLUG CONNECT TO SCH-A105

3. Dsub 25 PIN CONNECTOR PIN DESCRIPTION (TEST CABLE 1, BACK SIDE)

DATA DESCRIPTION	Dsub CONN. PIN NO.
Vcc	4, 5, 6
GND	13, 23, 24, 25
PW ON/OFF	7
TX AUDIO	10
TX DATA	22
RX AUDIO	12
RX DATA	21
RSSI	8



4. CONVERSION TABLE OF FREQUENCY vs CHANNEL

T Y P E	CHANNEL	CONVERSION EQUATION	REMARK
TX FREQUENCY	1 N 799 990 N 1023	F=0.03 N + 825.00 F=0.03 (N-1023) + 825.00	N ; CH NUMBER F ; FREQUENCY
RX FREQUENCY	1 N 799 990 N 1023	F=0.03 N + 870.00 F=0.03 (N-1023) + 870.00	

FM MODE

TEST ITEM	STEP	PROCEDURE
1. PREPARE	a	Connect the test equipment
	b	Select FM Mode : Choose 'Analog Only' in the General NAM program, and Press [OK]
	c	Enter the test mode : press [* 7 5 9 # 8 1 3 5 8 0]
	d	Press [0 1] : You must do it at first in FM test mode.
	e	If you precess a wrong key, precess [#] key and then enter new command.
	f	To exit the test mode at any time : press [0 2]
2. RF power	a	Set the channel 383: press [0 9 0 3 8 3]
	b	Turn the carrier on and set the power level 2. : press [0 7 1 0 2]
	c	Measure the RF Power Output : +26dBm +2/-4 dBm Note 1 : In the case of using the antenna cable, must compensate for the cable loss. Note 2 : To prevent from damage the HHP, must measure by calibrated test equipment. Warning ! Adjustments without calibrated equipment can result in excessive heat and will void the warranty.
	d	power level control mode is [1 0 X] Adjust power level by using [SEND] or [END] key, and store : press [9 7]
	e	Then measure the power output for each level by pressing [OK] or [i Å] at every step.
	f	Then turn carrier off : press [0 8]
3. TX Frequency	a	Set the channel 383 : press [0 9 0 3 8 3]
	b	Turn the carrier on : press [0 7]
	c	Measure the tx frequency : 836.49MHz ; $\frac{3}{4}$ 2.5 ppm (; $\frac{3}{4}$ 2090Hz)
	d	Turn the carrier off : press [0 8]

TEST ITEM	STEP	PROCEDURE
4. Voice Deviation	a	Set the channel 383 : [0 9 3 8 3]
	b	Send the RF power, and set TX audio unmute : press [0 7 4 6 4 5 1 4]
	c	Turn the carrier on, and set the power level 2
	d	Set the audio generator output to 1KHz, 3.0 Vrms. Measure the TX voice deviation by using the HPF of 20Hz and LPF of 99KHz. (Spec : 2.9KHz $\pm$ 10%)
	e	To adjust the peak deviation, Press [6 3] and use the [SEND] or [END] key
	f	Store the peak deviation : press [OK]
	g	Set the audio generator output to 1KHz, 100Vrms
	h	To adjust the compressor off deviation : press [4 5], and use [SEND] or [END] key. (Spec : 2.9KHz $\pm$ 0.2KHz)
	i	Store the compressor on deviation : press [OK]
	j	To adjust the compressor off deviation : press [4 4], and use [SEND] or [END] key. (Spec : 2.9KHz $\pm$ 0.2KHz)
	k	Store the compressor on deviation : press [OK]
	l	Turn the carrier off, and TX mute : [0 8 1 3]
5. ST Deviation	a	Set the channel 383: press [0 9 0 3 8 3]
	b	Turn the carrier on and set the power level 2.
	c	Set ST : press [1 6]
	d	Measure the TX ST deviation by using the HPF of 20Hz and the LPF of 15KHz. (spec : 8KHz $\pm$ 10%)
	e	To adjust the deviation : press [0 6], and use [SEND] or [END] key.
	f	Store the deviation code in EEPROM : press [OK]
	g	Turn the ST and the carrier off : press [1 7 0 8]

TEST ITEM	STEP	PROCEDURE
6. SAT Deviation	a	Set the cahnnel 383 : [0 9 3 8 3]
	b	Turn the carrier on, and set the power level 2
	c	Set the Voice State and SAT on : press [4 6 3 2 1]
	d	Measure the TX SAT deviation by using the HPF of 20Hz and the BPF of 6KHz. (spec : 2KHz $\pm$ 10%)
	e	To adjust the deviation within specification : press [6 4], and use [SEND] or [END] key
	f	Store the deviation code in EEPROM : press [OK]
	g	Turn the SAT and the carrier off : press [3 3 0 8]
7. WBD Deviation	a	Set the channel and carrier on : [0 9 0 3 8 3 0 7]
	b	WBD on : [3 4]
	c	Measure the WBD deviation by using the HPF of 20Hz and the LPF of 99KHz. (spec : 8KHz $\pm$ 10%)
	d	To adjust the WBD deviation : press [6 5], and [SEND] or [END] key.
	e	Store the deviation code in EEPROM : press [OK]
	f	Turn the carrier off : press [0 8]
8. RX Audio	a	Set the equipment as below. RF frequency : 881.49MHz Input RF level : -80 dBm Modulation frequency : 1 KHz Frequency deviation : 8 KHz
	b	Set the channel 383 and the Voice State : press [0 9 0 3 8 3 4 6]
	c	Set the RX audio unmute : press [1 2]
	d	Set compandor on : press [4 4]
	e	Adjust the expandor on audio level : press [6 1] Use [SEND] or [END] key.
	f	Store the expandor on audio level : press [OK]
	g	Finish the test and exit test mode : press [0 2]

CDMA MODE

TEST ITEM	STEP	PROCEDURE
1. PREPARE	a b c d e f g h	Connect the test equipment Enter the test mode: press [* 7 5 9 # 8 1 3 5 8 0] If you press a wrong key, press [#] key and then enter new command. Press 01 to enter to the test menu Press 07 to turn the carrier on Press [0 9 X X X X #] to set the channel Press 34 to send continuous TX Control data To exit the test mode at any time : press [0 2]
2. FREQUENCY ACCURACY	a b c d e	To prepare, press [0 1 0 7 3 4 0 7] Set the power level & channel 363. : press [7 1 X X X # 0 9 0 3 6 3 #] Measure the frequency accuracy (spec: $\pm 300\text{Hz}$) To adjust the Frequency Accuracy : press [8 9] and use volume key Store the Frequency Accuracy in EEPROM: Press [OK/↵]
3. OCCUPIED CDMA BAND WIDTH	a b c	To prepare & set channel 363, press [0 1 0 9 0 3 6 3 #] Set the power level. : press [0 7 3 4 7 1 X X X #] Measure the Band Width. (spec: 1.32MHz)
4. LIMITATIONS ON EMISSIONS	a b c	To prepare & set the channel 363: press [0 1 0 9 0 3 6 3 #] Turn the carrier on and set the power level. : press [0 7 3 4 7 1 X X X #] Measure the spurious at $F_{ci} \pm 900\text{KHz}$, $F_{ci} \pm 1.98\text{MHz}$, $2F_c$, $3F_c$, $1/2F_c$ spec: $F_{ci} \pm 900\text{KHz}$ below 42dBc/30KHz $F_{ci} \pm 1.98\text{MHz}$ below 54dBc/30KHz Outside Receive Band $43+10\log(PY)$ PY: Mean output power in watts
5. GATED POWER & TIME	a b c d e	Set the Service option: 2 Set the Data Rate: Eighth (1200bps) Registering: HHP --> HP8924C Call : HP8924C --> HHP Measure the Gated Power & Time spec: Gated Power at least 20dB Gated Time - Rising Time: below 6us Falling Time: below 6us Burst Time: below 1.25ms

6. Description of Frequency Stabilization Circuit , Suppression of Spurious Radiation

Frequency Synthesizer Circuit

The Frequency synthesizer is an indirect frequency synthesizer PLL(Phase Locked Loop). It consists of a VCTCXO(U303), PLL IC(U302), VCO(OSC300), and loop filter.

VCTCXO

The VCTCXO is a reference source of the frequency synthesizer. It provides 19.68MHz reference frequency to PLL. The VCTCXO is a Voltage Controlled Temperature Compensated Crystal Oscillator having 19.68MHz ± 2.5 ppm frequency stability over all useful temperature range. A correct frequency tuning is made by the control voltage.

VCO

The VCO(OSC300) generates the signal having 966 ± 12.5 MHz center frequency with the voltage control. PLL IC controls this signal.

PLL IC

The PLL IC(U302) includes prescalers and charge pump. The reference divider in PLL IC divides the frequency of VCTCXO by 19.68MHz and makes reference frequency 10KHz. This reference frequency is supplied to one of the input of phase detector. The signal generated at VCO goes into another input stage of the phase detector through a prescaler and the main divider. At this point, the error proportional to the phase difference of two inputs is occurred. This error signal is supplied to the frequency control input stage of VCO through the loop filter consisted RC.

Spurious Radiation Suppression Circuit

The spurious signal from antenna is suppressed at the duplexer. The duplexer has a flat characteristics to the receive signal and a high attenuation characteristics to the harmonic signal of transmission. So it suppress the spurious radiation

Table: The characteristic of duplexer filter(F401)

Parameter	Value
T X	
Center Frequency	836.5 MHz (FT)
Bandwidth	FT ₁ 12.5 MHz
Insertion Loss at BW	+25 _{dB} 2.4dB Max -30 _{dB} ~ +85 _{dB} 2.6dB Max
VSWR at BW	1.57 Max
Input power	3W Max
Attenuation	869 ~ 894MHz 45.3dB Typ 42.0dB Min
Ripple at BW	1.6dB Max
R X	
Center Frequency	881.5 MHz (FR)
Bandwidth	FR ₁ 12.5 MHz
Insertion Loss at BW	3.dB Max
VSWR at BW	1.4 Max
Input power	3W Max
Attenuation	824 ~ 849MHz 60dB Typ 58dB Min
Ripple at BW	2dB Max