

# Service Manual

## GD30/GD50 Personal Cellular Telephone

Handheld Portable

**EB-GD30****EB-GD50**

## Specification



|                                            | 900 MHz                                                                                                                     | 1800 MHz                                   |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Frequency range                            | Tx: 890 - 915 MHz<br>Rx: 935 - 960 MHz                                                                                      | Tx: 1710 - 1785 MHz<br>Rx: 1805 - 1880 MHz |
| Tx/Rx frequency separation                 | 45 MHz                                                                                                                      | 95 MHz                                     |
| RF channel bandwidth                       | 200 kHz                                                                                                                     |                                            |
| Number of RF channels                      | 124                                                                                                                         | 374                                        |
| Speech coding                              | Full rate/Half rate/Enhanced Full rate                                                                                      | Full rate/Half rate                        |
| Operating temperature                      | -10°C to +55°C                                                                                                              |                                            |
| Type                                       | Class 4 Handheld                                                                                                            | Class 1 Handheld                           |
| RF Output Power                            | 2 W maximum                                                                                                                 | 1 W maximum                                |
| Modulation                                 | GMSK (BT = 0.3)                                                                                                             |                                            |
| Connection                                 | 8 ch/TDMA                                                                                                                   |                                            |
| Voice digitizing                           | 13 kbps RPE-LTP / 13 kps ACLEP / 5.6 kps CELP / VSLEP                                                                       |                                            |
| Transmission speed                         | 270.3 kbps                                                                                                                  |                                            |
| Diversity                                  | Frequency hopping                                                                                                           |                                            |
| Signal Reception                           | Double superheterodyne                                                                                                      |                                            |
| Intermediate Frequencies                   | 282 MHz and 45 MHz                                                                                                          |                                            |
| Antenna Terminal Impedance                 | 50 Ω                                                                                                                        |                                            |
| Antenna VSWR                               | <2.1 : 1                                                                                                                    |                                            |
| Dimensions                                 | Height: 135 mm<br>Width: 45 mm<br>Depth: 20.5 mm (30 mm with EB-BLD30 Battery)                                              |                                            |
| Volume                                     | 123 cc (150 cc with EB-BLD30 Battery)                                                                                       |                                            |
| Weight                                     | GD30: 130 g (170 g with EB-BLD30 Battery)<br>GD50: 115 g (170 g with EB-BLD30 Battery)                                      |                                            |
| Display                                    | Graphical chip on glass liquid crystal, Alphanumeric, 16 x 3 characters, 5 icons and 6 x 1 characters                       |                                            |
| Illumination                               | 4 LEDs for the LCD (Green)<br>8 LEDs for the keypad (Green)<br>1 LED Incoming call (Green)<br>1 Charging LED (Red)          |                                            |
| Keypad                                     | 17 keys, Navigation key                                                                                                     |                                            |
| SIM                                        | Plug-in type only                                                                                                           |                                            |
| External DC Supply Voltage                 | 3.6 V                                                                                                                       |                                            |
| Battery                                    | EB-BSD30: 3.6 V nominal, 670mAh, Ni-MH<br>EB-BSD50: 3.6 V nominal, 670mAh, Li-Ion<br>EB-BLD30: 3.6V nominal, 1340mAh, Ni-MH |                                            |
| Standby Battery Life<br>DRX 9              | EB-BSD30/EB-BSD50: 95 hrs maximum<br>EB-BLD30: 190 hrs maximum                                                              |                                            |
| Conversation Battery Life<br>PL 7, DTX 50% | EB-BSD30/EB-BSD50: 180 minutes<br>EB-BLD30: 360 minutes                                                                     |                                            |

Battery life figures are dependent on network conditions.

### WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service manual by anyone else could result in serious injury or death.

# Panasonic

## GSM

Issue 1  
Revision 0

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# WARNINGS AND CAUTIONS

## WARNING

The equipment described in this manual contains polarized capacitors utilising liquid electrolyte. These devices are entirely safe provided that neither a short-circuit nor a reverse polarity connection is made across the capacitor terminals. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN DAMAGE TO THE EQUIPMENT OR, AT WORST, POSSIBLE INJURY TO PERSONNEL RESULTING FROM ELECTRIC SHOCK OR THE AFFECTED CAPACITOR EXPLODING. EXTREME CARE MUST BE EXERCISED AT ALL TIMES WHEN HANDLING THESE DEVICES.

## Caution

The equipment described in this manual contains electrostatic sensitive devices (ESDs). Damage can occur to these devices if the appropriate handling procedure is not adhered to.

### *ESD Handling precautions*

A working area where ESDs may be safely handled without undue risk of damage from electrostatic discharge, must be available. The area must be equipped as follows:

**Working Surfaces** - All working surfaces must have a dissipative bench mat, SAFE for use with live equipment, connected via a 1M $\Omega$  resistor (usually built into the lead) to a common ground point.

**Wrist Strap** - A quick release skin contact device with a flexible cord, which has a built in safety resistor of approximately 1M $\Omega$  shall be used. The flexible cord must be attached to a dissipative earth point.

**Containers** - All containers and storage must be of the conductive type.

### *Batteries*

This equipment may contain an internal battery in addition to the external battery packs. These batteries are recyclable and should be disposed of in accordance with local legislation. They must not be incinerated, or disposed of as ordinary rubbish.

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# 1 INTRODUCTION

## 1.1 Purpose of this Manual

This Service Manual contains the information and procedures required for installing, operating and servicing the Panasonic GSM Personal Cellular Mobile Telephone system operating on the GSM Digital Cellular Network.

## 1.2 Structure of the Manual

The manual is structured to provide service engineering personnel with the following information and procedures:

1. General and technical information - provides a basic understanding of the equipment, kits and options, together with detailed information for each of the major component parts.
2. Installation and operating information - provides instructions for unpacking, installing and operating the equipment.
3. Servicing information - provides complete instructions for the testing, disassembly, repair and reassembly of each major component part. Step-by-step troubleshooting information is given to enable the isolation and identification of a malfunction, and thus determine what corrective action should be taken. The test information enables verification of the integrity of the equipment after any remedial action has been carried out.
4. Illustrated parts list - provided to enable the identification of all equipment components, for the ordering of spare/ replacement parts.

## 1.3 Servicing Responsibilities

The procedures described in this manual must be performed by qualified service engineering personnel, at an authorised service centre.

The service engineering personnel are responsible for fault diagnosis and repair of all equipment described in this manual.

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## 2 GENERAL DESCRIPTION

### 2.1 General

This section provides a general description and kit composition details for the GSM Handportable Telephone system and optional kits.

Panasonic Model Numbers GD30 and GD50 are high performance, small, light, business GSM telephones. The following features are included as standard:

1. Triple Rate which includes Full Rate, Half Rate and Enhanced Full Rate (EFR) speech, codec.
2. Dual Band, GSM 900 and GSM 1800 operation.

In addition, GD50 has a Desktop Handsfree function comprising integral echo cancellation and noise suppression.

### 2.2 Handportable Main Kit

The handportable main kit provides a standalone Class 4 GSM telephone. The plug-in SIM contains the subscriber and network information necessary to operate the phone on a GSM network.

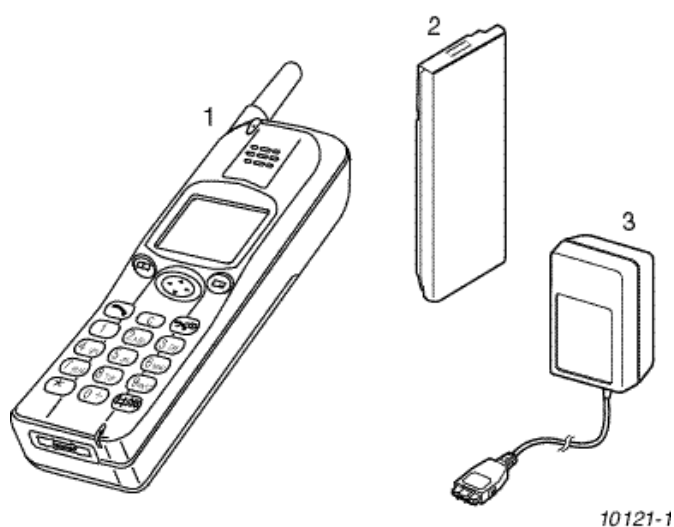


Figure 2.1: Handportable Main Unit Kit Contents

#### 2.2.1 GD30 Contents

| NUMBER | DESCRIPTION                                | PART NUMBER          |
|--------|--------------------------------------------|----------------------|
| 1      | Main unit GD30                             | EB-GD30              |
| 2      | Battery, Standard<br>or:<br>Battery, Large | EB-BSD30<br>EB-BLD30 |
| 3      | AC Adaptor                                 | EB-CAD70             |
| —      | Documentation                              | See Section 9        |

#### 2.2.2 GD50 Contents

| NUMBER | DESCRIPTION                                | PART NUMBER          |
|--------|--------------------------------------------|----------------------|
| 1      | Main unit GD50                             | EB-GD50              |
| 2      | Battery, Standard<br>or:<br>Battery, Large | EB-BSD50<br>EB-BLD30 |
| 3      | AC Adaptor                                 | EB-CAD70             |
| —      | Documentation                              | See Section 9        |

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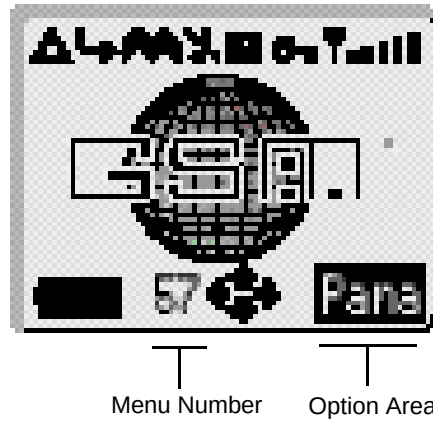
## 3 OPERATING INSTRUCTIONS

### 3.1 General

This section provides a brief guide to the operation and facilities available on the GD30 and GD50 mobile telephones. Refer to the Operating Instructions supplied with the telephones for full operational information.

### 3.2 LCD Display

The handportable unit has a graphical chip on glass liquid crystal display in conjunction with the following icons:



**Figure 3.1: LCD display**

|             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| T           | Indicates received signal strength: T strong signal area; \ weak signal area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| S           | Indicates that it is possible to make an emergency call.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Menu Number | The number of the feature pointed to by the pointer. To access a feature enter the menu number on the keypad.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| H           | Displays the battery charge level: H Battery is at full charge; K Battery requires recharging;<br>G The battery icon flashes during charging. During car mount use, when the battery is fully charged, the battery icon will not light.                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Menu Icon   | Displays a small icon related to the current status of the telephone:<br>Y telephone is roaming on a non-home network;<br>t using the "Call Divert" feature or the telephone has Call Divert set;<br>] shows that the vibration alert is switched on;<br>[ shows that telephone is in silent mode - no tones;<br>N indicates there are unread Short Text Messages (SMS). Lit when SMS area is full;<br>O the telephone is locked;<br>U shows that normal character have been entered in Alpha Entry;<br>V shows that Greek character have been entered in Alpha Entry;<br>W shows that extended character have been entered in Alpha Entry;<br>X shows that numbers have been entered in Alpha Entry. |
| p           | Indicates that the navigation key ( g ) can be pressed. Each arrow will light individually to indicate which direction is valid.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Option Area | Pressing the select key ( B ) will select the option displayed in the option area of the display.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

Following some operations the display will automatically clear after three seconds or after pressing any key except E .

### 3.3 Location of Controls

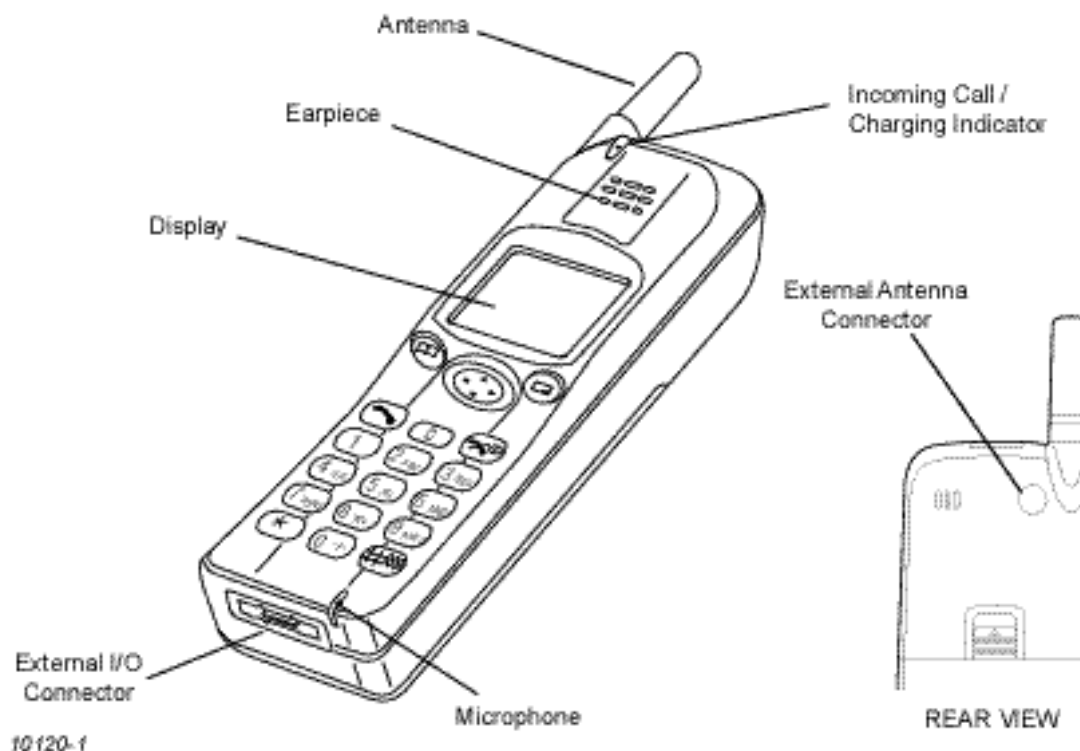
Incoming/Charge indicator:

Green – incoming call.

Red – charging battery pack.

External connector:

Used to connect to external accessories or charging equipment.

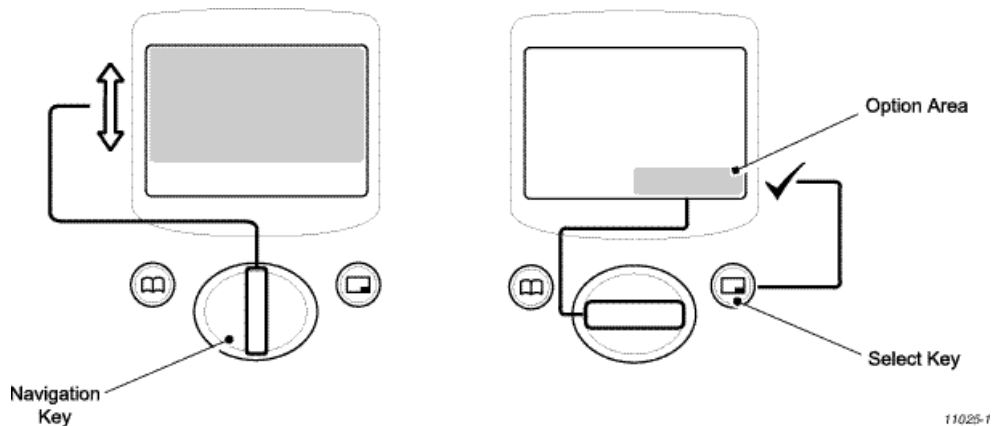


**Figure 3.2: Location of controls for GD30/GD50**

|        |                                                                                                                                                                                                               |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| g      | Navigation Key. Scrolls through options or features menu and increases or decreases volume.                                                                                                                   |
| B      | Select Key. Selects option shown in the Option Area of the display.                                                                                                                                           |
| A      | Phonebook Key. Browses through the Phonebook or stores a number in the Phonebook. Changes the type of characters entered during Alpha Entry.                                                                  |
| D      | Send Key. Makes a call.                                                                                                                                                                                       |
| C      | Clear Key. Clears the last digit entered, clears all digits when pressed and held or returns to the previous display.                                                                                         |
| E      | End Key. Ends a call or switches the telephone on/off when pressed and held.                                                                                                                                  |
| 0 to 9 | Digit keys. Enter wild numbers or pauses when pressed and held. Where appropriate the 0 key scrolls up or down through abbreviated control names and then select to reveal the international access code "+". |
| #      | Vibrator enable/disable Key. Press and hold to enable or disable the vibrator.                                                                                                                                |

### 3.4 Concept of Operation

There is a close relationship between the Select Key, Navigation Key and display.



**Figure 3.3: Concept of Operation**

Pressing up and down ( e ) will move the pointer up and down and scroll through more information in the main area of the display.

Pressing left and right ( f ) will scroll through options in the option area of the display. To choose the option press the Select Key ( B ).

### 3.5 Alpha Entry

Alpha Entry is used to enter alphanumeric characters into Phonebook, Short Messages and the Greeting Message.

| Key | Character/Operation                                                                                                                                     |       |                         |   |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------------------|---|
|     | U                                                                                                                                                       | V     | W                       | X |
| 1   | " @ - , . ; ! : ' ? < ( ) ' & % + - / < > = £ \$ ¥ ¢ §                                                                                                  |       |                         | 1 |
| 2   | A B C a b c                                                                                                                                             | Δ E Z | Ä Å Æ B C Ç a à b c     | 2 |
| 3   | D E F d e f                                                                                                                                             | H Θ I | D E É F d e è é f       | 3 |
| 4   | G H I g h i                                                                                                                                             | K Λ M | G H I g h i ì           | 4 |
| 5   | J K L j k l                                                                                                                                             | N Ξ O | J K L j k l             | 5 |
| 6   | M N O m n o                                                                                                                                             | Π P Σ | M N Ñ O Ö ø m n ñ o ö ø | 6 |
| 7   | P Q R S p q r s                                                                                                                                         | T Υ Φ | P Q R S p q r s ß       | 7 |
| 8   | T U V t u v                                                                                                                                             | Ξ Ψ Ω | T U Ü V t u ü v         | 8 |
| 9   | W X Y Z w x y z                                                                                                                                         |       | W X Y Z w x y z         | 9 |
| C   | Deletes the character above the cursor, deletes the character to the left when at the end of the line or clears the entire entry when pressed and held. |       |                         |   |

Each time a key is pressed it will display the next character. When another key is pressed or no key is pressed for a short time the cursor will move to the next position.

To cycle between Greek characters ( v ), extended characters ( w ), numerals ( x ) and normal characters ( u ) press A .

#### 3.5.1 Editing Alpha Entry

Pressing e will move the cursor up or down one line. Pressing f will move the cursor left or right one character. When the cursor is moved over a character and another key pressed this will insert the new character.

Pressing C will delete the character to the left of the cursor.

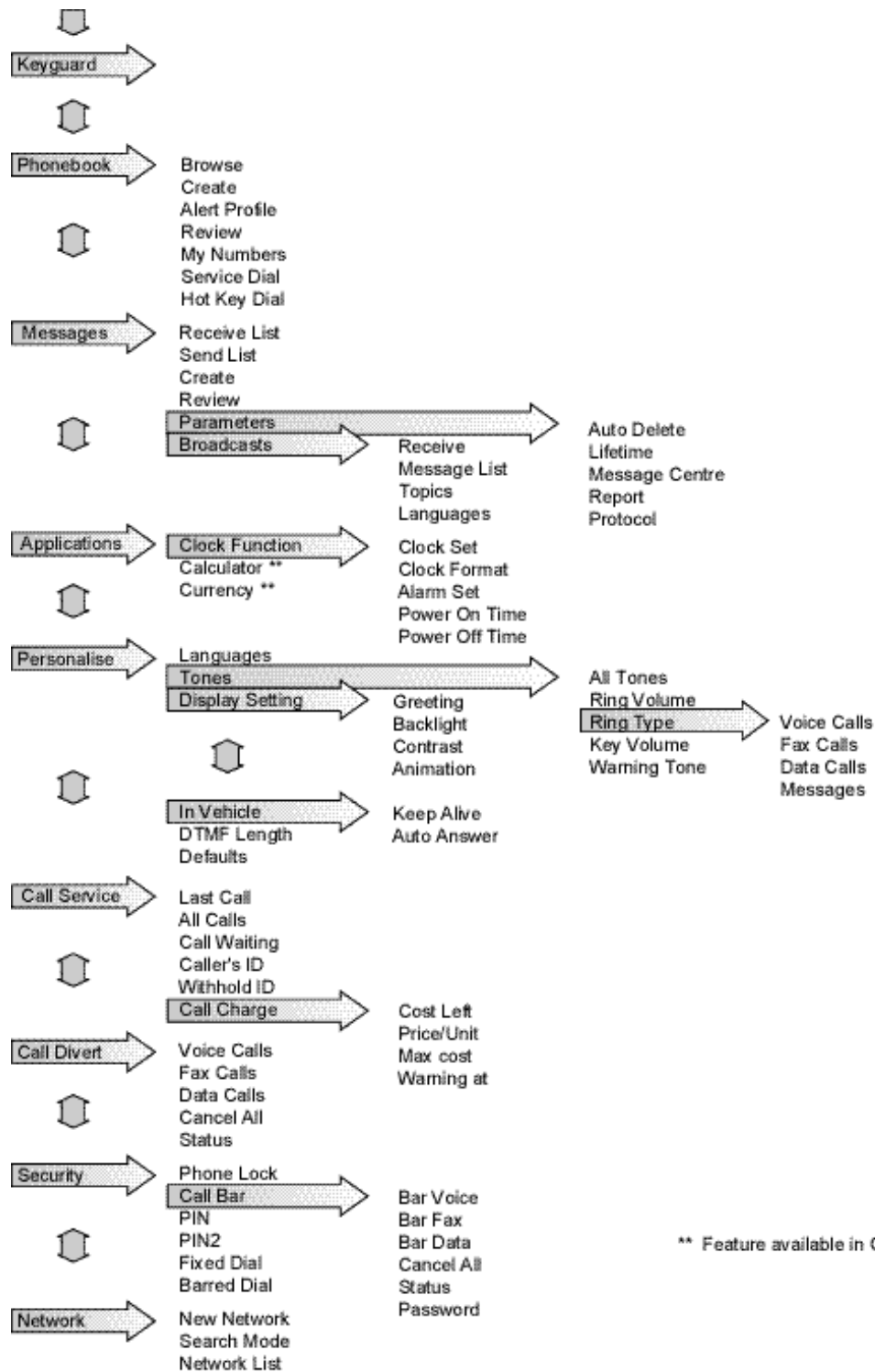
### 3.6 Incoming Calling Line Identification (CLI)

When a call is received the last 6 digits of the CLI information is matched with the phonebook. Therefore an incoming call could match to the wrong phonebook entry.

### 3.7 Hot Key Dial Source List

The source for Hot Key Dial Numbers is normally 'Phonebook' or 'Service Dial Numbers'. For some OEMs it may be a requirement to store these numbers in the EEPROM. When the source is the EEPROM and the telephone software is updated, the source numbers may be lost. Also, if the user changes the source of the Hot Key Dial numbers, it will not be possible to redirect the source back to the EEPROM. However, in the event that an OEM would like the Hot Key Dial source to be stored in the EEPROM, it is unlikely that the user will have the option to change the Hot Key Dial source.

### 3.8 Features Menu Structure



10124-1

Figure 3.4: Features Menu Structure

### 3.9 Public Man Machine Interface (MMI)

It is possible to operate all GSM telephones in the same way using the Public MMI. The following operations will work with all GSM telephones. However, this information is restricted to those operations that are supported by GD30 and GD50 telephones.

The \* and # in the following procedures should be replaced by \* and # , respectively. Also <SND> and <END> should be replaced with D and E keys.

### 3.9.1 Reading Phonebook Memory Location

# &lt;MEMORY LOCATION&gt;

Leading zeros can be left out of the location number, e.g. 007 can be 7.

### 3.9.2 Presentation of IMEI

\* # 0 6 #

### 3.9.3 Security

**Change PIN**                    \* \* 0 4 \* <OLD PIN> \* <NEW PIN> \* <NEW PIN> #

**Change PIN2**      \* \* 0 4 2 \* <OLD PIN2> \* <NEW PIN2> \* <NEW PIN2> #

**Unblock PIN**      \* \* 0 5 \* <PIN UNBLOCKING KEY> \* <NEW PIN> \* <NEW PIN> #

**Unblock PIN2**      \* \* 0 5 2 \* <PIN2 UNBLOCKING KEY> \* <NEW PIN2> \* <NEW PIN2> #

### 3.9.4 Call Hold

**Place a call on hold** 2 <SND>

**Recall a held call** 2 <SND>

**Make a second call**                      <TELEPHONE NUMBER> <SND>

**Swap between two held calls**      2 <SND>

**End held call** O <SND>

**End active call** 1 <SND>

Reject incoming call 0 &lt;SND&gt;

### 3.9.5 Call Waiting

**Enable Call Waiting** \* 4 3 \* # <SND>

**Disable Call Waiting** # 4 3 \* # <SND>

**Call Waiting Status** \* # 4 3 \* # <SND>

### 3.9.6 Calling Line Identification

| Calling Line Identification Feature             | Service Code |
|-------------------------------------------------|--------------|
| Calling Line Identification Presentation (CLIP) | 30           |
| Calling Line Identification Restriction (CLIR)  | 31           |
| Connected Line Presentation (CLOP)              | 76           |
| Connected Line Restriction (CLOR)               | 77           |

|                                          |                                  |
|------------------------------------------|----------------------------------|
| <b>Enable</b>                            | * <SERVICE CODE> * # <SND>       |
| <b>Disable</b>                           | # <SERVICE CODE> * # <SND>       |
| <b>Temporary suppress identification</b> | # 3 1 # <TELEPHONE NUMBER> <SND> |
| <b>Temporary display identification</b>  | * 3 1 # <TELEPHONE NUMBER> <SND> |

### 3.9.7 Telecommunication Services Used for Public MMI

#### Teleservice

| Service                      | MMI Service Code |
|------------------------------|------------------|
| All teleservices             | 10               |
| Telephony                    | 11               |
| All data teleservices        | 12               |
| Facsimile services           | 13               |
| Short Message Services (SMS) | 16               |
| All teleservices except SMS  | 19               |
| Voice group services         | 17               |

#### Bearer Service

| Service                        | MMI Service Code |
|--------------------------------|------------------|
| All bearer services            | 20               |
| All asynchronous services      | 21               |
| All synchronous services       | 22               |
| All data synchronous services  | 24               |
| All data asynchronous services | 25               |
| All dedicated packet access    | 26               |
| All dedicated PAD access       | 27               |

### 3.9.8 Call Divert

| Call Divert Type         | Service Code |
|--------------------------|--------------|
| Divert all calls         | 21           |
| Divert calls if busy     | 67           |
| Divert calls if no reply | 61           |
| Divert if not reachable  | 62           |

#### Set (except “No Reply” Call Bar

\*\* <SERVICE CODE> \* <FORWARD TELEPHONE NUMBER> \* <TELECOMMUNICATION SERVICE> # <SND>

#### Set “No Reply” Call Bar

\*\* <SERVICE CODE> \* <FORWARD TELEPHONE NUMBER> \* <TELECOMMUNICATION SERVICE> \*  
<TIME TO RING (seconds) # <SND>

#### Clear

## <SERVICE CODE> \* <TELECOMMUNICATION SERVICE> \* # <SND>



**Status**

\* # &lt;SERVICE CODE&gt; \* &lt;TELECOMMUNICATION SERVICE&gt; \* # &lt;SND&gt;

**Clear all Call Diverts**

# # 0 0 2 #

**3.9.9 Call Bar**

| Call Bar Type                                                 | Service Code |
|---------------------------------------------------------------|--------------|
| All outgoing calls                                            | 33           |
| Outgoing international calls                                  | 331          |
| Outgoing international calls except those to the PLMN country | 332          |
| All incoming calls                                            | 35           |
| Incoming international calls when roaming                     | 351          |

**Set** \* <PASSWORD> \* <TELECOMMUNICATION SERVICE> # <SND>**Clear** # <PASSWORD> \* <TELECOMMUNICATION SERVICE> # <SND>**Status** \* # <TELECOMMUNICATION SERVICE> # <SND>**Clear all Call Bar Types** # 3 3 0 \* <PASSWORD> # <SND>**Change Call Bar Password** \*\* 0 3 \*\* <OLD PASSWORD> \* <NEW PASSWORD> \* <NEW PASSWORD> # <SND>

## 3.10 Troubleshooting

The user is given the following information and advised to contact the dealer if the problems persist:

| Problem                                                    | Cause                                                                                                                                                 | Remedy                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Telephone will not switch on                               |                                                                                                                                                       | Check that the battery pack is fully charged and correctly connected to the telephone.                                                                                                                                                                                                                                                                            |
| Extremely short battery life for a new battery pack        | The network in use and the condition of the battery pack can affect battery life.                                                                     | Avoid areas of poor reception. Ensure batteries are fully charged. Additionally, for NiMH batteries, ensure batteries are also discharged fully before recharging.                                                                                                                                                                                                |
| Short battery life for an old battery pack                 | The battery pack was worn out.                                                                                                                        | Replace with a new one.                                                                                                                                                                                                                                                                                                                                           |
| Short battery life for Ni-MH battery pack                  | The life of the battery pack is affected by improper charging, this is inherent in all Ni-MH batteries.                                               | To maintain maximum performance, always use until the Low Battery Warning appears and then fully recharge the battery pack. To revive a Battery Pack, use the telephone until the Low Battery Warning appears and then fully recharge three times. However, if the battery life still is short, the battery pack has eventually worn out. Replace with a new one. |
| The battery level indicator H does not light when charging | If a battery is deeply discharged it will take a short time before there is sufficient power in the telephone to light the battery level indicator H. | Leave to charge for several minutes in temperatures between +5°C and +35°C.                                                                                                                                                                                                                                                                                       |
| Calls cannot be made                                       | The telephone is locked.                                                                                                                              | Unlock the telephone (Menu: Security: Phone Lock).                                                                                                                                                                                                                                                                                                                |
|                                                            | Outgoing calls are barred.                                                                                                                            | Disable the outgoing call barring (Menu: Security: Call Bar).                                                                                                                                                                                                                                                                                                     |
|                                                            | The telephone is not registered to a network.                                                                                                         | Move to a coverage area and operate the telephone after it has registered with a network.                                                                                                                                                                                                                                                                         |
| Calls cannot be made from Fixed Dial Store                 |                                                                                                                                                       | Check that SIM supports Fixed Dial. Check if the Fixed Dial is switched on (Menu: Security: Fixed Dial). Check the telephone number is stored in the Fixed Dial.                                                                                                                                                                                                  |
| Calls cannot be received                                   | The telephone is not switched on.                                                                                                                     | Switch the telephone on.                                                                                                                                                                                                                                                                                                                                          |
|                                                            | Incoming calls are barred.                                                                                                                            | Disable the incoming call barring (Menu: Security: Call Bar).                                                                                                                                                                                                                                                                                                     |
|                                                            | The telephone is not registered to a network.                                                                                                         | Move to a coverage area and operate the telephone after it has registered with a network.                                                                                                                                                                                                                                                                         |
| Emergency calls cannot be made                             | User's phone is not in a GSM coverage area.                                                                                                           | Check that the antenna symbol S is displayed. Move to a coverage area and operate the telephone when the antenna symbol is displayed.                                                                                                                                                                                                                             |
| Telephone numbers cannot be recalled                       | The telephone is locked.                                                                                                                              | Unlock the telephone (Menu: Security: Phone Lock).                                                                                                                                                                                                                                                                                                                |
|                                                            | Fixed Dial is switched on.                                                                                                                            | Switch off Fixed Dial (Menu: Security: Fixed Dial).                                                                                                                                                                                                                                                                                                               |

## 3.11 Important Error Messages

The following table is a list of error messages that may occur during use of the telephone, with a description and suggested course of action:

| Area not Allowed             | Roaming in the selected area is not allowed.                                                                                                                                                                   |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Network not Allowed          | Roaming with the selected network is not allowed.                                                                                                                                                              |
| Security Failure             | The network has detected authentication failure because the SIM is not registered with that network. Contact the Service Provider.                                                                             |
| SIM Blocked                  | The SIM is blocked because the wrong PUK has been entered ten times. Contact the Service Provider.                                                                                                             |
| SIM Error                    | The telephone has detected a problem with the SIM. Switch the telephone off and then back on. If the message does not disappear, contact the Service Provider.                                                 |
| Message Rejected Store Full  | A message has been received but the message store is full. To receive messages, delete some of the currently stored messages or set messages to automatically clear (Menu: Messages: Parameters: Auto Delete). |
| PIN2 Invalidated             | The PIN2 is blocked permanently because the wrong PUK2 has been entered 10 times. Services controlled by PIN2 cannot be used. Contact the Service Provider.                                                    |
| Warning Store Full Continue? | The message area is full. New messages cannot be stored until some of the currently stored messages are deleted.                                                                                               |
| Auto Redial List Full        | Redial list of unsuccessfully dialled numbers is full. Switch the telephone off and then on again.                                                                                                             |

## 3.12 Security Codes

| Code Type                               | Number of Digits | Description                                                                                                                                                                                                                                                                          |
|-----------------------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Personal Identification Number (PIN)    | 4 to 8           | Controls SIM security. Supplied by the service provider.                                                                                                                                                                                                                             |
| PIN 2                                   | 4 to 8           | Controls memory security. Supplied by the service provider.                                                                                                                                                                                                                          |
| PIN/PIN 2 Unblocking Key<br>(PUK/PUK 2) | 8                | Used to unblock PIN and PIN 2. A PIN or PIN 2 will become blocked if the wrong PIN or PIN 2 is entered three times. When the blocked PIN or PIN 2 is unblocked, a new PIN or PIN 2 must be entered. If the wrong PUK or PUK 2 is entered 10 times, the cursorr SIM will be unusable. |
| Supplied by the service provider.       |                  |                                                                                                                                                                                                                                                                                      |
| Password                                | 4                | Controls the call bar function. If the wrong password is entered three times, this service will be revoked. Supplied by the service provider.                                                                                                                                        |
| Lock Code                               | 4                | Controls telephone security.                                                                                                                                                                                                                                                         |
| Factory set to "0000".                  |                  |                                                                                                                                                                                                                                                                                      |

## 3.13 SIM Personalisation

### 3.13.1 Introduction

SIM personalisation will limit the use of the telephone to a single SIM, a SIM supplied by one Network/Sub-network/Service Provider or a SIM purchased by a company (corporation). If a personalised GD30/GD50 contains a SIM that is from a different source it will display the message "SIM ERROR" when switched on. This personalisation of GD30/GD50 is sometimes referred to as SIM lock or SIM latch.

### 3.13.2 Testing

To test a personalised GD30/GD50, when the user has not supplied the SIM, a SIM configured for test purposes (e.g. test SIM or soft SIM) should be used. The mobile will recognise that the SIM is for testing purposes only and operate as normal.

### 3.13.3 Personalisation Function

Personalisation is activated during manufacture and then enabled at a later stage. Enabling/disabling is available by entering a special key sequence immediately after power on. Once the enable/disable menu is shown it is possible to select the type of personalisation. When personalisation is enabled it is only possible to disable it if the mobile contains an illegal SIM and the sixteen digit Control Key (CK) is known. When enabled the CK is withheld from the user and cannot be read, for security reasons.

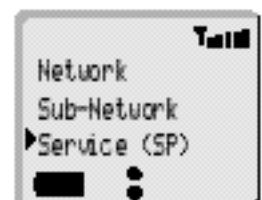
There are two special key sequences to enter the enable/disable menu:

| Key sequence  | Notes                                        |
|---------------|----------------------------------------------|
| 7 4 6 B B     | Can only disable personalisation.            |
| 5 2 8 2 4 B B | Can both enable and disable personalisation. |

### 3.13.4 Disabling Procedure

1. F 7 4 6 B B or 5 2 8 2 4 B B.
2. F e to point at:  
 "SIM" for SIM Personalisation  
 "Network" for Network Personalisation  
 "Subnetwork" for Subnetwork Personalisation  
 "SP" for Service Provider Personalisation or  
 "Corporate" for Company Personalisation.
3. F B.
4. F the 16 digit Control Key.
5. F B.
6. F the 16 digit Control Key.
7. F B.

The display will confirm which type of Personalisation has been disabled.



### 3.13.5 Enabling Procedure

1. 5 2 8 2 4 B B.
2. F e to point at  
 "SIM" for SIM Personalisation  
 "Network" for Network Personalisation  
 "Subnetwork" for Subnetwork Personalisation  
 "SP" for Service Provider Personalisation or  
 "Corporate" for Company Personalisation.
3. F B.
4. F the 16 digit Control Key.
5. F B.
6. F the 16 digit Control Key.
7. F B.



The display will confirm which type of Personalisation has been enabled.

### 3.14 GSM Services Supported by PC Card

| Bearer Service Number | Bearer Service Rate           | Access Structure | Access Rate | Information Transfer | Error Correction Options |
|-----------------------|-------------------------------|------------------|-------------|----------------------|--------------------------|
| 21                    | Asynchronous 300 bps          | Asynch           | 300 bps     | UDI or modem         | T or NT                  |
| 22                    | Asynchronous 1.2 kbps         | Asynch           | 1.2 kbps    | UDI or modem         | T or NT                  |
| 23                    | Asynchronous 1200/75 bps      | Asynch           | 1200/75 bps | UDI or modem         | T or NT                  |
| 24                    | Asynchronous 2.4 kbps         | Asynch           | 2.4 kbps    | UDI or modem         | T or NT                  |
| 25                    | Asynchronous 4.8 kbps         | Asynch           | 4.8 kbps    | UDI or modem         | T or NT                  |
| 26                    | Asynchronous 9.6 kbps         | Asynch           | 9.6 kbps    | UDI or modem         | T or NT                  |
| 41                    | Dedicated PAD Access 300 bps  | Asynch           | 300 bps     | UDI                  | T or NT                  |
| 42                    | Dedicated PAD Access 1.2 kbps | Asynch           | 1.2 kbps    | UDI                  | T or NT                  |
| 44                    | Dedicated PAD Access 2.4 kbps | Asynch           | 2.4 kbps    | UDI                  | T or NT                  |
| 45                    | Dedicated PAD Access 4.8 kbps | Asynch           | 4.8 kbps    | UDI                  | T or NT                  |
| 46                    | Dedicated PAD Access 9.6 kbps | Asynch           | 9.6 kbps    | UDI                  | T or NT                  |

### 3.15 GSM Network Codes and Names

| Country              | Access Code | Network Operator              | Network Code |    |
|----------------------|-------------|-------------------------------|--------------|----|
| Albania              | +355        | AMC                           | 276          | 01 |
| Andorra              | +376        | STA -Mobiland                 | 213          | 03 |
| Armenia              | +374        | Armentel                      | 283          | 01 |
| Australia            | +61         | TELECOM Australia             | 505          | 01 |
|                      |             | OPTUS Communications Pty Ltd. | 505          | 02 |
|                      |             | Vodafone PTY                  | 505          | 03 |
| Austria              | +43         | Mobilkom Austria              | 232          | 01 |
|                      |             | max.mobil                     | 232          | 03 |
| Azerbaijan           | +994        | Azercell                      | 400          | 01 |
| Bahrain              | +973        | Batelco                       | 426          | 01 |
| Bangladesh           | +880        | Grameen Phone Ltd             | 470          | 01 |
| Belgium              | +32         | Belgacom Mobile               | 206          | 01 |
|                      |             | Mobistar                      | 206          | 10 |
| Bosnia & Herzegovina | +387        | Cronet                        | 218          | 01 |
|                      | +068        | PTT Bosnia                    | 218          | 19 |
| Bulgaria             | +359        | Citron                        | 284          | 01 |
| Brunei Darussalam    | +673        | DSTCom                        | 528          | 11 |
|                      |             | Jabatan Telekom               | 528          | 01 |
| Cambodia             | +855        | CamGSM                        | 456          | 01 |
| Cameroon             | +237        | PTT Cameroon Cellnet          | 624          | 01 |

| Country            | Access Code | Network Operator                             | Network Code |    |
|--------------------|-------------|----------------------------------------------|--------------|----|
| China              | +86         | Guangdong MCC                                | 460          | 00 |
|                    |             | China United Telecommuni-cations Corporation | 460          | 01 |
|                    |             | Liaoning PPTA                                | 460          | 02 |
| Croatia            | +385        | HR Cronet                                    | 219          | 01 |
| Cyprus             | +357        | Cyprus Telecommunication Authority           | 280          | 01 |
| Czech Republic     | +42         | Eurotel Praha                                | 230          | 02 |
|                    |             | Radio Mobil                                  | 230          | 01 |
| Germany            | +49         | DeTeMobil GmbH                               | 262          | 01 |
|                    |             | Mannesmann Mobilfunk                         | 262          | 02 |
| Denmark            | +45         | TELE Danmark Mobile                          | 238          | 01 |
|                    |             | Sonofon                                      | 238          | 02 |
|                    |             | Telia                                        | 238          | 20 |
|                    |             | Mobilix                                      | 238          | 30 |
| Egypt              | +20         | Arento                                       | 602          | 01 |
| Estonia            | +372        | Eesti Mobiiltelefon                          | 248          | 01 |
|                    |             | Radiolinja Eesti AS                          | 248          | 02 |
|                    |             | Q GSM                                        | 248          | 03 |
| Ethiopia           | +251        | ETA                                          | 636          | 01 |
| Fiji               | +679        | Vodafone                                     | 542          | 01 |
| Finland            | +358        | Sonera                                       | 244          | 91 |
|                    |             | Finnet                                       | 244          | 09 |
|                    |             | OY Radiolinja AB                             | 244          | 05 |
|                    |             | Telia                                        | 244          | 03 |
|                    |             | Alands Mobiltelefon                          | 244          | 05 |
| France             | +33         | France Telecom                               | 208          | 01 |
|                    |             | SFR                                          | 208          | 10 |
|                    |             | Bouygues Telekom                             | 208          | 20 |
| French Polynesia   | +689        | Tikiphone                                    | 547          | 20 |
| French West Indies | +590        | Ameris                                       | 340          | 01 |
| Georgia            | +995        | Geocell                                      | 282          | 01 |
|                    |             | Magticom                                     | 282          | 02 |
| Germany            | +49         | D1, T-Mobil                                  | 262          | 01 |
|                    |             | D2, Mannesmann                               | 262          | 02 |
|                    |             | E-Plus Mobilfunk                             | 262          | 03 |
| Ghana              | +233        | ScanCom                                      | 620          | 01 |
| Gibraltar          | +350        | GibTel                                       | 266          | 01 |
| Greece             | +30         | Cosmote                                      | 202          | 01 |
|                    |             | Panafon S.A                                  | 202          | 05 |
|                    |             | STET HELLAS                                  | 202          | 10 |
| Guinea             | +224        | Sotelgui                                     | 611          | 02 |
| Hungary            | +36         | Westel 900 GSM RT                            | 216          | 30 |
|                    |             | Pannon GSM RT                                | 216          | 01 |
| Hong Kong          | +852        | Hong Kong Telecom CSL Ltd.                   | 454          | 00 |
|                    |             | Hutchison Telephone Co. Ltd.                 | 454          | 04 |
|                    |             | SmarTone Mobile Communications Ltd.          | 454          | 06 |
|                    |             | P Plus Comm                                  | 454          | 22 |
|                    |             | New World PCS                                | 454          | 10 |
|                    |             | Mandarin Comm                                | 454          | 16 |
|                    |             | Pacific Link                                 | 454          | 18 |
|                    |             | Peoples Telephone                            | 454          | 12 |
| Hungary            | +36         | Pannon GSM                                   | 216          | 01 |
|                    |             | Westel 900                                   | 216          | 30 |
| Iceland            | +354        | Post & Simi                                  | 274          | 01 |
|                    |             | Icelandic Mobile Phone                       | 274          | 02 |

| Country                                | Access Code | Network Operator                 | Network Code |    |
|----------------------------------------|-------------|----------------------------------|--------------|----|
| India                                  | +91         | Bharti Cellular Limited          | 404          | 10 |
|                                        |             | BPL Mobile                       | 404          | 21 |
|                                        |             | Skycell                          | 404          | 40 |
|                                        |             | Airtel                           | 404          | 10 |
|                                        |             | Essar                            | 404          | 11 |
|                                        |             | Maxtouch                         | 404          | 20 |
|                                        |             | Command                          | 404          | 30 |
|                                        |             | Mobilenet                        | 404          | 31 |
|                                        |             | RPG MAA                          | 404          | 41 |
|                                        |             | Modi Telstra                     | 404          | 14 |
|                                        |             | Sterling Cellular                | 404          | 11 |
|                                        |             | BPL USWest                       | 404          | 27 |
|                                        |             | TATA                             | 404          | 07 |
|                                        |             | Escotel                          | 404          | 12 |
|                                        |             | Aircel Digilink                  | 404          | 15 |
| Indonesia                              | +62         | PT Telekomunikasi Indonesia      | 510          | 10 |
|                                        |             | PT. Satelit Palapa Indonesia     | 510          | 01 |
|                                        |             | PT Excelcomindo Pratama          | 510          | 11 |
| Iran (Islamic Republic of)             | +98         | T.C.I                            | 432          | 11 |
| Ireland                                | +353        | Telecom Ireland                  | 272          | 01 |
|                                        |             | Digifone                         | 272          | 02 |
|                                        |             | Meteor                           | 272          | 03 |
| Italy                                  | +39         | Omnitel Pronto Italia            | 222          | 10 |
|                                        |             | Telecom Italia Mobile            | 222          | 01 |
| Ivory Coast                            | +225        | Comstar                          | 612          | 01 |
|                                        |             | Ivoiris                          | 612          | 03 |
|                                        |             | Loteny Telecom                   | 612          | 05 |
| Jordan                                 | +962        | JMTS                             | 416          | 01 |
| Kuwait                                 | +965        | MTCNet                           | 419          | 02 |
| Luxembourg                             | +352        | P & T Luxembourg                 | 270          | 01 |
| Laos<br>(People's Democratic Republic) | +856        | Lao Shinawatra                   | 457          | 01 |
| Latvia                                 | +371        | Latvian Mobile Telephone Co.Ltd. | 247          | 01 |
| Lebanon                                | +961        | Libancell                        | 415          | 03 |
|                                        |             | Cellis                           | 415          | 01 |
| Lesotho                                | +266        | Vodacom                          | 651          | 01 |
| Liechtenstein                          | +4175       | Natel-D                          | 228          | 01 |
| Lithuania                              | +370        | Bite GSM                         | 246          | 02 |
|                                        |             | Omnitel                          | 246          | 01 |
| Luxembourg                             | +352        | P&T LUXGSM                       | 270          | 01 |
|                                        |             | Millicom Lux SA                  | 270          | 77 |
| Macau                                  | +853        | C.T.M.                           | 455          | 01 |
| Macedonia                              | +389        | PTT Makedonija                   | 294          | 01 |
| Madagascar                             | +261        | Sacel                            | 646          | 03 |
|                                        |             | Madacom                          | 646          | 01 |
| Malawi                                 | +265        | TNL                              | 650          | 01 |
| Malaysia                               | +60         | Celcom                           | 502          | 19 |
|                                        |             | Maxis                            | 502          | 12 |
|                                        |             | My BSB                           | 502          | 02 |
|                                        |             | MRTEL                            | 502          | 13 |
|                                        |             | Adam                             | 502          | 17 |
|                                        |             | Mutiara Telecom                  | 502          | 16 |
| Malta                                  | +356        | Telecell                         | 278          | 01 |
| Mauritius                              | +230        | Mauritius Telecom Ltd.           | 617          | 01 |
| Monaco                                 | +377        | France Telecom                   | 208          | 01 |
|                                        |             | SFR                              | 208          | 10 |
| Morocco                                | +212        | ONPT Morocco                     | 604          | 01 |
| Mozambique                             | +258        | Telecom de Mocambique            | 634          | 01 |

| Country                       | Access Code | Network Operator                        | Network Code |    |
|-------------------------------|-------------|-----------------------------------------|--------------|----|
| Myanmar                       | +95         | HPT                                     | 219          | 01 |
| Namibia                       | +264        | MTC                                     | 649          | 01 |
| Netherlands                   | +31         | LIBERTEL                                | 204          | 04 |
|                               |             | PTT Telecom                             | 204          | 08 |
| New Caledonia                 | +687        | Mobilis                                 | 546          | 01 |
| New Zealand                   | +64         | Bell South                              | 530          | 01 |
| Norway                        | +47         | Telenor Mobil AS                        | 242          | 01 |
|                               |             | NetCom GSM A/S                          | 242          | 02 |
| Oman                          | +968        | General Telecoms                        | 422          | 02 |
| Pakistan                      | +92         | Mobilink                                | 410          | 01 |
| Papua New Guinea              | +675        | Pacific                                 | 310          | 01 |
| Philippines                   | +63         | Globe Telecom GMCR Inc                  | 515          | 02 |
|                               |             | IslaCom                                 | 515          | 01 |
| Poland                        | +48         | Plus GSM                                | 260          | 01 |
|                               |             | ERA GSM                                 | 260          | 02 |
|                               |             | IDEA Centertel                          | 260          | 03 |
| Portugal                      | +351        | Telecomunicações Moveis Nacionais (TMN) | 268          | 06 |
|                               |             | TELECEL                                 | 268          | 01 |
|                               |             | Optimus                                 | 268          | 03 |
| Qatar                         | +974        | Q-Net                                   | 427          | 01 |
| Reunion                       | +262        | SRR                                     | 647          | 10 |
| Romania                       | +40         | MobiFon                                 | 226          | 01 |
|                               |             | MobilRom                                | 226          | 10 |
| Russian Federation            | +701        | Mobile Telesystems                      | 250          | 01 |
|                               |             | North-West GSM                          | 250          | 02 |
|                               |             | KB Impuls                               |              |    |
| San Marino                    | +378        | Omnitel                                 | 222          | 10 |
|                               |             | Telecom Italia Mobile                   | 222          | 01 |
| Saudi Arabia                  | +966        | Al Jawal                                | 420          | 01 |
|                               |             | EAE                                     | 420          | 07 |
| Senegal                       | +221        | Sonatel                                 | 608          | 01 |
| Seychelles                    | +248        | SEZ SEYCEL                              | 633          | 01 |
| Singapore                     | +65         | Singapore Telecom                       | 525          | 01 |
|                               |             | MobileOne                               | 525          | 03 |
| Slovak Republic               | +42         | Eurotel                                 | 231          | 02 |
|                               |             | Globtel                                 | 231          | 01 |
| Slovenia                      | +386        | Mobitel                                 | 293          | 41 |
| South Africa                  | +27         | Vodacom                                 | 655          | 01 |
|                               |             | MTN                                     | 655          | 10 |
| Spain                         | +34         | Movistar                                | 214          | 07 |
|                               |             | AIRTEL Spain                            | 214          | 01 |
| Sri Lanka                     | +94         | MTN Networks (PVT) Sri Lanka            | 413          | 02 |
| Sudan                         | +249        | Mobitel                                 | 634          | 01 |
| Sweden                        | +46         | Telia Mobitel                           | 240          | 01 |
|                               |             | Comviq GSM AB                           | 240          | 07 |
|                               |             | Europolitan AB                          | 240          | 08 |
| Switzerland                   | +41         | Swisscom 900                            | 228          | 01 |
|                               |             | Swisscom 1800                           | 228          | 01 |
| Syria                         | +963        | Mobile Syria                            | 417          | 09 |
| Taiwan                        | +886        | LDTA                                    | 466          | 92 |
| Tanzania (United Republic of) | +255        | Tritel                                  | 640          | 01 |
| Thailand                      | +66         | TH AIS GSM                              | 520          | 01 |
|                               |             | Total Access Comms                      | 520          | 18 |
| Tunisia                       | +216        | Tunisian PTT                            | 605          | 02 |
| Turkey                        | +90         | Turkcell                                | 286          | 01 |
|                               |             | Telsim                                  | 286          | 02 |
| Uganda                        | +256        | Celtel Cellular                         | 641          | 01 |

| Country                                                   | Access Code | Network Operator  | Network Code |
|-----------------------------------------------------------|-------------|-------------------|--------------|
| Ukraine                                                   | +380        | Mobile comms      | 255 01       |
|                                                           |             | Golden Telecom    | 255 05       |
| United Arab Emirates                                      | +971        | UAE ETISALAT-G1   | 424 01       |
|                                                           |             | UAE ETISALAT-G2   | 424 02       |
| United Kingdom<br>(Guernsey)<br>(Jersey)<br>(Isle of Man) | +44         | Vodafone          | 234 15       |
|                                                           |             | Cellnet           | 234 10       |
|                                                           |             | Guernsey Telecoms | 234 55       |
|                                                           |             | Jersey Telecoms   | 234 50       |
|                                                           |             | Manx Telecom      | 234 58       |
| Uzbekistan                                                | +7          | Daewoo GSM        | 434 04       |
|                                                           |             | Coscom            | 434 05       |
|                                                           |             | Buztel            | 434 01       |
| Vietnam                                                   | +84         | MTSC              | 452 01       |
|                                                           |             | DGPT              | 452 02       |
| Yugoslavia                                                | +381        | Mobile Telekom    | 220 01       |
|                                                           |             | Pro Monte         | 220 02       |
| Zimbabwe                                                  | +263        | NET ONE           | 648 01       |

### 3.16 Glossary of Terms

|                              |                                                                                                                                                                                                                                                                                                 |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DTMF</b>                  | Dual Tone Multiple Frequency tones. The numeric keys 0 to 9, and * and # will generate different DTMF tones when pressed during conversation. These are used to access voice mail, paging and computerised home banking.                                                                        |
| <b>GSM</b>                   | Global System for Mobile communications. The name given to the advanced digital technology that the telephone uses.                                                                                                                                                                             |
| <b>Home country</b>          | The country in which the home network operates.                                                                                                                                                                                                                                                 |
| <b>Home network</b>          | The GSM network on which subscription details are held.                                                                                                                                                                                                                                         |
| <b>Hot Key Dial</b>          | Hot Key Dial allows quick access to numbers stored in the Phonebook of Service Dial Number list. The source of the Hot Key Dial may be defined by the user or preprogrammed by the Service Provider. It is most likely to be preprogrammed to the Service Dial Numbers by the Service Provider. |
| <b>Lock code</b>             | Used for security of the telephone. Factory set to "0000".                                                                                                                                                                                                                                      |
| <b>Message Centre</b>        | Where messages are sent before they are forwarded onto their destination. The Message Centre telephone number may be programmed into the SIM or supplied by the service provider.                                                                                                               |
| <b>Network operator</b>      | The organisation responsible for operating a GSM network. Each country will have at least one network operator.                                                                                                                                                                                 |
| <b>Password</b>              | Used for the control of the call bar function. Supplied by the service provider.                                                                                                                                                                                                                |
| <b>PIN</b>                   | Personal Identification Number used for SIM security. Supplied by the service provider.                                                                                                                                                                                                         |
| <b>PIN2</b>                  | Personal Identification Number used for the control of Fixed Dial Memory and call charge metering. Supplied by the service provider.                                                                                                                                                            |
| <b>PUK/ PUK2</b>             | PIN/PIN2 Unblocking Key. Used to unblock the PIN/PIN2. Supplied by the service provider.                                                                                                                                                                                                        |
| <b>Registration</b>          | The act of locking on to a GSM network. This is usually performed automatically by the telephone.                                                                                                                                                                                               |
| <b>Roaming</b>               | The ability to use the telephone on networks other than the Home network.                                                                                                                                                                                                                       |
| <b>Service Dial Numbers</b>  | Service Dial Numbers are predefined numbers that allow the user to access a set of special services provided by the Service Provider. For example billing information or access to Voice Mail.                                                                                                  |
| <b>Service provider</b>      | The organisation responsible for providing access to the GSM network.                                                                                                                                                                                                                           |
| <b>SIM</b>                   | Subscriber Identification Module. A small smart-card which stores unique subscriber and user-entered information such as Phone Book, Fixed Dial Memory and short messages. Supplied by the service provider.                                                                                    |
| <b>Supplementary service</b> | Network-controlled GSM functions supported by the telephone. Supplementary services may only be available on a subscription bases.                                                                                                                                                              |
| <b>Wild numbers</b>          | Spaces in a stored telephone number. When the telephone number is recalled pressing a numeric key will fill in a space. This can be used to restrict dialling to a specific area.                                                                                                               |



## 4 DISASSEMBLY / REASSEMBLY INSTRUCTIONS

### 4.1 General

This section provides disassembly and reassembly procedures for the main components of GD30 and GD50 telephones.

These procedures MUST be performed by qualified service personnel, at an authorized service centre.

The following warnings and precautions MUST be observed during ALL disassembly/reassembly operations:

#### WARNING

The equipment described in this manual contains polarised capacitors utilising liquid electrolyte. These devices are entirely safe provided that neither a short-circuit nor a reverse polarity connection is made across the capacitor terminals. FAILURE TO OBSERVE THIS WARNING COULD RESULT IN DAMAGE TO THE EQUIPMENT OR, AT WORST, POSSIBLE INJURY TO PERSONNEL RESULTING FROM ELECTRIC SHOCK OR THE AFFECTED CAPACITOR EXPLODING. EXTREME CARE MUST BE EXERCISED AT ALL TIMES WHEN HANDLING THESE DEVICES.

#### Caution

The equipment described in this manual contains electrostatic sensitive devices (ESDs). Damage can occur to these devices if the appropriate handling procedure is not adhered to.

#### 4.1.1 ESD Handling Precautions

A working area where ESDs may be safely handled without undue risk of damage from electrostatic discharge, must be available. The area must be equipped as follows:

**Working Surfaces** – All working surfaces must have a dissipative bench mat, SAFE for use with live equipment, connected via a 1M2 resistor (usually built into the lead) to a common ground point.

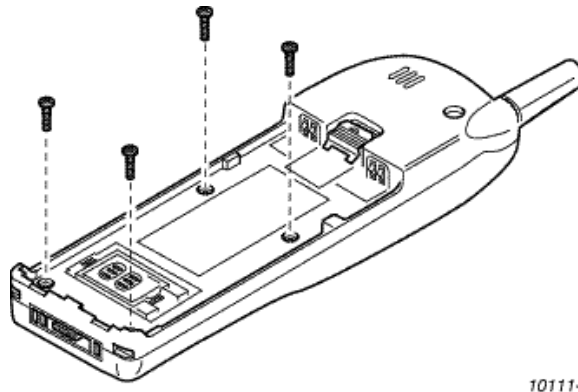
**Wrist Strap** – A quick release skin contact device with a flexible cord, which has a built in safety resistor of between 5k2 and 1M2 shall be used. The flexible cord must be attached to a dissipative earth point.

**Containers** – All containers and storage must be of the conductive type.

## 4.2 Disassembly

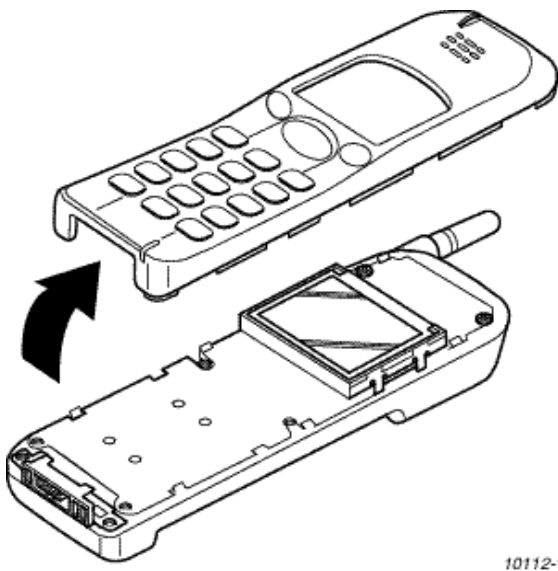
### 4.2.1 Case Removal

1. Remove the battery from the back of the telephone. Remove the four case screws located inside the battery compartment.



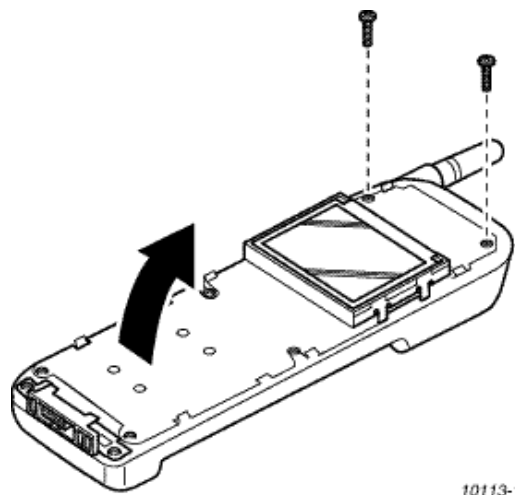
**Figure 4.1: Screw removal**

2. Remove the cover from the case by pulling from the connector end of the telephone. Care must be taken when separating the case from the cover as the retaining clips may be very stiff – if necessary, re-attach the battery to provide extra support for the case.



**Figure 4.2: Case Disassembly**

3. Remove the two screws securing the PCB assembly to the case. Lift the PCB assembly away from the case.



**Figure 4.3: PCB Assembly Removal**

## 4.2.2 Changing the Backup Battery

Remove the case as previously described. The backup battery is held in a retainer on the Main PCB. Observe polarity when replacing the battery.

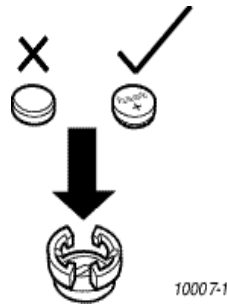


Figure 4.4: Battery Polarity

## 4.2.3 Access to Printed Circuit Boards

1. Remove the case as previously described. While applying slight pressure to the side retaining clips, lift the Main PCB away from the chassis.

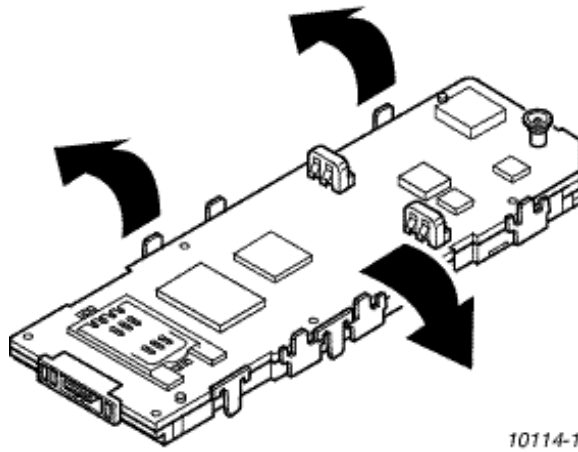


Figure 4.5: Main PCB removal

2. While applying slight pressure to the side retaining clips, lift the Keypad PCB away from the chassis.

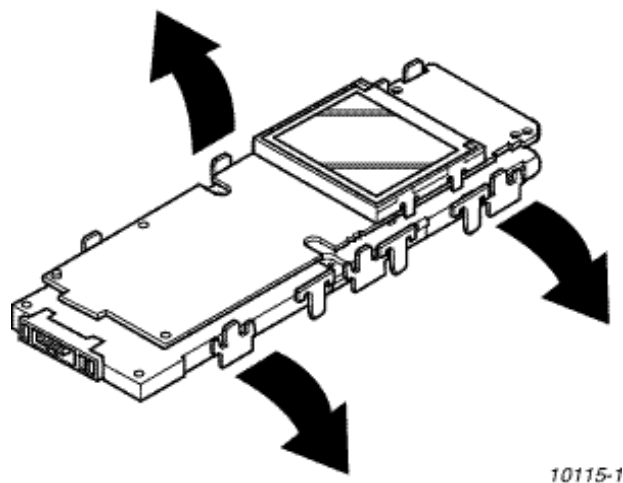


Figure 4.6: Keypad PCB removal

3. Gently bend the four Display Assembly lugs to allow removal from the Keypad PCB.

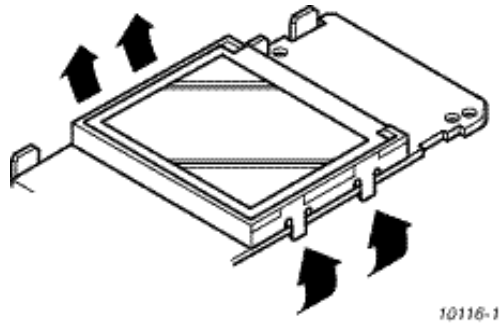


Figure 4.7: Display Assembly removal

#### 4.2.4 Case-Mounted Components

1. Remove the keypad by peeling it away from the case front.

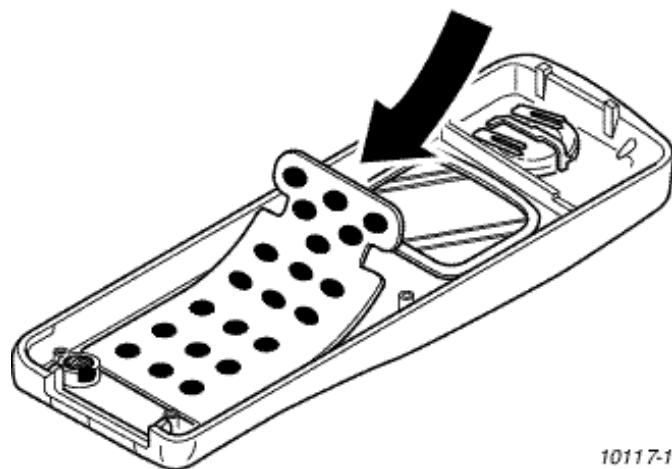


Figure 4.8: Removing the keypad

2. Remove the rubber boot which contains the microphone. When refitting, ensure contacts are oriented such that they make contact with the corresponding printed circuit pads on the Main PCB..

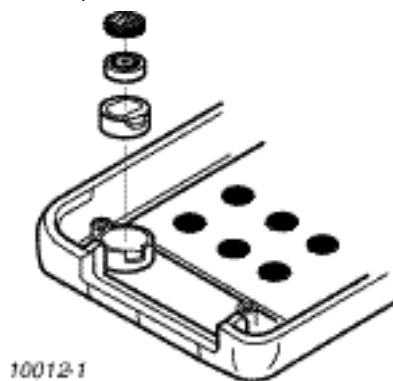
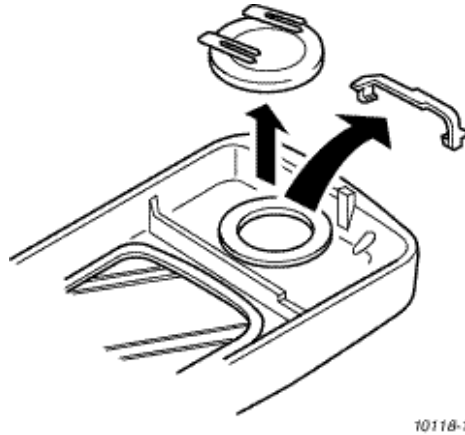


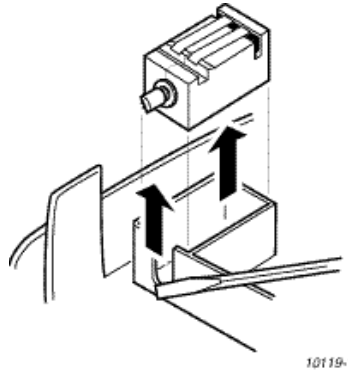
Figure 4.9: Microphone assembly removal

3. Unclip the speaker holder and lift out the speaker. Note that the retainer clip should be released gently from one side to ensure that damage does not occur to the retainer barbs..



**Figure 4.10: Speaker removal**

4. The Vibrate motor may be removed by gently applying pressure under the spindle/counterweight.



**Figure 4.11: Vibrate motor removal**

## 4.3 Reassembly

Care must be taken when reinstalling the back onto the telephone case. Ensure that the LCD module is oriented correctly, i.e. the ribbon connector is facing the top of the telephone. Also ensure that the securing screws are not over-tightened as this may affect the operation of the keypad.

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## 5 TECHNICAL SPECIFICATIONS

### 5.1 Tx Characteristics

All data is applicable to GSM 900 and GSM 1800 except where stated.

#### 5.1.1 Frequency error

$\pm 0.1$ ppm max., relative to base station frequency.

#### 5.1.2 Modulation phase error

RMS:  $\leq 5^\circ$

Peak:  $\leq 20^\circ$

#### 5.1.3 Output RF Spectrum due to Modulation

| Offset from Centre Frequency (kHz) | Maximum Level Relative to the Carrier (dB) |
|------------------------------------|--------------------------------------------|
| $\pm 100$                          | +0.5                                       |
| $\pm 200$                          | -30                                        |
| $\pm 250$                          | -33                                        |
| $\pm 600$ to 1800                  | -60                                        |

#### 5.1.4 Output RF Spectrum due to Switching Transients

| Offset from Centre Frequency (kHz) | Maximum Level (dBm) |          |
|------------------------------------|---------------------|----------|
|                                    | GSM 900             | GSM 1800 |
| $\pm 400$                          | -19                 | -22      |
| $\pm 600$                          | -21                 | -24      |
| $\pm 1200$                         | -21                 | -24      |
| $\pm 1800$                         | -24                 | -27      |

Measurement conditions for output RF spectrum measurements:

Frequency Span: 0 Hz

Measurement Bandwidth: 30 kHz

Video Bandwidth: 100 kHz

Peak Hold

#### 5.1.5 Spurious Emissions at the Antenna Connector

| Frequency Range         | Frequency Offset                       | Filter Bandwidth | Approximate Video Bandwidth | Limits (dBm) |          |
|-------------------------|----------------------------------------|------------------|-----------------------------|--------------|----------|
|                         |                                        |                  |                             | GSM 900      | GSM 1800 |
| 30 to 50 MHz            | -                                      | 10 kHz           | 30 kHz                      | -36          | -36      |
| 50 to 500 MHz           | -                                      | 100 kHz          | 300 kHz                     | -36          | -36      |
| 500 MHz to 1GHz         | 0 to 1MHz                              | 100 kHz          | 300 kHz                     | -36          | -36      |
| 1 GHz to 4GHz           | 0 to 10 MHz                            | 100 kHz          | 300 kHz                     | -30          | -36      |
| Excl. relevant TX band: | $\geq 10$ MHz                          | 300 kHz          | 1 MHz                       | -30          | -36      |
| P-GSM: 890 to 915 MHz;  | $\geq 20$ MHz                          | 1 MHz            | 3 MHz                       | -30          | -36      |
| DCS: 1710 to 1785 MHz   | (offset from edge of relevant TX band) |                  |                             |              |          |
| Relevant TX band:       | 1.8 to 6.0 MHz                         | 30 kHz           | 100 kHz                     | -30          | -30      |
| P-GSM: 890 to 915 MHz;  | (offset from carrier)                  |                  |                             |              |          |
| DCS: 1710 to 1785 MHz   |                                        |                  |                             |              |          |

Measurement conditions:

Peak Hold, Modulated Carrier

- Measurement averaged over a burst and then averaged again over 50 bursts.
- In each of the bands 925-960 MHz and 1805-1880 MHz up to 5 spurious measurements can fail these limits, in which case the limit  $\leq -36$  dBm shall apply.

## 5.1.6 Output Level, Dynamic Operation

### GSM 900

| Power Control Level | Transmitter Output Power (dBm) | Tolerance for Conditions (dB) |            |
|---------------------|--------------------------------|-------------------------------|------------|
|                     |                                | Normal                        | Extreme    |
| PL5                 | 32.4                           | +0.3, -0.6                    | +0.3, -0.6 |
| PL6                 | 30.7                           | ±0.5                          | ±0.5       |
| PL7                 | 29                             | ±0.5                          | ±0.5       |
| PL8                 | 27                             | ±0.5                          | ±0.5       |
| PL9                 | 25                             | ±0.5                          | ±0.5       |
| PL10                | 23                             | ±0.5                          | ±0.5       |
| PL11                | 21                             | ±0.5                          | ±0.5       |
| PL12                | 19                             | ±0.5                          | ±0.5       |
| PL13                | 17                             | ±0.5                          | ±0.5       |
| PL14                | 15                             | ±0.5                          | ±0.5       |
| PL15                | 13                             | ±0.5                          | ±0.5       |
| PL16                | 11                             | ±0.5                          | ±0.5       |
| PL17                | 9                              | ±0.5                          | ±0.5       |
| PL18                | 7                              | ±0.5                          | ±0.5       |
| PL19                | 5                              | ±0.5                          | ±0.5       |

### GSM 1800

| Power Control Level | Transmitter Output Power (dBm) | Tolerance for Conditions (dB) |            |
|---------------------|--------------------------------|-------------------------------|------------|
|                     |                                | Normal                        | Extreme    |
| PL0                 | 29.3                           | +0.4, -0.5                    | +0.4, -0.5 |
| PL1                 | 27.7                           | ±0.5                          | ±0.5       |
| PL2                 | 26                             | ±0.5                          | ±0.5       |
| PL3                 | 24                             | ±0.5                          | ±0.5       |
| PL4                 | 22                             | ±0.5                          | ±0.5       |
| PL5                 | 20                             | ±0.5                          | ±0.5       |
| PL6                 | 18                             | ±0.5                          | ±0.5       |
| PL7                 | 16                             | ±0.5                          | ±0.5       |
| PL8                 | 14                             | ±0.5                          | ±0.5       |
| PL9                 | 12                             | ±0.5                          | ±0.5       |
| PL10                | 10                             | ±0.5                          | ±0.5       |
| PL11                | 8                              | ±0.5                          | ±0.5       |
| PL12                | 6                              | ±0.5                          | ±0.5       |
| PL13                | 4                              | ±0.5                          | ±0.5       |
| PL14                | 2                              | ±0.5                          | ±0.5       |
| PL15                | 0                              | ±0.5                          | ±0.5       |

## 5.1.7 Residual Peak Power

≤70 dBc (BW = 300 kHz)



## 5.2 Rx Characteristics

### 5.2.1 Sensitivity

#### GSM 900 Full rate speech

The reference sensitivity performance in terms of frame erasure, bit error, or residual bit error rates (whichever is appropriate) is specified in the following table, according to the propagation conditions.

| Channels        | Propagation Conditions TUhigh |                        | Propagation Conditions RA |                        | Propagation Conditions HT |                        | Static Conditions       |                        |
|-----------------|-------------------------------|------------------------|---------------------------|------------------------|---------------------------|------------------------|-------------------------|------------------------|
|                 | Test limit error rate %       | Minimum no. of samples | Test limit error rate %   | Minimum no. of samples | Test limit error rate %   | Minimum no. of samples | Test limit error rate % | Minimum no. of samples |
| TCH/FS FER      | $6.742 \cdot \alpha$          | 8900                   |                           |                        |                           |                        | $0.122 \cdot \alpha$    | 164000                 |
| class Ib (RBER) | $0.42/\alpha$                 | 1,000,000              |                           |                        |                           |                        | $0.41/\alpha$           | 20,000,000             |
| class II (RBER) | 8.33                          | 120,000                | 7.5                       | 24000                  | 9.333                     | 60000                  | 2.439                   | 8200                   |

The reference sensitivity level is <-102dBm.

**NOTE:**

$1 \leq \alpha \leq 1.6$ . The value of  $\alpha$  can be different for each channel condition but must remain the same for FER and class Ib RBER measurements for the same channel condition.

#### GSM 900 Half rate speech

The reference sensitivity performance in terms of frame erasure, bit error, or residual bit error rates (whichever is appropriate) is specified in the following table, according to the propagation conditions.

| Channels                          | Propagation Conditions TUhigh |                        | Propagation Conditions RA |                        | Propagation Conditions HT |                        |
|-----------------------------------|-------------------------------|------------------------|---------------------------|------------------------|---------------------------|------------------------|
|                                   | Test limit error rate %       | Minimum no. of samples | Test limit error rate %   | Minimum no. of samples | Test limit error rate %   | Minimum no. of samples |
| TCH/HS (FER)                      | 4.598                         | 13050                  |                           |                        |                           |                        |
| TCH/HS class Ib (BFI=0)           | 0.404                         | 148500                 |                           |                        |                           |                        |
| TCH/HS class II (BFI=0)           | 7.725                         | 25500                  | 8500                      | 20000                  | 7600                      | 20000                  |
| TCH/HS (UFR)                      | 6.250                         | 9600                   |                           |                        |                           |                        |
| TCH/HSL class Ib ((BFI or UFI)=0) | 0.269                         | 227000                 |                           |                        |                           |                        |

#### GSM 1800 Full rate speech

The reference sensitivity performance in terms of frame erasure, bit error, or residual bit error rates (whichever is appropriate) is specified in the following table, according to the propagation conditions.

| Channels        | Propagation Conditions TUhigh |                        | Propagation Conditions RA |                        | Propagation Conditions HT |                        | Static Conditions       |                        |
|-----------------|-------------------------------|------------------------|---------------------------|------------------------|---------------------------|------------------------|-------------------------|------------------------|
|                 | Test limit error rate %       | Minimum no. of samples | Test limit error rate %   | Minimum no. of samples | Test limit error rate %   | Minimum no. of samples | Test limit error rate % | Minimum no. of samples |
| TCH/FS FER      | $4.478 \cdot \alpha$          | 13400                  |                           |                        |                           |                        | $0.122 \cdot \alpha$    | 164000                 |
| class Ib (RBER) | $0.32/\alpha$                 | 1,500,000              |                           |                        |                           |                        | $0.41/\alpha$           | 20,000,000             |
| class II (RBER) | 8.333                         | 60,000                 | 7.5                       | 24000                  | 9.333                     | 30000                  | 2.439                   | 8200                   |

The reference sensitivity level is <-102 dBm.

**NOTE:**

$1 \leq \alpha \leq 1.6$ . The value of  $\alpha$  can be different for each channel condition but must remain the same for FER and class Ib RBER measurements for the same channel condition.

## GSM 1800 Half rate speech

The reference sensitivity performance in terms of frame erasure, bit error, or residual bit error rates (whichever is appropriate) is specified in the following table, according to the propagation conditions.

| Channels                          | Propagation Conditions<br>TUhigh |                              | Propagation Conditions<br>RA  |                              | Propagation Conditions<br>HT  |                              |
|-----------------------------------|----------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|------------------------------|
|                                   | Test limit<br>error rate<br>%    | Minimum<br>no. of<br>samples | Test limit<br>error rate<br>% | Minimum<br>no. of<br>samples | Test limit<br>error rate<br>% | Minimum<br>no. of<br>samples |
| TCH/HS (FER)                      | 4.706                            | 12750                        |                               |                              |                               |                              |
| TCH/HS class Ib (BFI=0)           | 0.426                            | 141000                       |                               |                              |                               |                              |
| TCH/HS class II (BFI=0)           | 7.725                            | 25500                        | 8735                          | 20000                        | 7600                          | 20000                        |
| TCH/HS (UFR)                      | 6.383                            | 9400                         |                               |                              |                               |                              |
| TCH/HSL class Ib ((BFI or UFI)=0) | 0.291                            | 206000                       |                               |                              |                               |                              |

## Blocking:

| Frequency                  | Small MS level in dBμVemf() |          |
|----------------------------|-----------------------------|----------|
|                            | GSM 900                     | GSM 1800 |
| FR ±600 kHz to FR ±800 kHz | 70                          | 70       |
| FR ±800 kHz to FR ±1.6 MHz | 70                          | 70       |
| FR ±1.6 MHz to FR ±3 MHz   | 80                          | 80       |
| 915 MHz to FR -3 MHz       | 90                          | -        |
| FR ±3 MHz to FR 980 MHz    | 90                          | -        |
| FR ±600 kHz to FR ±800 kHz | -                           | 87       |
| 1785 MHz to FR - 3 MHz     | -                           | 87       |
| 835 MHz to <915 MHz        | 113                         | -        |
| >980 MHz to 1000 MHz       | 113                         | -        |
| 100 kHz to <835 MHz        | 90                          | -        |
| >1000 MHz to 12.75 GHz     | 90                          | -        |
| 100 kHz to 1705 MHz        | -                           | 113      |
| >1705 MHz to <1785 MHz     | -                           | 101      |
| >1920 MHz to 1980 MHz      | -                           | 101      |
| >1980 MHz to 12.75 GHz     | -                           | 90       |

Measurement Conditions:

Wanted carrier is 3dB above reference sensitivity.

Interferer is CW

Spurious response exceptions:

6 exceptions are permitted IN band 915 - 980MHz

24 exceptions are permitted OUTSIDE band 915 - 980MHz.

## Intermodulation Characteristics:

| Interferer Level (f1 & f2) dBm | Interferer Frequencies (f1 & f2)                                         |
|--------------------------------|--------------------------------------------------------------------------|
| -49                            | Wanted frequency = $2f_1 - f_2$ ,<br>and $ f_1 - f_2  = 800 \text{ kHz}$ |

## 6 TEST AND MEASUREMENT

### 6.1 Introduction

This section provides information on testing GD30 and GD50 telephones. The layout is as follows:

1. Section 6.2 External testing: describes equipment requirements and general set up procedure.
2. Section 6.3 Complete Unit Test Setup: describes how the items of test equipment are used together and general set up procedure.
3. Section 6.4 Channel box test commands: provides detailed explanation of the different commands available using the test equipment and channel-box software.
4. Section 6.5 Adjustment mode: describes adjustments available on the GD30/GD50 handheld unit.
5. Section 6.6 Lock code: describes the procedure to check or reset the lock code using the Channel box software.

### 6.2 External Testing

The GD30/GD50 unit can be connected to a compatible personal computer for electronic adjustment and fault diagnosis. This section provides a description of the equipment required to perform those tasks.

Testing and adjustment of the handheld unit can be performed with the outer case in place and the cradle connected. For in-depth fault finding the unit should first be disassembled, as detailed in Section 4, and then the PCB Repair Jig used to connect the PCBs together externally as they would be found in normal use. Fault tracing can then be performed on the PCBs using suitable test equipment, such as spectrum analysers and oscilloscopes.

The unit must now be tested and calibrated for both frequencies (900 MHz and 1800 MHz) as well as for the two battery types.

#### 6.2.1 Jigs and Tools

##### *Test Equipment Descriptions*

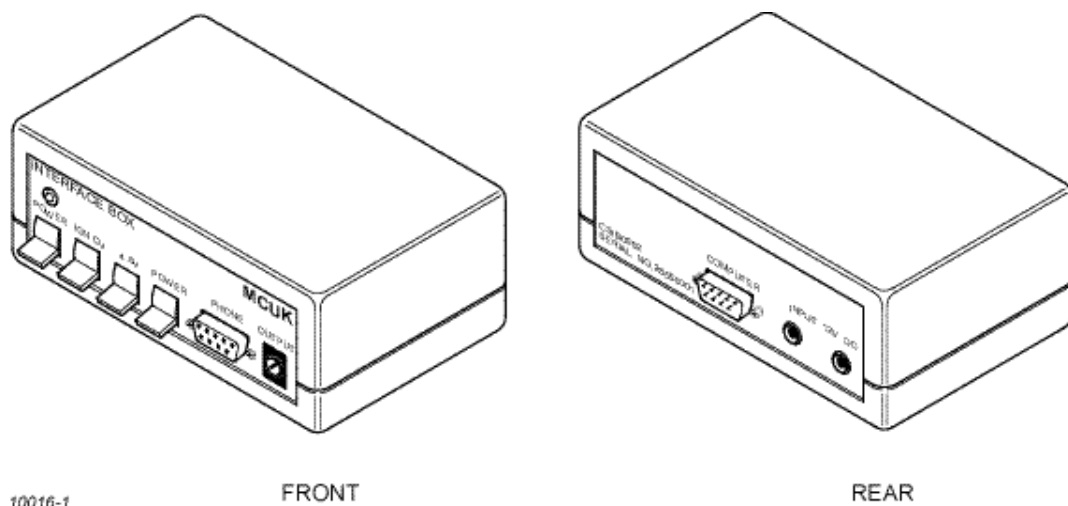
1. Interface box,  
Part Number: IFB003/IFB004

The Interface box provides:

- a. IFB003: Voltage regulation for +7.2 V, +5.6 V or 4.8 V DC outputs. The +7.2 V switch setting is used as a supply to Li-Ion type batteries (compatible for other products), the 5.6 V switch setting is used for PCB testing and the 4.8 V switch setting is used for testing the complete unit

Interface Box IFB004 is a later version that provides +4.8 V, +7.2V and +8.2 V DC outputs. It also allows selection of external power via the Interface cable.

- b. RS 232 interface. Ensures that the Unit Under Test is supplied with the correct signal levels and format..



**Figure 6.1: Interface Box IFB003 / IFB004**

2. Personal Computer (PC)

The PC (IBM compatible) is used as a Unit Under Test controller. This in conjunction with the channel box software, allows all of the test facilities normally provided through the keypad of the Unit Under Test.

## TEST AND MEASUREMENT

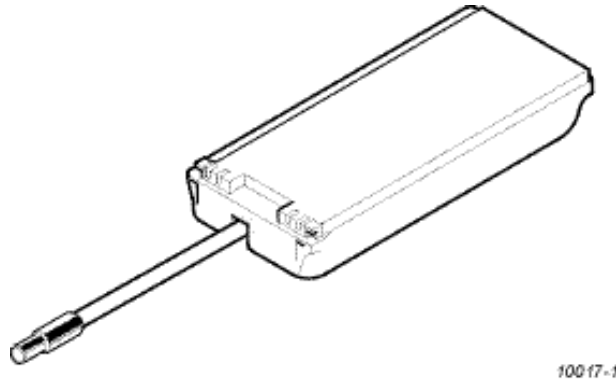
### 3. Power Supply

Provides 12 V DC supply to Interface Box IFB003 or IFB004.

### 4. Test Battery

Part Number: JT00022

Provides 3.6 V DC supply to Interface Box IFB003 or IFB004 to compensate for the current drain when the Unit Under Test is used at full transmit power.

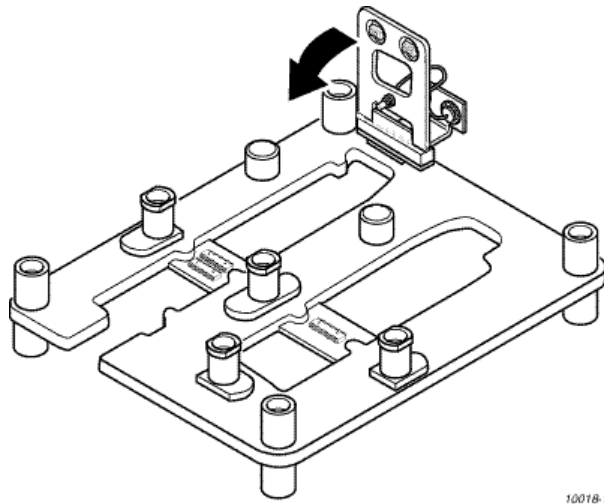


**Figure 6.2: Test Battery**

### 5. PCB Repair Jig

Part Number: JT00011

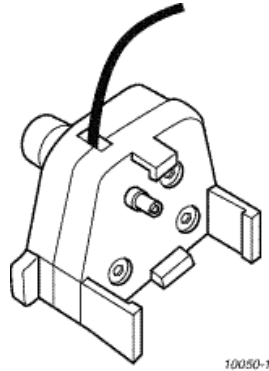
This unit provides the necessary connections between the Main and Key PCBs, and the connections between Main PCB and external test equipment.



**Figure 6.3: PCB Repair Jig**

6. RF Adaptor  
Part Number: JT00009

This unit provides an RF connection between the Unit Under Test and external test equipment. It has a lug on the back to allow both Adaptor and Unit Under Test to be suspended from a suitable rack or channel bracket, if required.



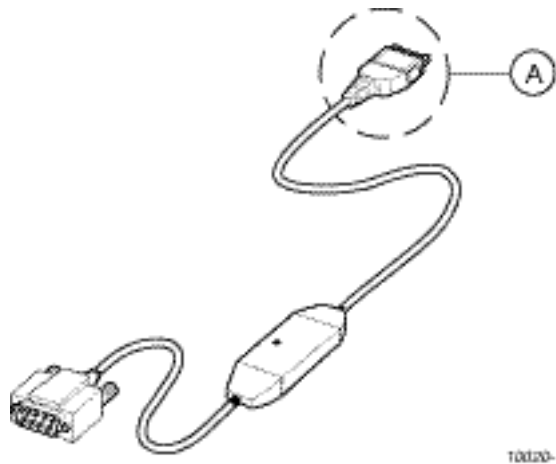
**Figure 6.4: RF Adaptor**

7. GSM Tester

This unit acts as a base station providing all the necessary GSM signalling requirements and also provides GSM signal measuring facilities.

8. Interface Cable  
Part Number: JT00004

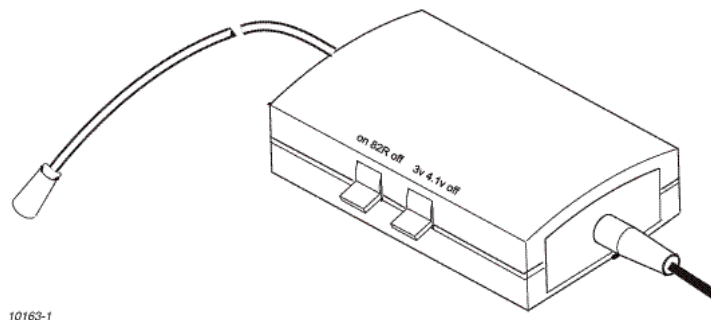
The interface cable allows connection between a computer and the Unit Under Test via IFB003. Connector (A) is available separately, if required, under part number DHS31-P18S-HL-BD.



**Figure 6.5: Interface Cable**

9. Battery Calibration Voltage Control Unit (BCVCU)  
Part Number: JT00010

This unit provides three voltage levels (3 V, 4.1 V and 0 V) to the Test Battery, and is used during battery calibration checks. It is powered from the Interface Box. .

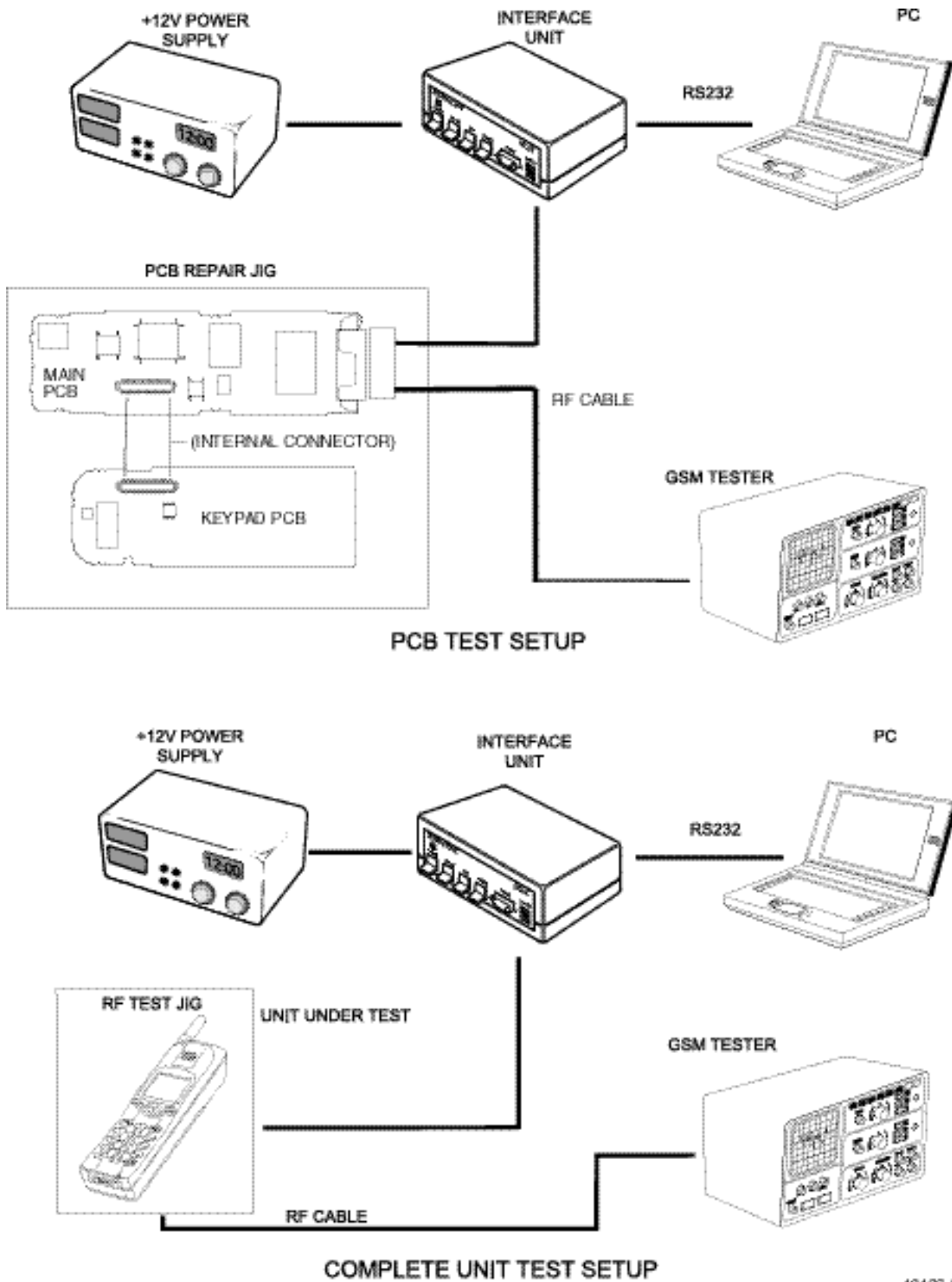


**Figure 6.6: Battery Calibration Voltage Control Unit (BCVCU)**

#### 10. Channel Box Software

This is the test software for the telephone unit and should be installed onto the personal computer to be used for testing.

### 6.3 Complete Unit Test Setup



10122-1

Figure 6.7: Complete unit test setup

### 6.3.1 External Testing Setup Procedure

#### IMPORTANT NOTE

To allow accurate measurement of the complete unit the test equipment must be connected as shown (Figure 6.6). The PCB Test Setup must be used to enable repair to PCBs. Once repair/replacement is complete, the assembled unit must be tested and calibrated with the jigs and tools connected as shown in Figure 6.7.

#### Full Test Equipment Requirements

For testing the handheld unit the following equipment is required:

1. Interface box
2. 12 V power supply
3. Personal computer (IBM compatible) with RS232 interface
4. RS232 interface cable (9 pin straight through connection)
5. GSM test station
6. RF Adaptor
7. Interface cable – JT00004

The channel box software (supplied on floppy disk) should be installed onto the main drive of the personal computer.

The RF cable is connected to the GSM test station via a suitable adapter. The 12 V supply is connected to the rear socket of the Interface box.

Two modes are available for testing the handheld unit:

1. Test Mode.

The Test Mode facility allows various sections of the handheld unit to be individually activated.

2. Normal Mode.

The Normal Mode facility allows the handheld unit to be powered externally for call origination/receiving operations.

**NOTE:** A suitable test SIM card will be required which is compatible with the GSM test station.

#### Power On into Test Mode

1. Connect the test equipment into test mode configuration.

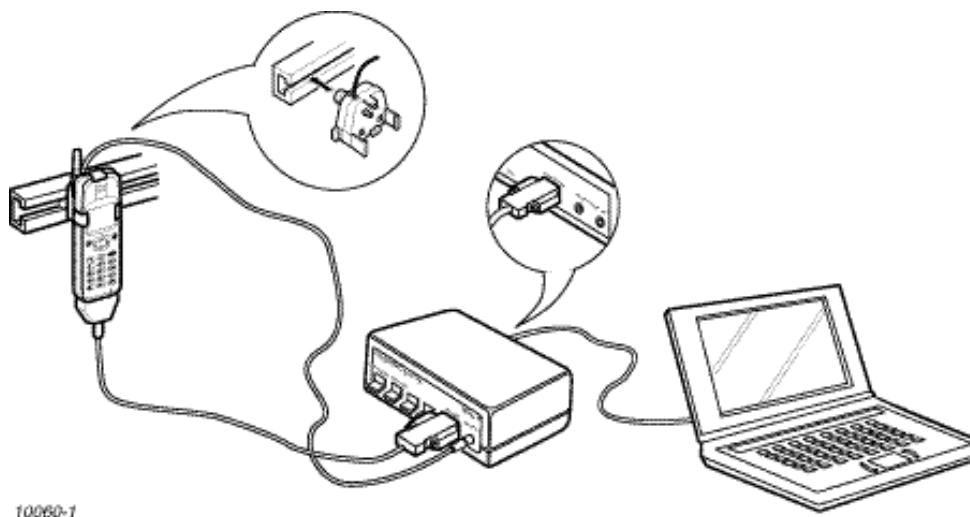


Figure 6.8: External test equipment setup

2. Ensure that the following settings are made:

- a. Interface box IFB003
 

|         |                                        |
|---------|----------------------------------------|
| Power:  | UP position                            |
| IGN:    | DOWN position                          |
| Mode    | UP position                            |
| Voltage | Dependent upon operation:              |
|         | 5.6 V for PCB testing                  |
|         | 4.8 V for Nickel Metal Hydride battery |
- b. Power supply
 

|          |     |
|----------|-----|
| +12V DC: | OFF |
|----------|-----|

## c. PC

Channel box software loaded and the screen indicating as shown:



[ESC] to END of PROGRAM

10027-1

**Figure 6.9: PC Screen (SCRN10)**

3. Press ENTER on the PC keyboard.
4. Switch on the +12 V supply.
5. At the PC press F10.
6. At the Interface box switch the power to ON.
7. Steps 5 and 6 above must be carried out within 1 second or power ON will time-out.

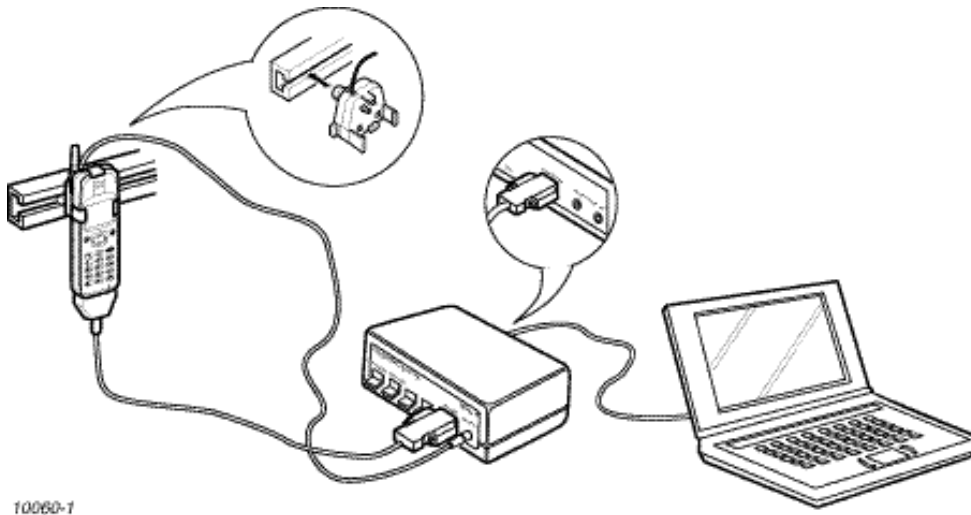
**NOTE:** The display will read:  
GET STATION  
ADDRESS = \_ \_  
INFO = \_ \_

The back light will be illuminated and all LEDs will be lit.

Go to section 7.4 (Channel Box Test Commands) for further testing information.

## Power On in Normal Mode

1. Connect together the test equipment.



10060-1

**Figure 6.10: External test equipment setup**



2. Ensure that the following settings are made:
  - a. Interface box IFB003
    - Power: UP position
    - IGN: DOWN position
    - MODE: UP position
  - b. Power supply
    - +12V DC: OFF
  - c. PC
    - Channel box software loaded and the screen indicating as shown:

```

TEST-SET MODE <CH-BOX>
NORMAL MODE <Emulat>
SOFT-SIM MODE <Emulat>
  
```

[ESC] to END of PROGRAM

10027-1

Figure 6.11: PC Screen (SCRN9)

3. On the PC press ENTER.
4. Switch on the 12V supply.
5. At the PC press F10.
6. At the Interface box switch the POWER to ON.

### Entering Call Mode from Test Mode

Ensure that a charged battery is attached to the telephone.

The screen of the PC will resemble the one shown:

```

<<< PANASONIC GD30 SERVICE BOX VER: 1.127 >>> 1999/08/10 12:03:52

INITIALIZE < INIT>----- SP LOOPBACK< STOP>----- GET KEYCODE< ENABLE>-----
CHG CH GSM < 62>----- PATH CONT < MESI>----- CONTROL OUT<ALL ON>-----
CHG CH DCS <69>----- TAM CONT <PLAYOFF>----- CHECK LCD1 < P1>-----
POWER LEVEL< PL 5>----- VOL. BUZZ < 1>----- SET ER DISP< ENABLE>-----
TX DATA < OFF>----- VOL. SIDE < -8dB>----- SOFT SIM < ENABLE>-----
RSSI (dBm) < CONT>----- VOL. MIC < 0dB>----- TEST MODE < TERM>-----
SET AGC 1 < +69dB>----- VOL. SP 1 < 0dB>----- SIM STATUS < SHOW>-----
SET AGC 2 < +35dB>----- VOL. SP 2 < 0dB>----- CHECKSUM < SHOW>-----
SET AGC 3 < +1dB>-----

VER [GD3STD/34/00/990524]
IMEI [004400870290085]
PRDCT[ ]
ST IN[ ]

1:END 2: 3: 4:MEM 5: 6:PTDAT 7:UTDAT 8: 9:P OFF 0:P ON
  
```

10128-1

Figure 6.12: PC Screen (SCRN11)

1. At the PC change the SOFT SIM field to read <ENB>. Press ENTER.
2. At the PC change the TEST field to read <TERM>. Press ENTER.

The UUT will power down and up again. If the UUT is connected to a GSM test set, after a delay of approximately 5 seconds the UUT will register service.

3. To return to test mode, set SOFT SIM field to <DIS> and set TEST field to <Test>. Press ENTER.

## 6.4 Channel Box Test Commands

The following table outlines the commands available using the channel-box software.

After the handheld unit has been switched on (section 7.3), use the up/down scroll keys on the personal computer keyboard to select the channel-box command. Use the left/right scroll keys to display the required indication and press the ENTER key to select the displayed function.

| CHANNEL BOX COMMAND                 | INDICATION                                                                       | FUNCTION                                                                                                                                                                                               |
|-------------------------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| TEST MODE                           | <TERM><br><ReST>                                                                 | Terminates test mode.<br>Restarts test mode                                                                                                                                                            |
| INITIALIZE                          | <INIT>                                                                           | When RETURN is pressed this will reset the default channel settings.                                                                                                                                   |
| CHANGE CH GSM                       | <xxx>                                                                            | Sets up predefined channel settings for GSM frequencies.                                                                                                                                               |
| CHANGE CH DCS                       | <xxx>                                                                            | Sets up predefined channel settings for DCS frequencies.                                                                                                                                               |
| POWER LEVEL                         | <xxx>                                                                            | Allows a specified power level to be set at the UUT.                                                                                                                                                   |
| TX DATA                             | <NRL 0><br><NRL 1><br><NRL R><br><ACC R>                                         | Sets TX Modulation to<br>Normal burst DATA all 0s<br>Normal burst DATA all 1s<br>Normal burst DATA all random<br>Access burst DATA random                                                              |
| RSSI (DBM)                          | <xxx>                                                                            | Provides an RSSI reading on the User specified channel.                                                                                                                                                |
| SET AGC 1<br>SET AGC 2<br>SET AGC 3 | <xxx><br><xxx><br><xxx>                                                          | Allows changes to AGC levels on LOW, MIDDLE, HIGH channels.                                                                                                                                            |
| SP LOOP BACK                        | <START><br><br><STOP>                                                            | Provides an audio path for use with the GSM test station<br>Sets audio loop-back from TX audio to RX audio without processing by the CODEC                                                             |
| PATH CONT                           | <MOSO><br><MESI><br><MESE><br><MISI><br><MISE>                                   | Sets audio paths:<br>MIC off speaker off<br>MIC external speaker internal<br>MIC external speaker external<br>MIC internal speaker internal<br>MIC internal speaker external                           |
| VOL. BUZZ                           | <xx>                                                                             | Sets buzzer volume between values 0 to 3 (Min to Max)                                                                                                                                                  |
| VOL. SIDE                           | <xx>                                                                             | Sets 4 side tone volume levels between 0dB and -18dB                                                                                                                                                   |
| VOL. MIC                            | <xx>                                                                             | Sets 8 MIC volume levels between 26dB and 40dB                                                                                                                                                         |
| VOL. SP1                            | <xx>                                                                             | Sets speaker pre-amp volume levels                                                                                                                                                                     |
| VOL. SP2                            | <xx>                                                                             | Sets speaker volume levels                                                                                                                                                                             |
| GET KEY CODE                        | <ENABLE><DISABLE>                                                                | Displays the value of a key pressed on the keypad                                                                                                                                                      |
| CONTROL OUT                         | <LED R><br><LED B><br><CHARGE ON><br><LED C><br><HF ON><br><ALL OFF><br><ALL ON> | Switches on Incoming LED<br>Switches on Backlight LEDs<br>Switches charge sequence on LCD<br>Switches on Charging LED<br>Switches on handsfree mode<br>Switches off all above<br>Switches on all above |
| CHECK LCD1                          | <P1><br><br><P2>                                                                 | Provides 50% visual display of check pattern on the UUT LCD<br><br>Provides 50% visual display of check pattern on the UUT LCD                                                                         |

| CHANNEL BOX COMMAND | INDICATION            | FUNCTION                                                                                                           |
|---------------------|-----------------------|--------------------------------------------------------------------------------------------------------------------|
| SET ER.DISP         | <ENABLE><br><DISABLE> | Unit error codes will be displayed on the UUT display<br>Unit error codes will not be displayed on the UUT display |
| SOFT SIM            | <ENABLE> <DISABLE>    | With ENABLE set and TEST MODE <TERM> the UUT is removed from test mode and can be placed into call mode            |
| TEST MODE           | <TERM>                | With SOFT SIM <ENABLED> the UUT will be removed from test mode and can be placed into a call                       |
| SIM STATUS          | <SHOW>                | Checks and displays the SIM status                                                                                 |
| CHECK SUM           | <SHOW>                | Displays the software checksum                                                                                     |

## 6.5 Adjustment Mode

**NOTE:** See Section 6.2.1 for a list of the equipment and setup procedures required to perform the following adjustment and calibration procedures.

The following procedures MUST be performed after replacement or repair of one or both of the PCBs in the handheld unit. Failure to do so may result in incorrect operation of the telephone.

The following adjustments MUST be made on BOARD PAIRS.

There are three distinct calibration procedures to adjust RF performance. These procedures are:

1. Ramping gain (Section 6.5.1)
2. RSSI (Section 6.5.2)
3. I and Q values (Section 6.5.3)

The adjustment data selected during calibration is stored in the telephone EEPROM.

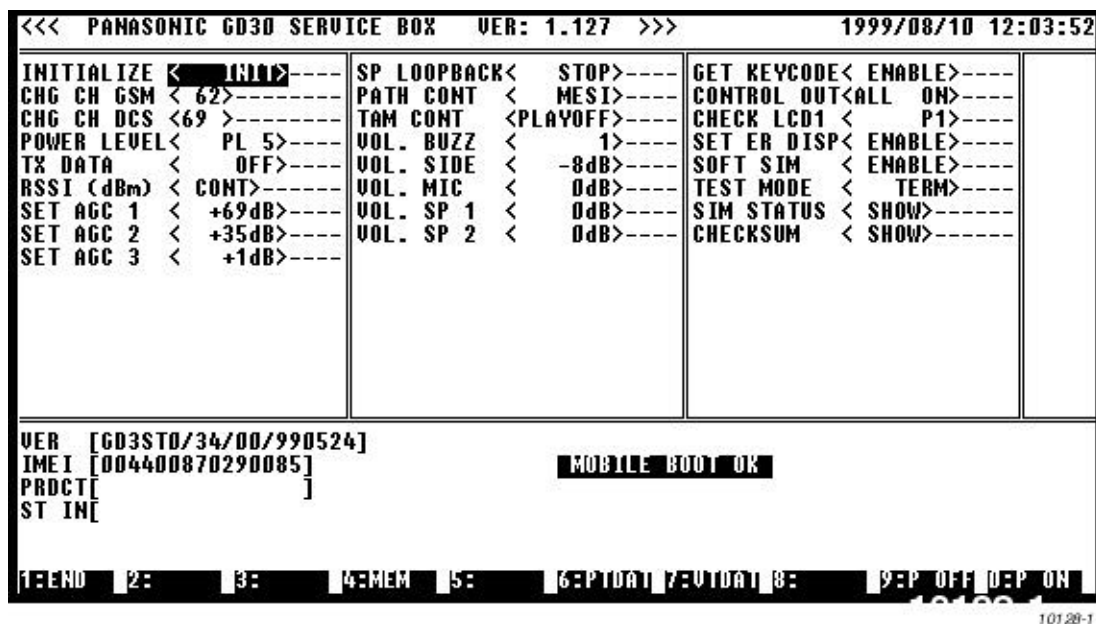


Figure 6.13: Test software screen

### 6.5.1 Ramping Gain

The carrier power must be measured and calibrated for each power level at channel 62.

#### GSM 900

| Power Level | Peak Power (dBm) | Tolerance (dBm) | Initial Calibration Value | Change per dB |
|-------------|------------------|-----------------|---------------------------|---------------|
| PL5         | 32.4             | +0.3, -0.6      | 214                       | 7.0           |
| PL6         | 30.7             | ±0.5            | 200                       | 5.0           |
| PL7         | 29               | ±0.5            | 190                       | 4.5           |
| PL8         | 27               | ±0.5            | 181                       | 4.0           |
| PL9         | 25               | ±0.5            | 173                       | 5.0           |
| PL10        | 23               | ±0.5            | 163                       | 5.0           |
| PL11        | 21               | ±0.5            | 153                       | 4.5           |
| PL12        | 19               | ±0.5            | 144                       | 3.5           |
| PL13        | 17               | ±0.5            | 137                       | 3.5           |
| PL14        | 15               | ±0.5            | 130                       | 2.5           |
| PL15        | 13               | ±0.5            | 125                       | 2.5           |
| PL16        | 11               | ±0.5            | 120                       | 3.0           |
| PL17        | 9                | ±0.5            | 114                       | 3.5           |
| PL18        | 7                | ±0.5            | 107                       | 3.5           |
| PL19        | 5                | ±0.5            | 100                       | 3.5           |

#### GSM 1800

| Power Level | Peak Power (dBm) | Tolerance (dBm) | Initial Calibration Value | Change per dB |
|-------------|------------------|-----------------|---------------------------|---------------|
| PL0         | 29.3             | +0.4, -0.5      | 194                       | 5.0           |
| PL1         | 27.7             | ±0.5            | 184                       | 4.0           |
| PL2         | 26               | ±0.5            | 176                       | 4.0           |
| PL3         | 24               | ±0.5            | 168                       | 4.5           |
| PL4         | 22               | ±0.5            | 159                       | 4.0           |
| PL5         | 20               | ±0.5            | 151                       | 3.5           |
| PL6         | 18               | ±0.5            | 144                       | 3.5           |
| PL7         | 16               | ±0.5            | 137                       | 3.5           |
| PL8         | 14               | ±0.5            | 130                       | 2.5           |
| PL9         | 12               | ±0.5            | 125                       | 3.0           |
| PL10        | 10               | ±0.5            | 119                       | 2.5           |
| PL11        | 8                | ±0.5            | 114                       | 2.5           |
| PL12        | 6                | ±0.5            | 109                       | 3.0           |
| PL13        | 4                | ±0.5            | 103                       | 3.0           |
| PL14        | 2                | ±0.5            | 97                        | 2.5           |
| PL15        | 0                | ±0.5            | 92                        | 2.5           |

## Calibration of output power on each power level

**NOTE:** To ensure that the telephone operates within set SAR margins, Panasonic recommends that a power meter capable of measurement to an accuracy of  $\pm 0.2$  dBm (Hewlett Packard HP8990 or equivalent) is used when calibrating power levels. Use of a less accurate power meter may result in the phone failing to meet SAR standards.

To calibrate the ramping gain, first switch the unit into Test Mode (Section 6.3).

This procedure must be followed for all power levels PL5 to PL19, for low, middle and high channels for GSM 900. GSM 1800 shall be calibrated for all power levels PL0 to PL15 for top middle and bottom channels.

1. Set the Channel box controls to Channel 62 at Power Level 14, normal burst modulated with random data as follows:
  - a. Press the down arrow until CHANGE CH <62> is highlighted and then press ENTER.
  - b. Press the down arrow until PL <14> is highlighted. Press the move left arrow until <14> appears in the highlighted field. Press ENTER.
  - c. Press the down arrow until TX DATA <OFF> is highlighted. Press the move arrow until <NRL R> appears in the highlighted field. Press ENTER.

| <<< PANASONIC GD30 CHANNEL BOX VER: 1.127 >>>                              |                       | 1999/08/03 08:58:39     |  |
|----------------------------------------------------------------------------|-----------------------|-------------------------|--|
| INITIALIZE < INIT>---                                                      | SP LOOPBACK< STOP>--- | GET KEYCODE< ENABLE>--- |  |
| CHG CH GSM < 62> ACK                                                       | PATH CONT < MESI>---  | CONTROL OUT<ALL ON>---  |  |
| CHG CH DCS <698>---                                                        | TAM CONT <PLAYOFF>--- | CHECK LCD1 < P1>---     |  |
| POWER LEVEL< PL14>ACK                                                      | UOL. BUZZ < 1>---     | SET ER DISP< ENABLE>--- |  |
| TX DATA < NRL R>ACK                                                        | UOL. SIDE < -8dB>---  | SOFT SIM < ENABLE>---   |  |
| RSSI <dBm> < CONT>---                                                      | UOL. MIC < 0dB>---    | TEST MODE < TERM>---    |  |
| SET AGC 1 < +69dB>---                                                      | UOL. SP 1 < 0dB>---   | SIM STATUS < SHOW>---   |  |
| SET AGC 2 < +35dB>---                                                      | UOL. SP 2 < 0dB>---   | CHECKSUM < SHOW>---     |  |
| SET AGC 3 < +1dB>---                                                       |                       |                         |  |
| VER [GD3ST0/34/00/990524]<br>IMEI [004400870290085]<br>PRDCT [ ]<br>ST INI |                       |                         |  |
| INIT<br>CHG_CH<br>SET_PL5<br>TX_DAT_NR                                     |                       |                         |  |
| 1:END 2: 3:PROG 4:MEM 5: 6:PTDAT 7:UTDAT 8: 9:P OFF 0:P ON                 |                       |                         |  |

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Figure 6.14: Tx data field

2. At the GSM test unit measure the Peak Power.
3. If the measured power is in the range of the target power (see previous table), then proceed to step 10.
4. At the Channel box press F7 to view the TRIM for the mid-channel.

| <<< PANASONIC GD30 CHANNEL BOX VER: 1.127 >>>                                              |                       | 1999/08/03 08:58:39     |  |
|--------------------------------------------------------------------------------------------|-----------------------|-------------------------|--|
| INITIALIZE < INIT>---                                                                      | SP LOOPBACK< STOP>--- | GET KEYCODE< ENABLE>--- |  |
| CHG CH GSM < 62> ACK                                                                       | PATH CONT < MESI>---  | CONTROL OUT<ALL ON>---  |  |
| CHG CH DCS <698>---                                                                        | TAM CONT <PLAYOFF>--- | CHECK LCD1 < P1>---     |  |
| POWER LEVEL< PL14>ACK                                                                      | UOL. BUZZ < 1>---     | SET ER DISP< ENABLE>--- |  |
| TX DATA < NRL R>ACK                                                                        | UOL. SIDE < -8dB>---  | SOFT SIM < ENABLE>---   |  |
| RSSI <dBm> < CONT>---                                                                      | UOL. MIC < 0dB>---    | TEST MODE < TERM>---    |  |
| SET AGC 1 < +69dB>---                                                                      | UOL. SP 1 < 0dB>---   | SIM STATUS < SHOW>---   |  |
| SET AGC 2 < +35dB>---                                                                      | UOL. SP 2 < 0dB>---   | CHECKSUM < SHOW>---     |  |
| SET AGC 3 < +1dB>---                                                                       |                       |                         |  |
| VER [GD3ST0/34/00/990524]<br>IMEI [004400870290085]<br>PRDCT [ ]<br>ST INI                 |                       |                         |  |
| C<br>S<br>I                                                                                |                       |                         |  |
| VIEW TRIM PL Mch<br>TRIM PL Hch<br>TRIM PL Lch<br>TRIM PL Tch<br>TRIM PL Bch<br>TRIM Other |                       |                         |  |
| 1:END 2: 3:PROG 4:MEM 5: 6:PTDAT 7:UTDAT 8: 9:P OFF 0:P ON                                 |                       |                         |  |

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Figure 6.15: Power level view 1

5. Select VIEW TRIM PL MCH, and make a note of this value.

```

<<< PANASONIC GD300 CHANNEL BOX  VER: 1.127 >>> 1999/08/03 08:58:39

INITIALIZE < INIT>-----
CHG CH GSM < 62> ACK
CHG CH DCS <698>-----
POWER LEVEL< PL14>ACK
TX DATA <NRL RX>ACK
RSSI <dBm> < CONT>-----
SET AGC 1 < +69dB>-----
SET AGC 2 < +35dB>-----
SET AGC 3 < +1dB>-----

SP LOOPBACK<
PATH CONT <
TAM CONT <PLA
VOL. BUZZ <
VOL. SIDE <
VOL. MIC <
VOL. SP 1 <
VOL. SP 2 <

M ch
PL5 GSM = 159 PL0 DCS = 160
PL6 GSM = 142 PL1 DCS = 152
PL7 GSM = 135 PL2 DCS = 144
PL8 GSM = 130 PL3 DCS = 136
PL9 GSM = 123 PL4 DCS = 129
PL10 GSM = 117 PL5 DCS = 124
PL11 GSM = 110 PL6 DCS = 118
PL12 GSM = 104 PL7 DCS = 110
PL13 GSM = 99 PL8 DCS = 104
PL14 GSM = 93 PL9 DCS = 101
PL15 GSM = 89 PL10 DCS = 96
PL16 GSM = 85 PL11 DCS = 92
PL17 GSM = 81 PL12 DCS = 85
PL18 GSM = 78 PL13 DCS = 79
PL19 GSM = 71 PL14 DCS = 75
PL15 DCS = 71

VER [GD3ST0/34/00/990524]
IMEI [004400870290085]
PRDCT[ ]
ST INI

HIT ANY KEY
1:END 2: 3:PROG 4:MEM 5: 6:PTDAT 7:UTDAT 8: 9:P OFF 0:P ON

```

**Figure 6.16: Power level view 2**

6. Perform the following calculation and make a note of the result:

$$\text{New Trim value} = \text{Old Trim Value} + (\text{Required Power} - \text{Measured Power}) \times \text{Change per dB}$$

(step 5)                      (table)                      (step2)                      (table)

Make a note of the result.

- At the Channel box press F6 to program the TRIM for the mid-channel.

```

<<< PANASONIC GD30 CHANNEL BOX   VER: 1.127 >>>          1999/08/03 08:58:39

INITIALIZE <  INIT>-----
CHG CH GSM < 62>   ACK
CHG CH DCS <698>
POWER LEVEL<  PL14>ACK
TX DATA  <  NRL RX>ACK
RSSI <dBm> <  CONT>-----
SET AGC 1 <  +69dB>-----
SET AGC 2 <  +35dB>-----
SET AGC 3 <  +1dB>-----

SP LOOPBACK<  STOP>-----
PATH CONT <  MES1>-----
TAM CONT  <PLAYOFF>-----
VOL. BUZZ <  1>-----
VOL. SIDE < -8dB>-----
VOL. MIC  < 0dB>-----
VOL. SP 1 < 0dB>-----
VOL. SP 2 < 0dB>-----

GET KEYCODE<  ENABLE>-----
CONTROL OUT<ALL ON>-----
CHECK LCD1 <  P1>-----
SET ER DISP<  ENABLE>-----
SOFT SIM <  ENABLE>-----
TEST MODE <  TERM>-----
SIM STATUS <  SHOW>-----
CHECKSUM <  SHOW>-----

VER [GD3ST0/34/00/990524]
IMEI [004400870290085]
PRDCI ]
ST INI

1

1:END 2: 3:PROG 4:MEM 5: 6:PTDAT 7:UTDAT 8: 9:P OFF 0:P ON

```

**Figure 6.17: Power level selection 1**

8. Select PROGRAM TRIM PL MCH GSM.

```

<<< PANASONIC GD30 CHANNEL BOX  UER: 1.127 >>> 1999/08/03 08:58:39
INITIALIZE < INIT>----- SP LOOPBACK< STOP>----- GET
CHG CH GSM < 62>----- ACK PATH CONT < MESI>----- CONT
CHG CH DCS <698>----- TAM CONT <PLAYOFF>----- CHEC
POWER LEVEL< PL14>ACK UOL. BUZZ < 1>----- SET
TX DATA < NPL R>ACK UOL. SIDE < -8dB>----- SOFT
RSSI <dBm> < CONT>----- UOL. MIC < 0dB>----- TEST
SET AGC 1 < +69dB>----- UOL. SP 1 < 0dB>----- SIM
SET AGC 2 < +35dB>----- UOL. SP 2 < 0dB>----- CHEC
SET AGC 3 < +1dB>-----

UER [GD3ST0/34/00/990524]
IMEI [004400870290085]
PRDCT [
ST INI

1:END 2: 3:PROG 4:MEM 5: 6:PTDAT 7:UTDAT 8: 9:P OFF 0:P ON

```

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Figure 6.18: Power level selection 2

9. Highlight the PL14 field and press ENTER.

```

<<< PANASONIC GD30 CHANNEL BOX  UER: 1.127 >>> 1999/08/03 08:58:39
INITIALIZE < INIT>----- SP LOOPBACK< STOP>----- GET KEYCODE< ENABLE>-----
CHG CH GSM < 62>----- ACK PATH CONT < MESI>----- CONTROL OUT<ALL ON>-----
CHG CH DCS <698>----- TAM CONT <PLAYOFF>----- CHECK LCD1 < P1>-----
POWER LEVEL< PL14>ACK UOL. BUZZ < 1>----- SET ER DISP< ENABLE>-----
TX DATA < NPL R>ACK UOL. SIDE < -8dB>----- SOFT SIM < ENABLE>-----
RSSI <dBm> < CONT>----- UOL. MIC < 0dB>----- TEST MODE < TERM>-----
SET AGC 1 < +69dB>----- UOL. SP 1 < 0dB>----- SIM STATUS < SHOW>-----
SET AGC 2 < +35dB>----- UOL. SP 2 < 0dB>----- CHECKSUM < SHOW>-----
SET AGC 3 < +1dB>-----

UER [GD3ST0/34/00/990524]
IMEI [004400870290085]
PRDCT [
ST INI

1:END 2: 3:PROG 4:MEM 5: 6:PTDAT 7:UTDAT 8: 9:P OFF 0:P ON

```

10134-1

Figure 6.19: Power level selection 3

10. Enter the value calculated in step 6 into the data field and then press ENTER.
11. Press ESC.
12. At the GSM test unit re-measure the peak power.
13. Repeat steps 2 to 11 of this procedure for the remaining power levels, in the following order:
  - PL6, PL9 and PL19.
  - Power Levels between PL9 and PL6.
  - Power Levels between PL14 and PL9.
  - Power Levels between PL19 and PL14.
14. Calibrate PL5 (limits  $\pm 0.2$ dB).
15. After calibrating at channel 62, the carrier power must be measured and calibrated at LOW and HIGH channels as described in steps 2 to 14.
16. Repeat steps 2 to 14 for the GSM 1800 settings in the following order:
  - PL10 (limits  $\pm 0.5$ dB).
  - PL1, PL5 and PL15.
  - Power levels between PL5 and PL1.
  - Power levels between PL10 and PL5.

## TEST AND MEASUREMENT

Power levels between PL15 and PL10.

Power level PL0 (limits  $\pm 0.2$ dB).

| Channel    | GSM900 | GSM1800 |
|------------|--------|---------|
| Low/Bottom | 10     | 544     |
| Mid        | 62     | 699     |
| High/Top   | 105    | 885     |

### 6.5.2 RSSI

This procedure describes the calibration of RSSI on the compensation channel (Mch = Ch 67). This process must be carried out for LOW/BOTTOM CHANNEL and HIGH/TOP CHANNEL. The following channel settings are used in this procedure:

1. Set up the test equipment as described in Section 6.3 and switch the unit into test mode as described.
2. Apply a carrier frequency of +68KHz to the UUT (for Ch 67 = 948.400 MHz) at an input level of -90 dBm.
3. At the Channel box highlight the CHANGE CH <67> field and press ENTER.
4. Highlight the SET AGC 1 field and change the set value to 45 dB and press ENTER.
5. Highlight the RSSI dBm <> field and press ENTER.

| <<< PANASONIC GD30 CHANNEL BOX VER: 1.127 >>>                                                                                                                                     |                        | 1999/08/03 08:58:39      |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------|--|
| INITIALIZE < INIT>----                                                                                                                                                            | SP LOOPBACK< STOP>---- | GET KEYCODE< ENABLE>---- |  |
| CHG CH GSM < 60> ACK                                                                                                                                                              | PATH CONT < MESI>----  | CONTROL OUT<ALL ON>----  |  |
| CHG CH DCS <698>----                                                                                                                                                              | TAM CONT <PLAYOFF>---- | CHECK LCD1 < P1>----     |  |
| POWER LEVEL< PL 5>----                                                                                                                                                            | UOL. BUZZ < 1>----     | SET ER DISP< ENABLE>---- |  |
| TX DATA < OFF>----                                                                                                                                                                | UOL. SIDE < -8dB>----  | SOFT SIM < ENABLE>----   |  |
| RSSI <dBm> < CONT> -91.5                                                                                                                                                          | UOL. MIC < 0dB>----    | TEST MODE < TERM>----    |  |
| SET AGC 1 < +49dB>ACK                                                                                                                                                             | UOL. SP 1 < 0dB>----   | SIM STATUS < SHOW>----   |  |
| SET AGC 2 < +35dB>----                                                                                                                                                            | UOL. SP 2 < 0dB>----   | CHECKSUM < SHOW>----     |  |
| SET AGC 3 < +1dB>----                                                                                                                                                             |                        |                          |  |
| <div> <div> VER [GD3ST0/34/00/990524]<br/> IMEI [004400870290085]<br/> PRDCT [ ]<br/> ST INI </div> <div> <b>MOBILE BOOT OK</b><br/> CHG_CH<br/> CHG_CH<br/> AGC+49 </div> </div> |                        |                          |  |
| 1:END 2: 3:PROG 4:MEM 5: 6:PIDAT 7:UTDAT 8: 9:P OFF 0:P ON                                                                                                                        |                        |                          |  |

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Figure 6.20: RSSI dB field

6. If the measured value is not  $-90 \pm 1$  then make the following calculation:

$$\text{RSSI offset value} = [-(90 + \text{MEASURED RSSI VALUE})] \times 2$$

$$= [-90 - \text{MEASURED RSSI VALUE}] \times 2,$$

for example  $[-(90 + (-95))] \times 2$

$$= [-90 - (-95)] \times 2$$

$$= 10$$

Record the result.



7. At the Channel box press F7 to view data.

| <<< PANASONIC GD30 CHANNEL BOX UER: 1.127 >>>                              |                        | 1999/08/03 08:58:39                                                                        |  |
|----------------------------------------------------------------------------|------------------------|--------------------------------------------------------------------------------------------|--|
| INITIALIZE < INIT>----                                                     | SP LOOPBACK< STOP>---- | GET KEYCODE< ENABLE>----                                                                   |  |
| CHG CH GSM < 60> ACK                                                       | PATH CONT < MESI>----  | CONTROL OUT<ALL ON>----                                                                    |  |
| CHG CH DCS <698>-----                                                      | TAM CONT <PLAYOFF>---- | CHECK LCD1 < P1>-----                                                                      |  |
| POWER LEVEL< PL 5>-----                                                    | UOL. BUZZ < 1>-----    | SET ER DISP< ENABLE>----                                                                   |  |
| TX DATA < OFF>-----                                                        | UOL. SIDE < -8dB>----- | SOFT SIM < ENABLE>-----                                                                    |  |
| RSSI <dBm> < CONT> -91.5                                                   | UOL. MIC < 0dB>-----   | TEST MODE < TERM>-----                                                                     |  |
| SET AGC 1 < +49dB>ACK                                                      | UOL. SP 1 < 0dB>-----  | SIM STATUS < SHOW>-----                                                                    |  |
| SET AGC 2 < +35dB>-----                                                    | UOL. SP 2 < 0dB>-----  | CHECKSUM < SHOW>-----                                                                      |  |
| SET AGC 3 < +1dB>-----                                                     |                        |                                                                                            |  |
| UER [GD3ST0/34/00/990524]<br>IMEI [004400870290085]<br>PRDCT [1]<br>ST INI |                        | VIEW TRIM PL Mch<br>TRIM PL Hch<br>TRIM PL Lch<br>TRIM PL Tch<br>TRIM PL Bch<br>TRIM Other |  |
| 1:END 2: 3:PROG 4:MEM 5:                                                   |                        | 9:P OFF 0:P ON                                                                             |  |

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Figure 6.21: RSSI reading 1

8. Select TRIM OTHER and make a note of the RSSI COMP GSM reading.

| <<< PANASONIC GD30 CHANNEL BOX UER: 1.127 >>>                              |           | 1999/08/03 08:58:39                                                                                                                                                                                                                                                    |  |
|----------------------------------------------------------------------------|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| INITIALIZE < INIT>----                                                     | SP LOOPBA |                                                                                                                                                                                                                                                                        |  |
| CHG CH GSM < 60> ACK                                                       | PATH CONT |                                                                                                                                                                                                                                                                        |  |
| CHG CH DCS <698>-----                                                      | TAM CONT  |                                                                                                                                                                                                                                                                        |  |
| POWER LEVEL< PL 5>-----                                                    | UOL. BUZZ |                                                                                                                                                                                                                                                                        |  |
| TX DATA < OFF>-----                                                        | UOL. SIDE |                                                                                                                                                                                                                                                                        |  |
| RSSI <dBm> < CONT> -91.5                                                   | UOL. MIC  |                                                                                                                                                                                                                                                                        |  |
| SET AGC 1 < +49dB>ACK                                                      | UOL. SP 1 |                                                                                                                                                                                                                                                                        |  |
| SET AGC 2 < +35dB>-----                                                    | UOL. SP 2 |                                                                                                                                                                                                                                                                        |  |
| SET AGC 3 < +1dB>-----                                                     |           |                                                                                                                                                                                                                                                                        |  |
| UER [GD3ST0/34/00/990524]<br>IMEI [004400870290085]<br>PRDCT [1]<br>ST INI |           | IQCH GAIN = 0.00dB<br>ICH OFFSET = 127<br>QCH OFFSET = 127<br>BAT TEMP = 14<br>BAT VOLT HI = 803<br>BAT VOLT LO = 573<br>DAC REF = 716<br>DELTA U = 6<br>U IGNORE = 12<br>TIMER OFFSET = 0<br>COMP OFFSET = 40<br>AFC OFFSET = 12<br>RTC COMP = 0<br>LCD CONTRAST = 42 |  |
| HIT ANY KEY<br>1:END 2: 3:PROG 4:MEM 5:                                    |           | 6:PTDAT 7:UTDAT 8: 9:P OFF 0:P ON                                                                                                                                                                                                                                      |  |

10137-1

Figure 6.22: RSSI reading 2

9. Press ESC.

10. At the Channel box press F6 to program data.

```

<<< PANASONIC GD30 CHANNEL BOX  VER: 1.127 >>> 1999/08/03 08:58:39
INITIALIZE < INIT>----- SP LOOPBACK< STOP>----- GET KEYCODE< ENABLE>-----
CHG CH GSM < 60>----- ACK PATH CONT < MESI>----- CONTROL OUT<ALL ON>-----
CHG CH DCS <698>----- TAM CONT <PLAYOFF>----- CHECK LCD1 < P1>-----
POWER LEVEL< PL 5>----- UOL. BUZZ < 1>----- SET ER DISP< ENABLE>-----
TX DATA < OFF>----- UOL. SIDE < -8dB>----- SOFT SIM < ENABLE>-----
RSSI <dBm> < CONT> -91.5 UOL. MIC < 0dB>----- TEST MODE < TERM>-----
SET AGC 1 < +49dB>ACK UOL. SP 1 < 0dB>----- SIM STATUS < SHOW>-----
SET AGC 2 < +35dB>----- UOL. SP 2 < 0dB>----- CHECKSUM < SHOW>-----
SET AGC 3 < +1dB>-----

PROG TRIM PL Mch GSM
TRIM PL Hch GSM
TRIM PL Lch GSM
TRIM PL Mch DCS
TRIM PL Hch DCS
TRIM PL Lch DCS
TRIM PL Tch DCS
TRIM PL Bch DCS
TRIM RSSI
TRIM Other

UER [GD3ST0/34/00/990524]
IMEI [004400870290085]
PRDCT[ ]
ST INI

1:END 2: 3:PROG 4:MEM 5: 6:PTDAT 7:UTDAT 8: 9:P OFF 0:P ON
  
```

Figure 6.23: RSSI reading 3

11. Select TRIM RSSI and press ENTER.

12. Make the following calculation:

RSSI offset value (from step 8) + reading noted in step 6. Enter the result into RSSI COMP field for example: 10+ 5 = 15

```

<<< PANASONIC GD30 CHANNEL BOX  VER: 1.127 >>> 1999/08/03 08:58:39
INITIALIZE < INIT>----- SP LOOPBACK< STOP>----- GET CONT
CHG CH GSM < 60>----- ACK PATH CONT < MESI>----- CHC RSSI Lch GSM
CHG CH DCS <698>----- TAM CONT <PLAYOFF>----- SET RSSI Hch GSM
POWER LEVEL< PL 5>----- UOL. BUZZ < 1>----- SOFT RSSI Comp GSM
TX DATA < OFF>----- UOL. SIDE < -8dB>----- TEST RSSI Lch DCS
RSSI <dBm> < CONT> -91.5 UOL. MIC < 0dB>----- SIM RSSI Mch DCS
SET AGC 1 < +49dB>ACK UOL. SP 1 < 0dB>----- CHEC RSSI Hch DCS
SET AGC 2 < +35dB>----- UOL. SP 2 < 0dB>----- RSSI Tch DCS
SET AGC 3 < +1dB>----- RSSI Bch DCS
RSSI Comp DCS
FACTORY DEFAULT

UER [GD3ST0/34/00/990524]
IMEI [004400870290085]
PRDCT[ ]
ST INI

1:END 2: 3:PROG 4:MEM 5: 6:PTDAT 7:UTDAT 8: 9:P OFF 0:P ON
  
```

Figure 6.24: RSSI reading 4

13. Press ENTER.

14. Press ESC.

15. Measure the RSSI level again by highlighting the RSSI dBm field and press ENTER.

16. Repeat steps 6 to 15 for both LOW/BOTTOM and HIGH/TOP channels.

| Channel    | GSM 900 |
|------------|---------|
| Low/Bottom | 37      |
| Comp       | 67      |
| High/Top   | 95      |

17. Repeat steps 6 to 15 for GSM 1800 on the channels listed below:.

| Channel | GSM 1800 |
|---------|----------|
| Bch     | 586      |
| Lch     | 681      |
| Mch     | 731      |
| Hch     | 861      |
| Tch     | 878      |

**NOTE:** The AGC1 setting for GSM 1800 RSSI calibration should be 51 dBm.

### 6.5.3 I and Q Values

**NOTE:** With the I, Qch adjustment procedures the transmitter must be set to Power Level 5 (this presents the worst case of non-linearity) so care must be taken that the spectrum analyser used can accept a signal input of 33 dBm. If not an appropriate attenuator must be used.

#### I, Q ch Offsets

Spectrum Analyser setup  
 centre frequency = 902.4 MHz  
 RBW = 10 kHz  
 VBW = 10 kHz  
 span = 1 MHz  
 sweep time = 2 sec

1. Set the Channel box controls to channel 62 at power level 5, normal burst modulated with all 1's.
  - a. Press the down arrow until CHANGE CH > is highlighted and then press ENTER.
  - b. Press the down arrow until PL is highlighted. Press ENTER.
  - c. Press the down arrow until TX DATA is highlighted. Press the move arrow until "NRL 1" appears in the highlighted field.
  - d. Press ENTER.

```

<<< PANASONIC GD30 SERVICE BOX  VER: 1.128  >>> 1999/09/01 15:26:49

INITIALIZE < INIT>---- SP LOOPBACK< STOP>---- GET KEYCODE< ENABLE>----
CHG CH GSM < 62>---- ACK PATH CONT < MESI>---- CONTROL OUT<ALL CH>----
CHG CH DCS < 608>---- TAM CONT < PLAYOFF>---- CHECK LCD1 < D1>----
POWER LEVEL< PL 5>ACK VOL. BUZZ < 1>---- SET ER DISP< ENABLE>----
TX DATA < NRL 1>ACK VOL. SIDE < -8dB>---- SOFT SIN < ENABLE>----
RSSI (dBm) < CONT>---- VOL. MIC < 0dB>---- TEST MODE < TERM>----
SET AGC 1 < +68dB>---- VOL. SP 1 < 0dB>---- SIM STATUS < SHOW>----
SET AGC 2 < +35dB>---- VOL. SP 2 < 0dB>---- CHECKSUM < SHOW>----
SET AGC 3 < +1dB>----

VER [GD33A/01/00/990720] MOBILE BOOT OK
IMEI [004400870360359] CHG CH
PRDCT[ ] SET_PLS
ST IN[ ] TX_DAT_N1

1:END 2: 3: 4:MEM 5: 6:PTDAT 7:VITAL 8: 9:P OFF 0:P ON
  
```

Figure 6.25: Channel box setup

## TEST AND MEASUREMENT

- On the spectrum analyser measure the carrier leakage ratio. Carrier leakage ratio is measured as the ratio of peak power and the power at 68 kHz below peak frequency.

Example:

peak power (902.468 MHz) = 33 dBm

power at 135 kHz below peak power = -9 dBm

carrier leakage ratio = 33 dBm - (-9 dBm) = 42 dBm

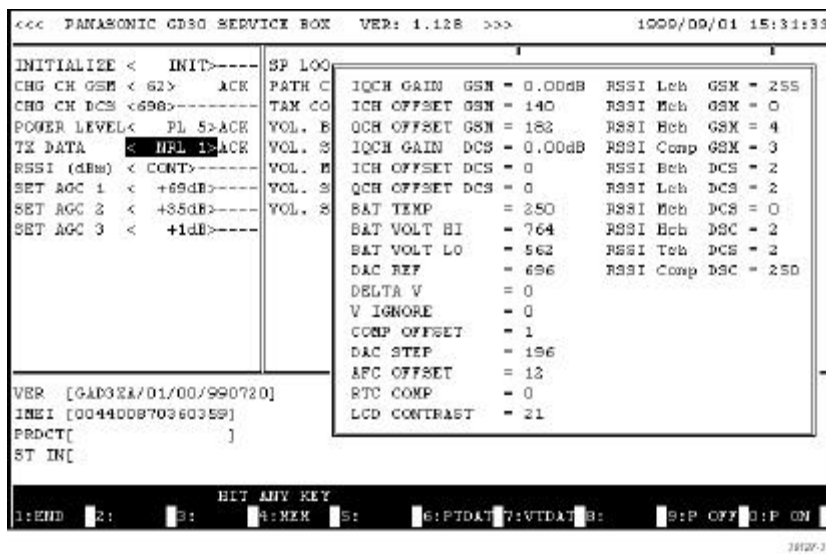


Figure 6.26: Carrier leakage ratio

- If carrier leakage ratio is greater than 30 dBc then unit is OK. (offset calibration is complete).
- If carrier leakage ratio less than 30 dBc then go to 'Ich Gain Calibration'.

### Ich check

- At the Channel box check Ich offset data by selecting F7 then VIEW TRIM OTHER.

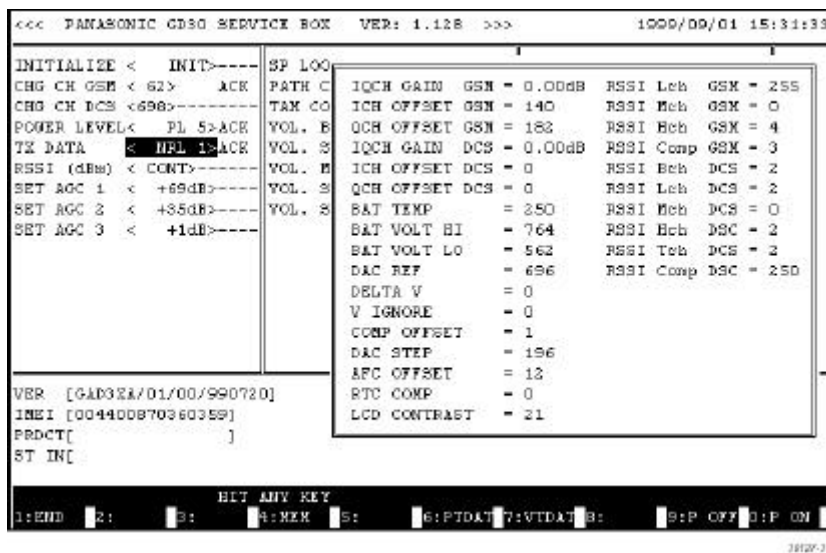


Figure 6.27: I, Q data field selection 1

2. At the Channel box set Ich offset to 147, press F6 to program TRIM OTHER.

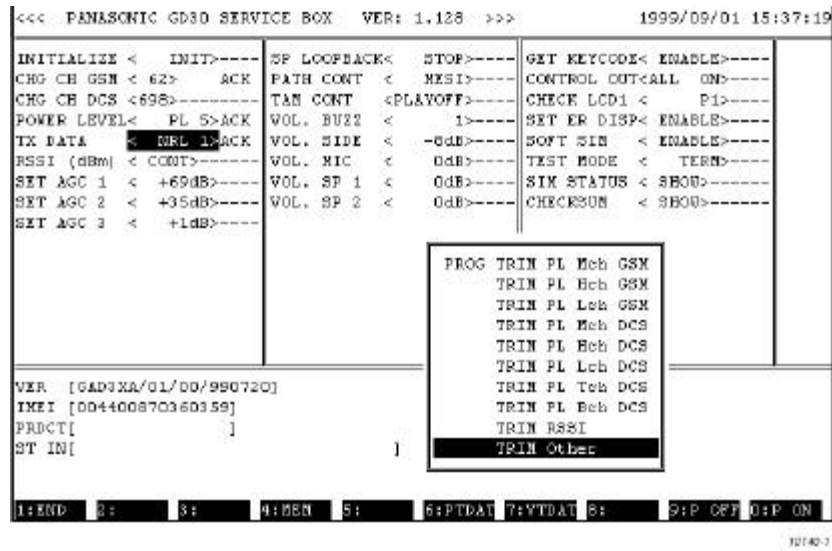


Figure 6.28: I,Q data field selection 2

3. Select Ich OFFSET

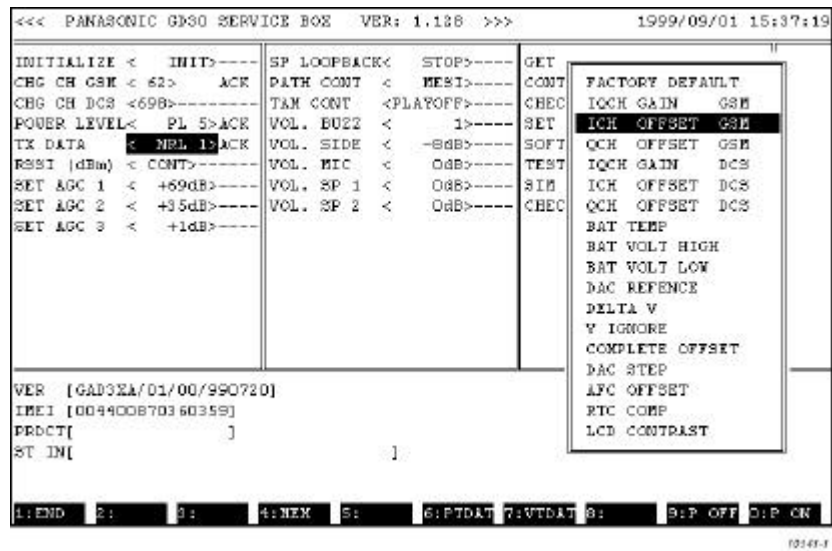


Figure 6.29: I,Q data field selection 3

4. Enter 147 for Ich OFFSET and press ENTER.

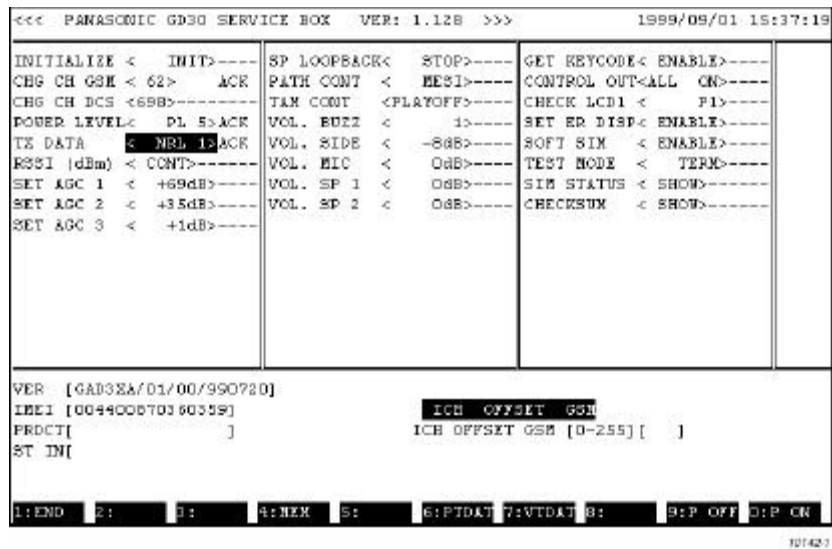


Figure 6.30: I,Q data field selection 4

- Using the Spectrum Analyser, measure the new carrier leakage ratio.
- If the new carrier leakage ratio is greater than 30dBc then the unit is OK (offset calibration is complete).
- If the original carrier leakage ratio (see I,Q OFFSETS step 2) is greater than the new carrier leakage ratio go to I Dec Calibration.
- If the original carrier leakage ratio is less than the new carrier leakage ratio go to I Inc Calibration.

#### I Dec Calibration

- Set Ich offset to 107 (see Ich Check step 2).
- Using the spectrum analyser measure the new carrier leakage ratio.
- If the carrier leakage ratio is greater than 30dBc then unit is OK (offset calibration is complete).
- If not then repeat steps 1, 2 and 3 above for Ich offset values: 87, 67, 47, 27 and 7.
- If the carrier leakage ratio is still not greater than 30dBc then go to Qch Check.

#### I Inc Calibration

- Set Ich offset to 167 (see Ich check step 2).
- Using the spectrum analyser measure the carrier leakage ratio.
- If the carrier leakage ratio is greater than 30dBc then the unit is OK. (offset calibration is complete).
- If not then repeat steps 1, 2 and 3 above for Ich offset values: 187, 207, 227, 247.
- If the carrier leakage ratio is still not greater than 30dBc then go to Qch Check.

#### Qch Check

- Set Ich offset to 127.
- Set Qch offset to 147.
  - At the Channel box press F6.
  - Press move down arrow until QCH OFFSET appears in the field. Press ENTER.
  - Enter 3 into the data field and press enter.
- Measure the new carrier leakage ratio.
- If the carrier leakage ratio is greater than 35 dBc the unit is OK. (offset calibration is complete).
- If the original carrier leakage ratio (see I, Q ch Offsets step 2) is greater than new carrier leakage ratio then go to Q Dec Calibration.
- If the original carrier leakage ratio is less than new carrier leakage ratio then go to Q Inc Calibration.

#### Q Dec Calibration

- Set Qch offset to 107 (see Qch Check step 2).
- Measure carrier leakage ratio.

3. If the carrier leakage ratio is greater than 35 dBc then unit is OK. (offset calibration is complete).
4. If not then repeat steps 1, 2 and 3 above for Qch offset values: 87, 67, 47, 27, 7.
5. If the carrier leakage ratio is still less than 35 dBc then unit is a fail.

### Q Inc Calibration

1. Set Qch offset to 167 (see Qch Check step 2).
2. Measure carrier leakage ratio.
3. If carrier leakage ratio is greater than 35 dBc then unit is OK. (offset calibration is complete).
4. If carrier leakage ratio is less than 35 dBc then repeat steps 1, 2 and 3 above for Qch offset values: 187, 207, 227, 247.
5. If carrier leakage ratio is less than 35 dBc then unit is a fail.

### I, Qch Gain

**IMPORTANT:** I, Qch offset calibration should be done before this calibration.

Spectrum Analyser Setup.

centre frequency = 902.4 MHz

RBW = 10 kHz

VBW = 10 kHz

span = 1 MHz

sweep time = 2 sec

1. Set the Channel box controls to channel 62 at power level 5, normal burst modulated with all 1's.
  - a. Press the down arrow until CHANGE CH > is highlighted and then press ENTER.
  - b. Press the down arrow until PL is highlighted. Press ENTER.
  - c. Press the down arrow until TX DATA is highlighted. Press the move arrow until 1 appears in the highlighted field. Press ENTER.
2. Using the spectrum analyser measure the image leak ratio. Image leak ratio is the measured ratio of peak power and the power at 135 kHz below peak frequency.

Example:

peak power (902.468 Mhz) = 33 dBm

power at 135 kHz below peak power = -9 dBm

image leak ratio = 33 dBm - (-9 dBm) = 42 dBm

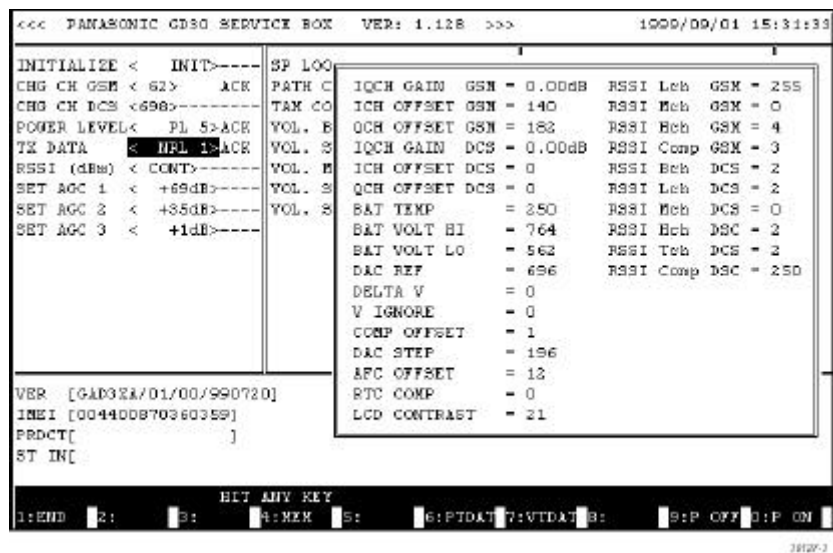


Figure 6.31: Image leak ratio

3. If image leak ratio is greater than 30 dBc then unit is OK. (offset calibration is complete).
4. If image leak ratio is less than 30 dBc then go to Ich gain calibration.

### ***IQch Gain Calibration***

1. Set IQch gain to -0.25 dB.
  - a. On the Channel box press F6, and select TRIM OTHER.
  - b. Press move left arrow until IQCH GAIN field is highlighted. Press ENTER.
  - c. Enter 1 (for -0.25 dB) into the data field. Press ENTER.
2. Measure the image leak ratio.
3. If image leak ratio is greater than 30 dBc then unit is OK. (offset calibration is complete)
4. If image leak ratio is less than 30 dBc then repeat steps 1, 2 and 3 above with IQch gain values: -0.50 dB (enter '2'), and -0.75 dB (enter '3').
5. If image leak ratio is still less than 30 dBc then the unit is a fail.

### **6.5.4 Simple Receiver Test**

The following procedure gives a method by which the Unit Under Test (UUT) can be placed into a condition allowing the service technician to probe the entire receive RF path. Input level and frequency can also be specified.

To perform the following procedure the UUT must first be placed into Test Mode. Perform the following steps:

1. At the Channel box highlight the CHG CH (GSM900 or GSM1800) field and set the required test channel. Press ENTER.
2. Highlight the SET AGC 1,2,3 field and enter the required gain value.
3. At the GSM test unit input an RF signal at the required frequency and level.

The unit has now been placed in a state which will allow the received signal path to be monitored.

### **6.5.5 Simple Transmitter Test**

The following procedure gives a method by which the Unit Under Test (UUT) can be placed into a condition allowing the service technician to probe the entire transmit RF path. Input level and frequency can also be specified.

To perform the following procedure the UUT must first be placed into Test Mode. Perform the following steps:

1. At the Channel box highlight the CHG CH (GSM900 or GSM1800) field and set the required test channel.
2. Press ENTER.
3. Highlight the PL field and set the required test power level.
4. Press ENTER.
5. Highlight the TX\_DATA field and select the required modulation type and data.
6. Press ENTER.

The UUT is now in the required state to allow probing of the transmit RF path.

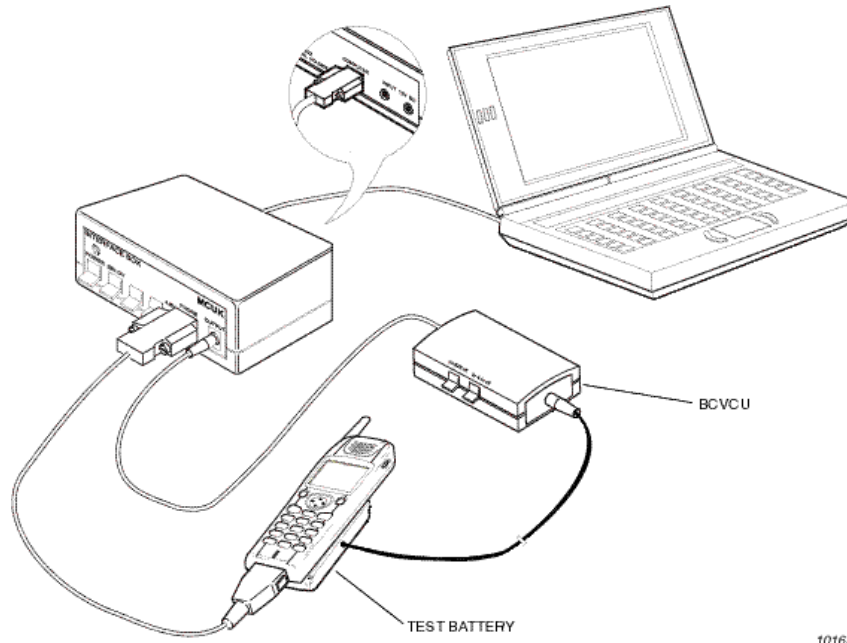


## 6.5.6 Battery Charging & Calibration

There are three procedures to calibrating the battery, voltage, temperature and charging calibration. A Battery Calibration Voltage Control Unit (BCVCU) is used to provide the necessary voltage levels for these checks. The BCVCU replaces the two regulated power supplies and 82 Ohm resistor required to calibrate previous mobile phone products.

### Preliminaries

1. Connect the mobile phone, test battery, BCVCU and Interface Box as shown in the diagram below.



**Figure 6.32: Battery Calibration Test Connections**

2. Set the Interface Box to output to 7.2 V. Leave the power supply switched OFF and set the MODE or EXT PWR switch to OFF.

### Voltage Calibration

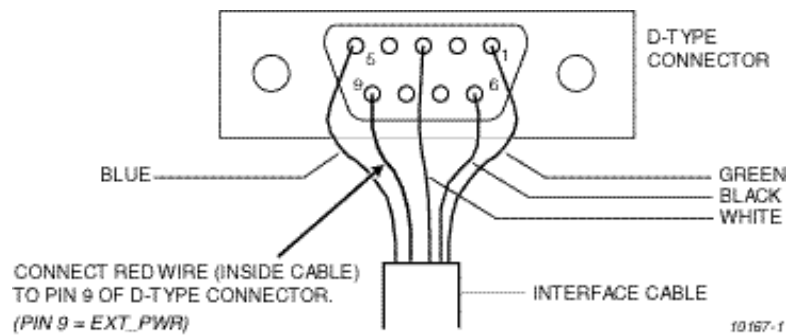
1. Set the BCVCU to 4.1 V (centre position on switch) and set the 82 Ohm switch to OFF.
2. Select and run the Channel Box software in 'Test Mode'.
3. Press [F10] and power the phone on. "TEST SET TEST MODE" should be displayed in the phone display.
4. Press [F4] on the PC. Go to, and select: "VIEW ADC LINES".
5. Look at ADIN1 (BAT VOLT) reading. This reading is "BAT VOLT HIGH". If reading is outside the range 803 and 723, then there is a fault and further investigation is required. Otherwise, record the value for later use.
6. Set the BCVCU output to 3.0 V.
7. Press "[Y]" [enter] on the PC to re-read ADC Data.
8. Look at ADIN1 (BAT VOLT) reading again. This reading is "BAT VOLT LOW". If the reading is not within the range 518 and 598, then there is a fault and further investigation is required. Otherwise, record the value for later use.
9. Press [N] (in repeat yes/no box), then [enter].
10. Press [F6]. Go to, and select: "TRIM Other". Go to, and select: "BAT VOLT HIGH". Enter value from step 5 above.
11. Press [F6]. Go to, and select: "TRIM Other" again. Go to, and select: "BAT VOLT LOW". Enter value from step 8 above. Set the BCVCU output to 4.1 volts.

### Temperature Calibration

1. Ensure that the BCVCU output is set to 4.1 V.
2. If the ADC data is not already being displayed, press [F4], "VIEW ADC LINES", [enter].
3. Look at the value for ADIN3 (BAT TEMP). If the value is outside the range 390 and 428, then there is a fault and further investigation is required. Otherwise, calculate the difference between the reading and the theoretical value of 409. Record this value for use below.
4. Press [N] (in repeat yes/no box), then [enter].
5. Press [F6]. Go to, and select: "TRIM Other" again.
6. Go to, and select: "BAT TEMP". Enter the value recorded in step 3.

## Charging Calibration

**NOTE:** The charging calibration procedure requires an interface cable (part number JT00004), modified as shown in the diagram below, to allow EXT\_PWR to be fed via pin 9 of the D-Type connector to the phone connector.



**Figure 6.33: Modification to Interface Cable JT00004**

1. Ensure that the BCVCU output is set to 4.1 V output and the MODE or EXT\_PWR switch set to ON. Set the 82 Ohms switch ON.
2. Press {shift}+[F4].
3. Go to, and select: "Set DAC Data". Type a value of 714, [enter].
4. Using arrows  $\uparrow\downarrow$ , highlight "Control out". Use  $\leftarrow\rightarrow$  arrows to highlight and select "CRG ON". ("ACK" should be displayed on the PC screen. If it is not displayed, then it may be necessary to re-power the telephone and start the Charging Calibration procedure again from step 1.)
5. Disconnect VBAT by switching the BCVCU output to OFF.
6. Measure VBAT voltage at the test battery. If the voltage is inside the range  $4.1\text{ V} \pm 5\text{ mV}$  then go to step 11 below. Otherwise, calculate the difference thus:-  $(\text{measured voltage} - 4.1)/0.0057 = \text{difference}$ .  
For example, for a measured voltage of 4.08 V the difference will be:  $(4.08 - 4.1) / 0.0057 = -3.5$
7. Press {shift} + [F4].
8. Go to, and select: "Set DAC Data". Enter the value calculated by subtracting the difference value recorded in step 6 from the DAC Data value (714). This value must be an integer.  
As an example, the example from step 6 would produce a value of:  $714 - (-3.5) = 717.5$  or 718 .
9. Repeat steps 6 to 8 until the measured voltage is  $4.1\text{ V} \pm 5\text{ mV}$
10. If the final value for DAC Data is outside the range  $614 \pm 814$ , then there is a fault and further investigation is required. Otherwise store the value as described below.
11. Press [F6]; Go to, and select:- "Trim Other";
12. Go to, and select:- "DAC Reference"; Enter the final DAC data value from step 10.
13. Press {shift}+[F4].
14. Go to, and select:- "Set DAC Data".
15. Enter:- (value stored in step 12) - 200.
16. Press [F4].
17. Go to, and select:- View ADC lines.
18. Read value for ADIN1 ("BAT VOLT").
19. If ["BAT VOLT HIGH" (from Voltage Calibration, step 5) - value read above], is inside the range 255 - 171, then go to step 20 (below) to store value. Otherwise there is a fault and further investigation is required.
20. Press [N] (in repeat yes/no box), then [enter]. Press [F6]; Highlight and select "Trim Other".
21. Highlight and select "DAC Step".
22. Enter value obtained in step 19.
23. Press {shift}+[F4].
24. Select: "Set DAC Data".
25. Re-enter original value from step 10 (i.e. present value +200).
26. Press [F4].
27. Highlight, and select:- "View ADC Lines".
28. Read ADIN5 (CRG CURRENT) value and record it as "Total current".
29. On the BCVCU, set the 82 Ohm switch to OFF.

30. Press [Y], [enter] to read ADC value again, and record it as "Phone current".
31. Calculate the Charge current ("Total current" - "Phone current"). If this outside the range 37 and 49, then there is a fault and further investigation is required. Otherwise, calculate the offset thus:- "Charging current" - 43.
32. Press [N] (in repeat yes/no box), then [enter]. Press [F6]
33. Go to, and select:- "TRIM other".
34. Go to, and select:- "Complete offset". Enter the offset value calculated in step 31.
35. Press [F9], wait for the prompt "Saving EV Trim Data" to disappear, turn OFF power supplies and remove the telephone.

## 6.6 Lock Code

**NOTE:** See Section 6.2.1 for a list of the equipment and setup procedures required to perform the following adjustment and calibration procedures.

To perform the following procedures the UUT must be placed into Test Mode.

### 6.6.1 Check current lock code

1. At the Channel box press F4 and highlight VIEW LOCK CONDITION. Press ENTER.

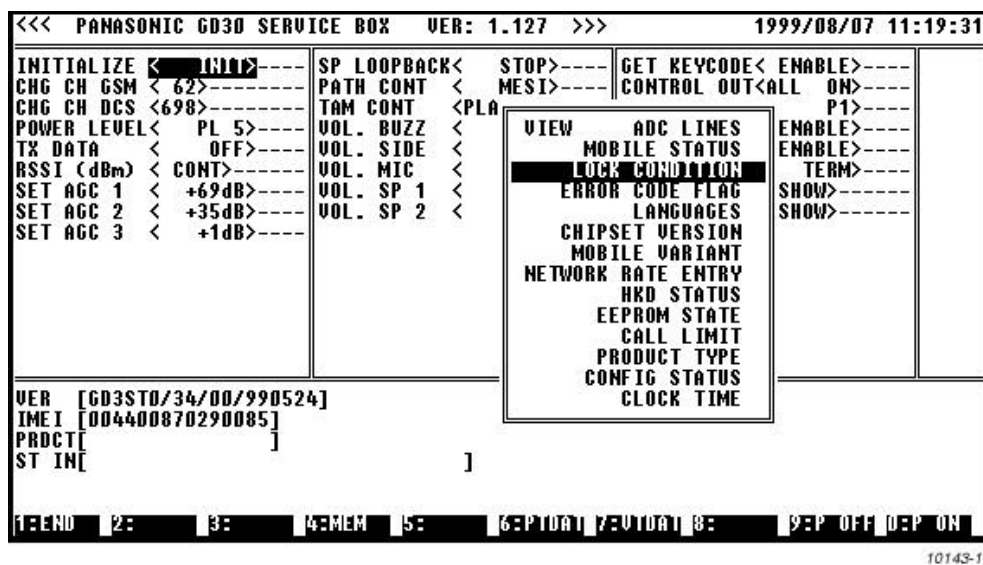


Figure 6.34: View lock code 1

2. The display will show the current lock status and lock code for the Unit Under Test.

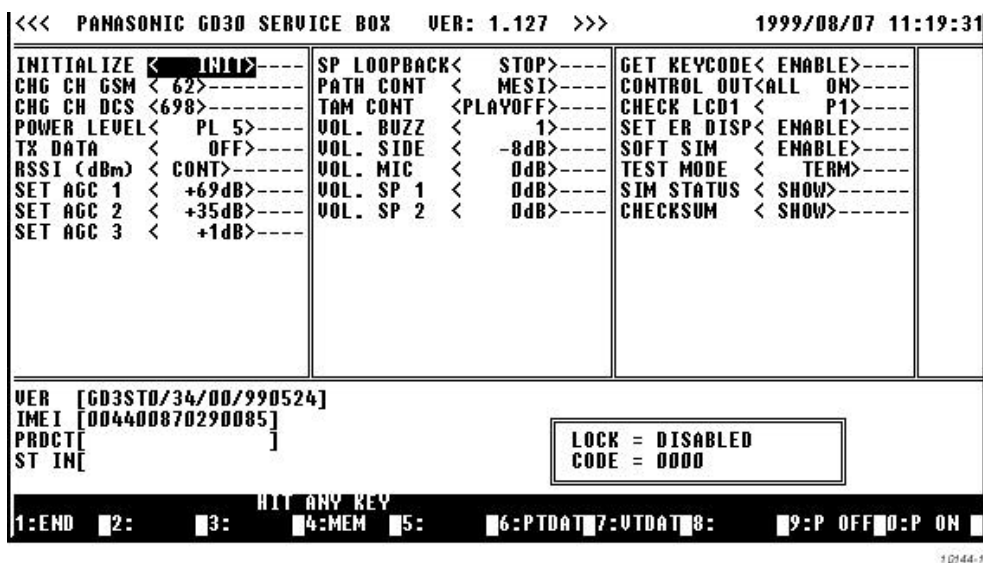


Figure 6.35: View lock code 2

## 6.6.2 Change current lock code

1. At the Channel box press SHIFT and F4 and highlight PROG LOCK CONDITION. Press ENTER.
2. Press ENTER to unlock the Unit Under Test. The current lock code will be used.

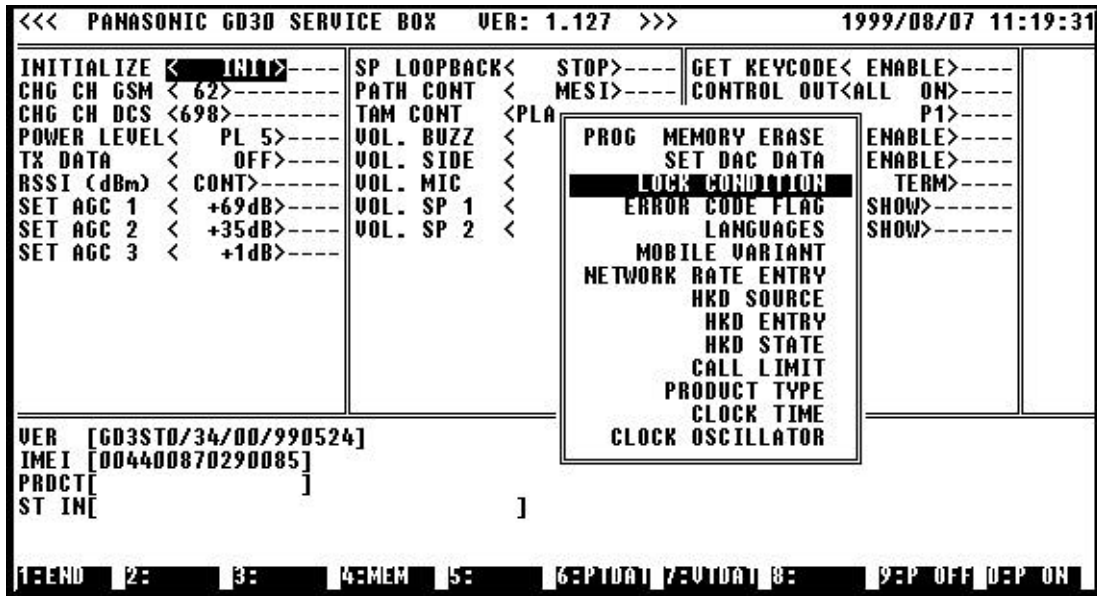
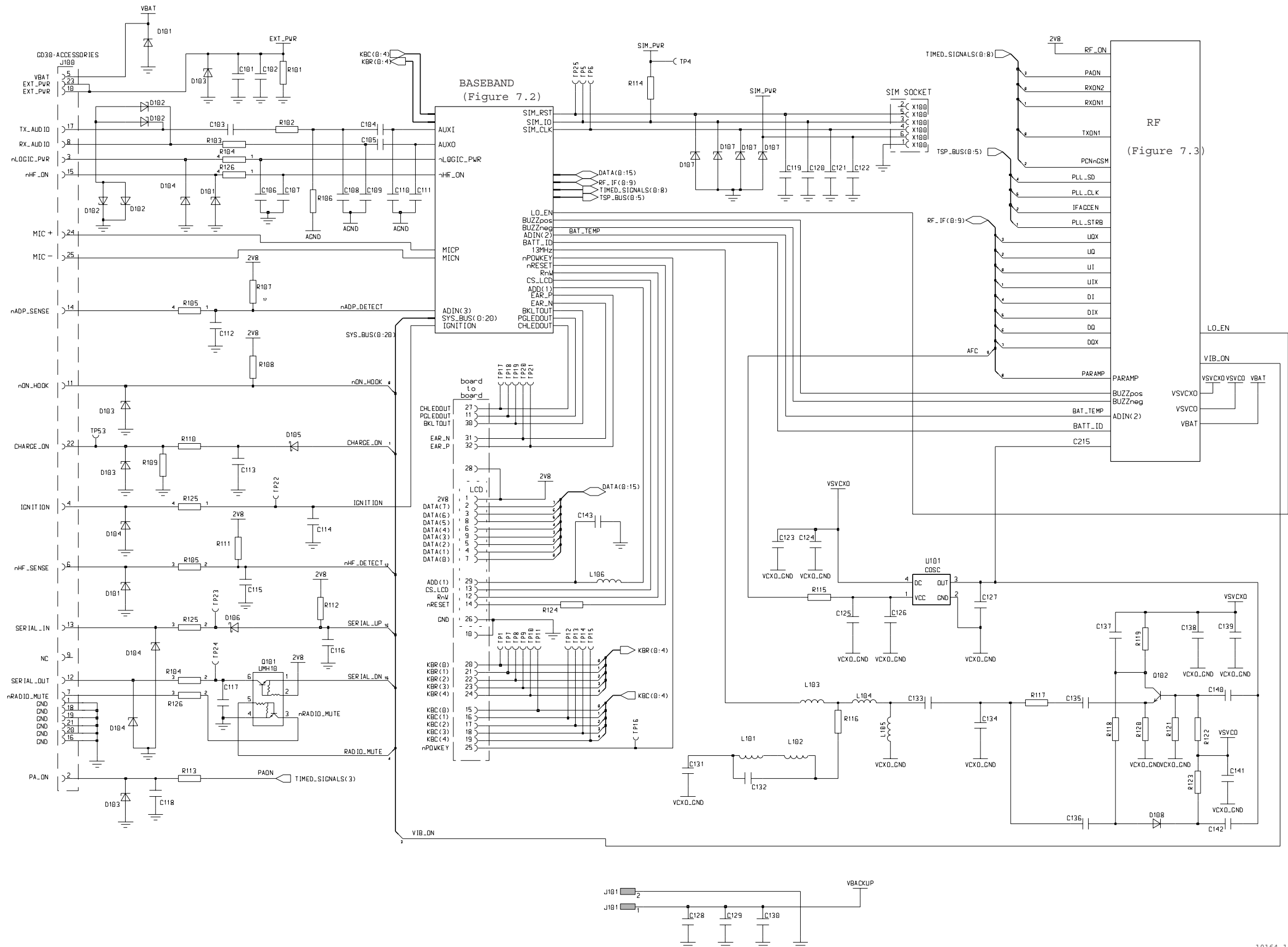


Figure 6.36: Change program lock code

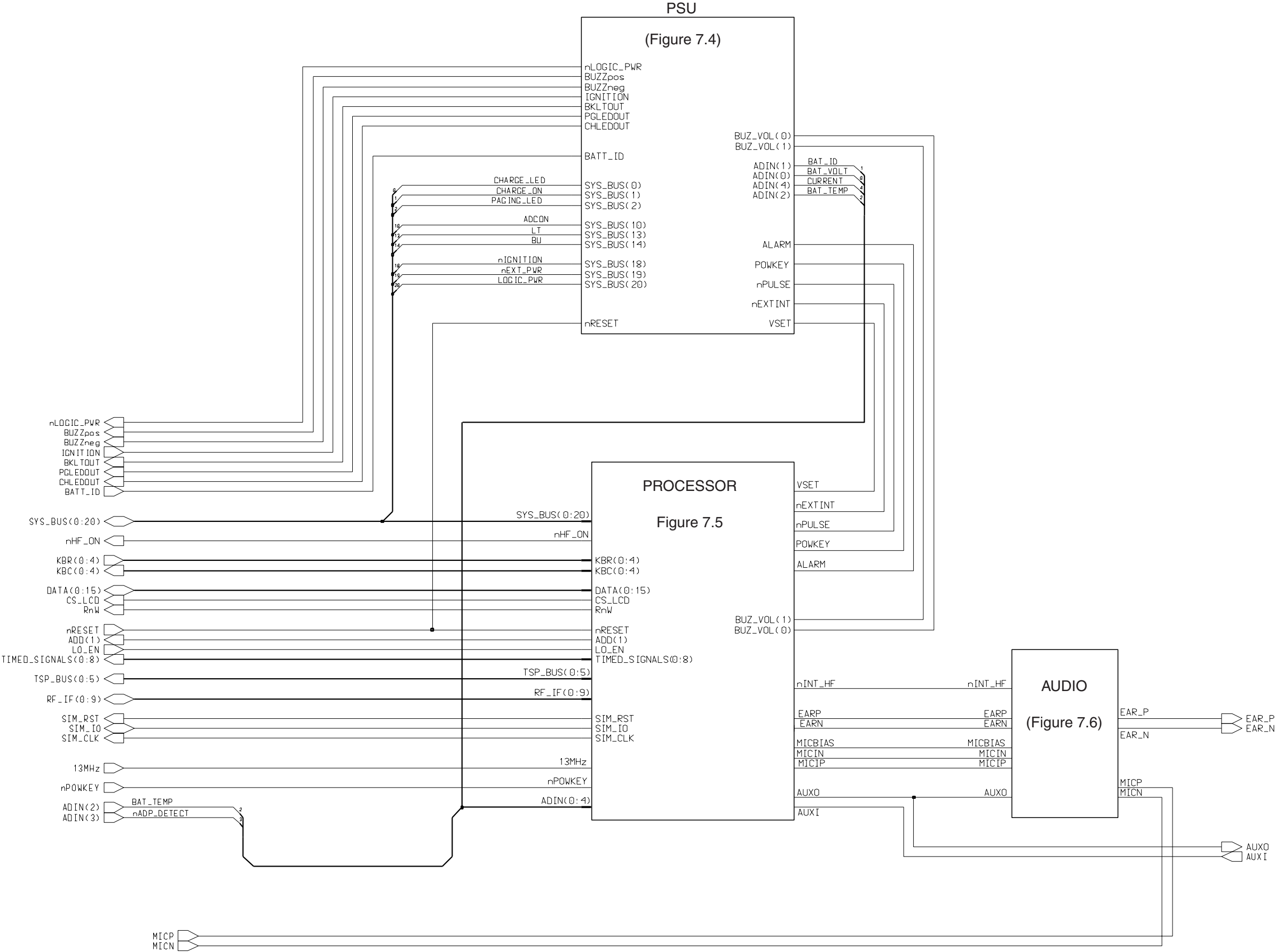
3. Enter "0000" to reset and lock the Unit Under Test to the factory default lock code "0000".

## 7 CIRCUIT DIAGRAMS

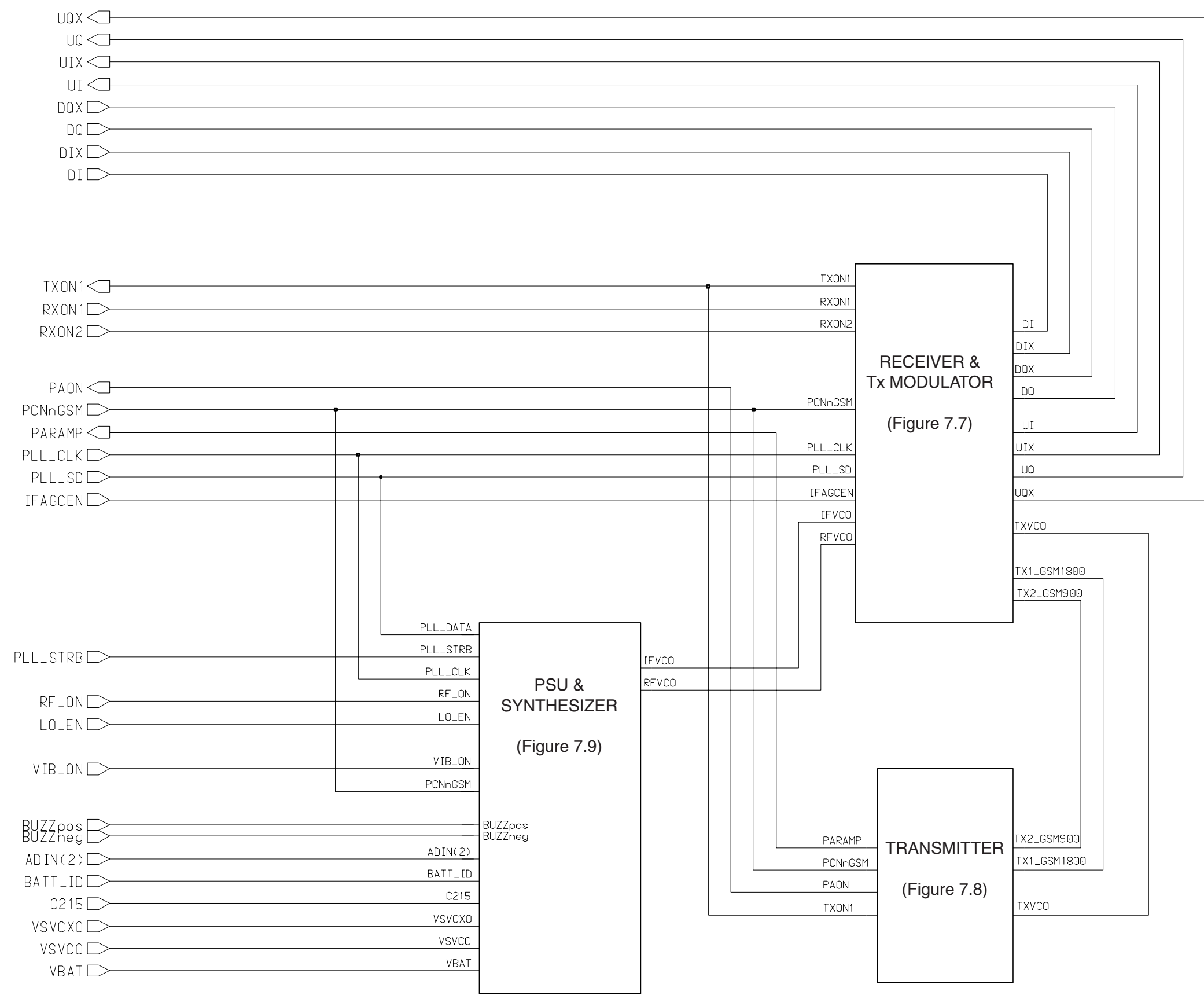
### 7.1 Main PCB: Top Level Diagram



7.2 Main PCB: Baseband Overview



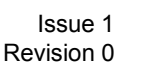
7.3 Main PCB: RF Overview



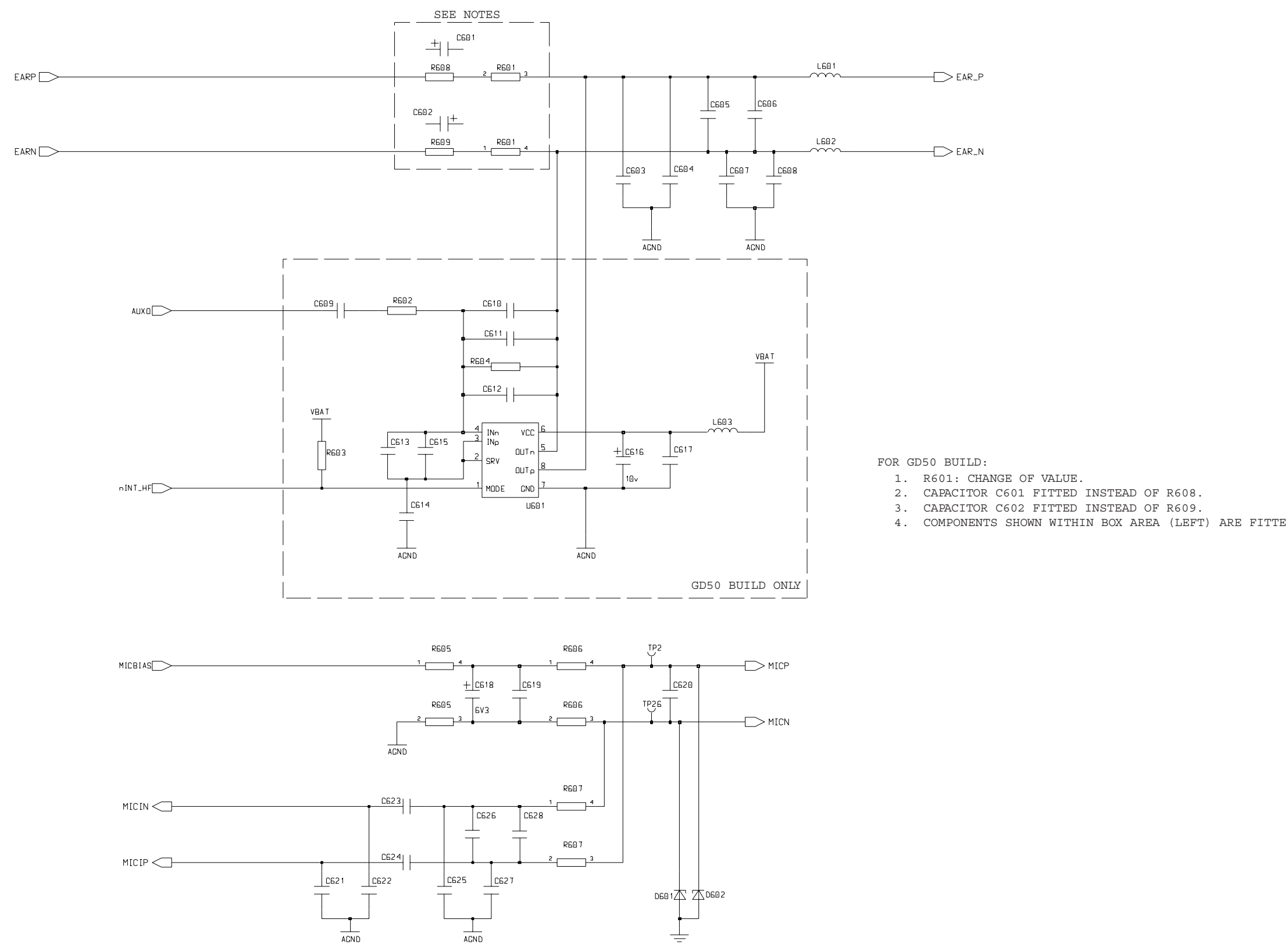
10166-1



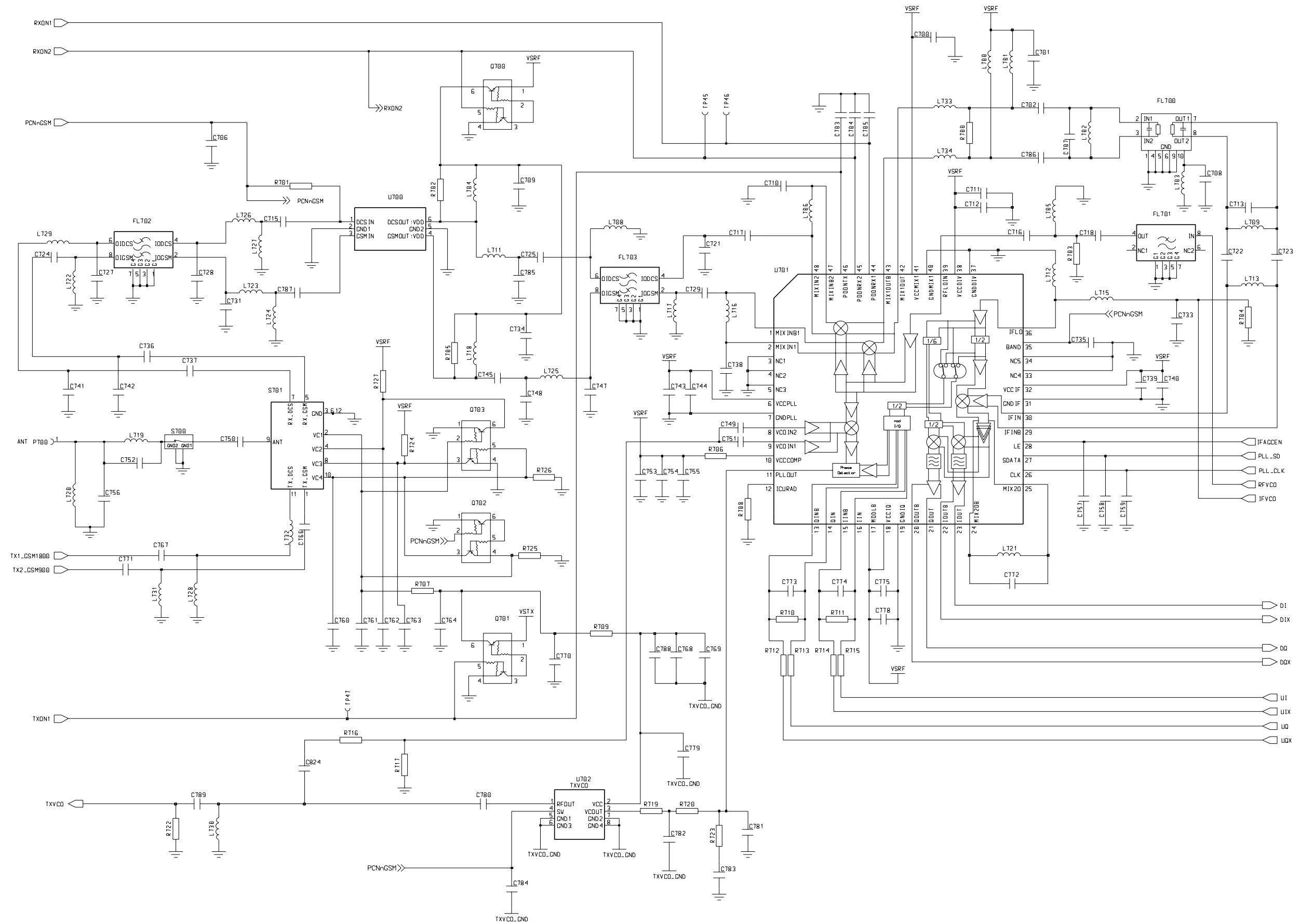




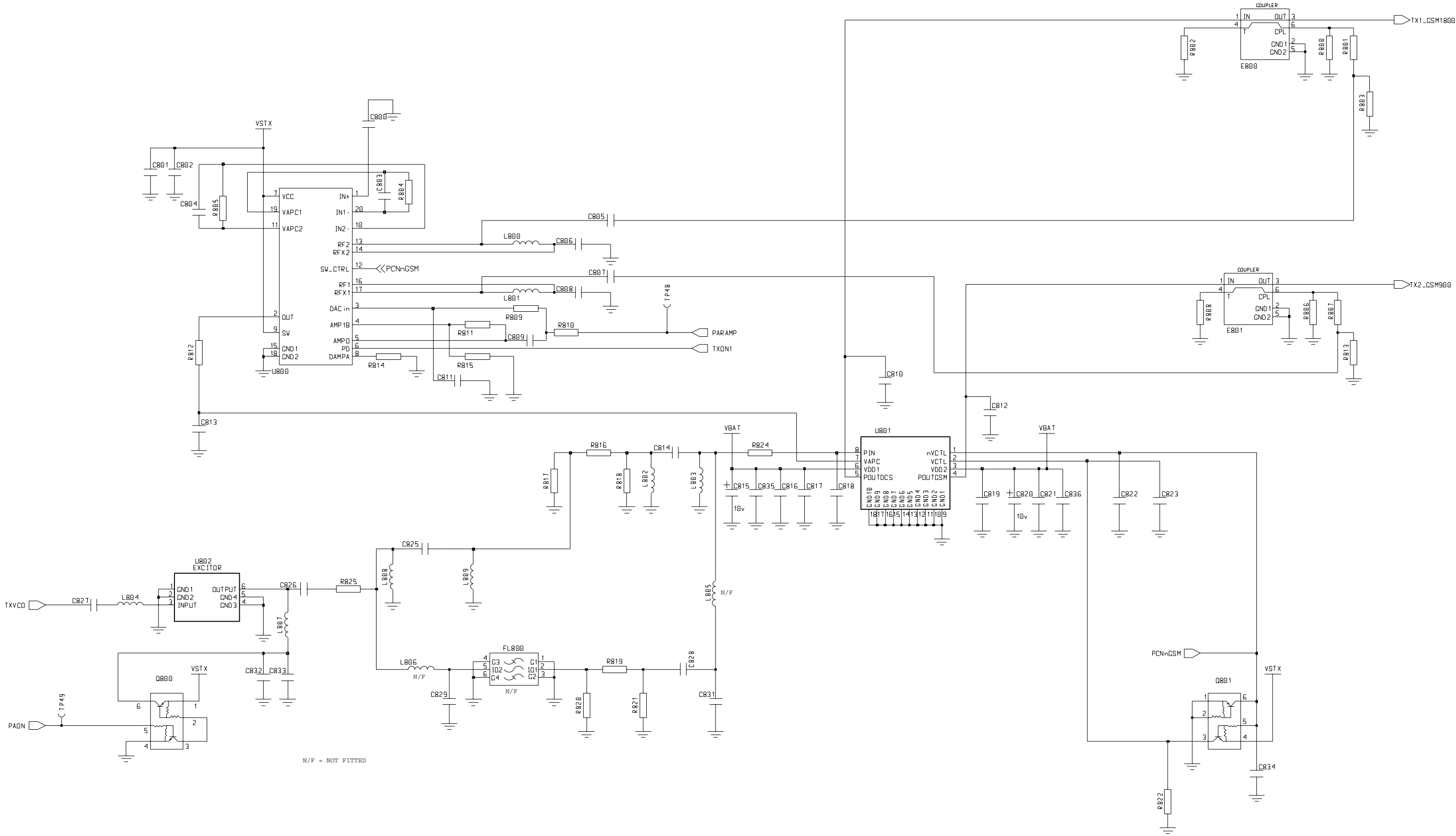
7.6 Main PCB: Audio

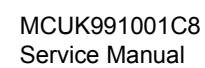


## 7.7 Main PCB: Receiver and Tx Modulator

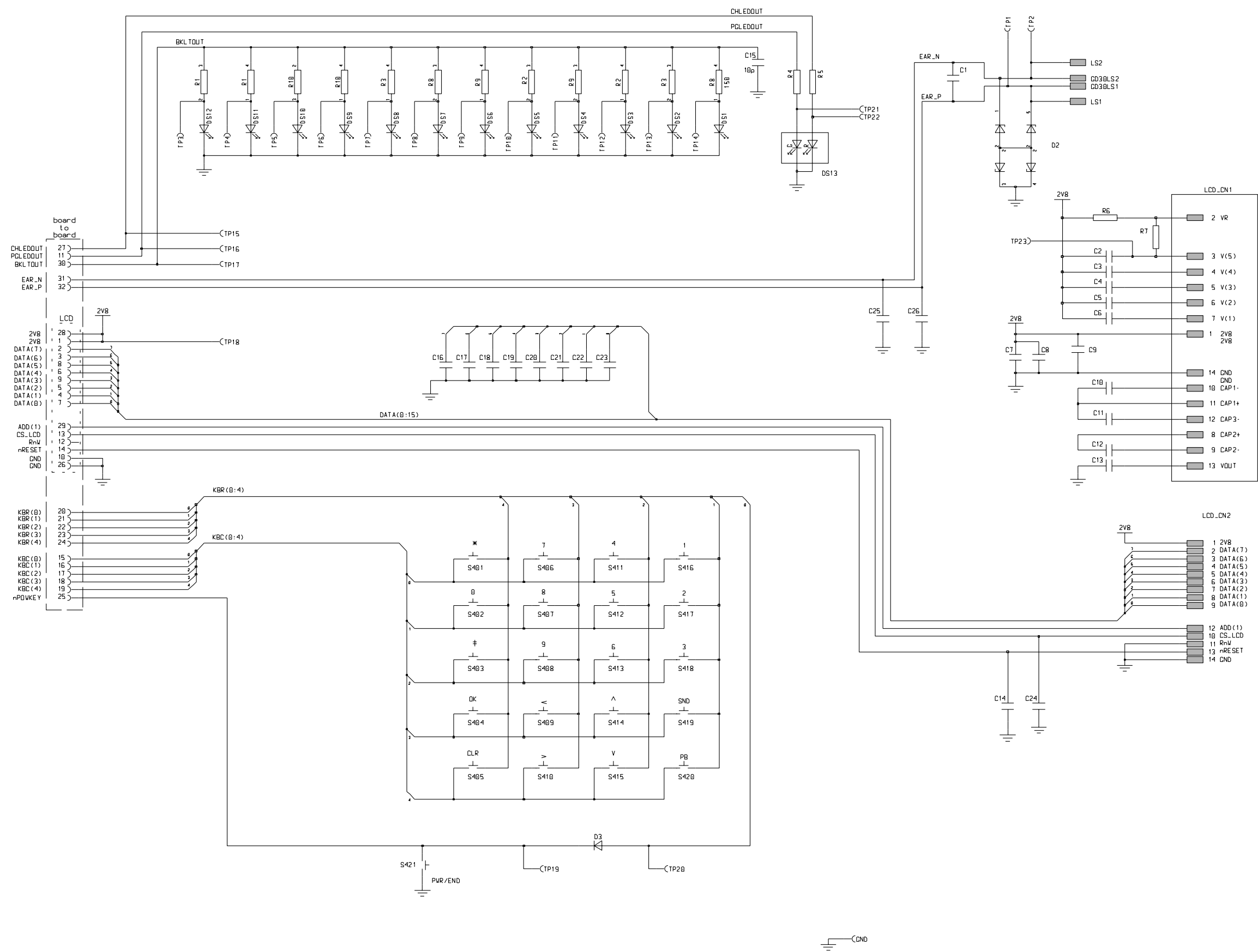


7.8 Main PCB: Transmitter



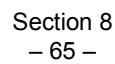


7.10Keypad PCB

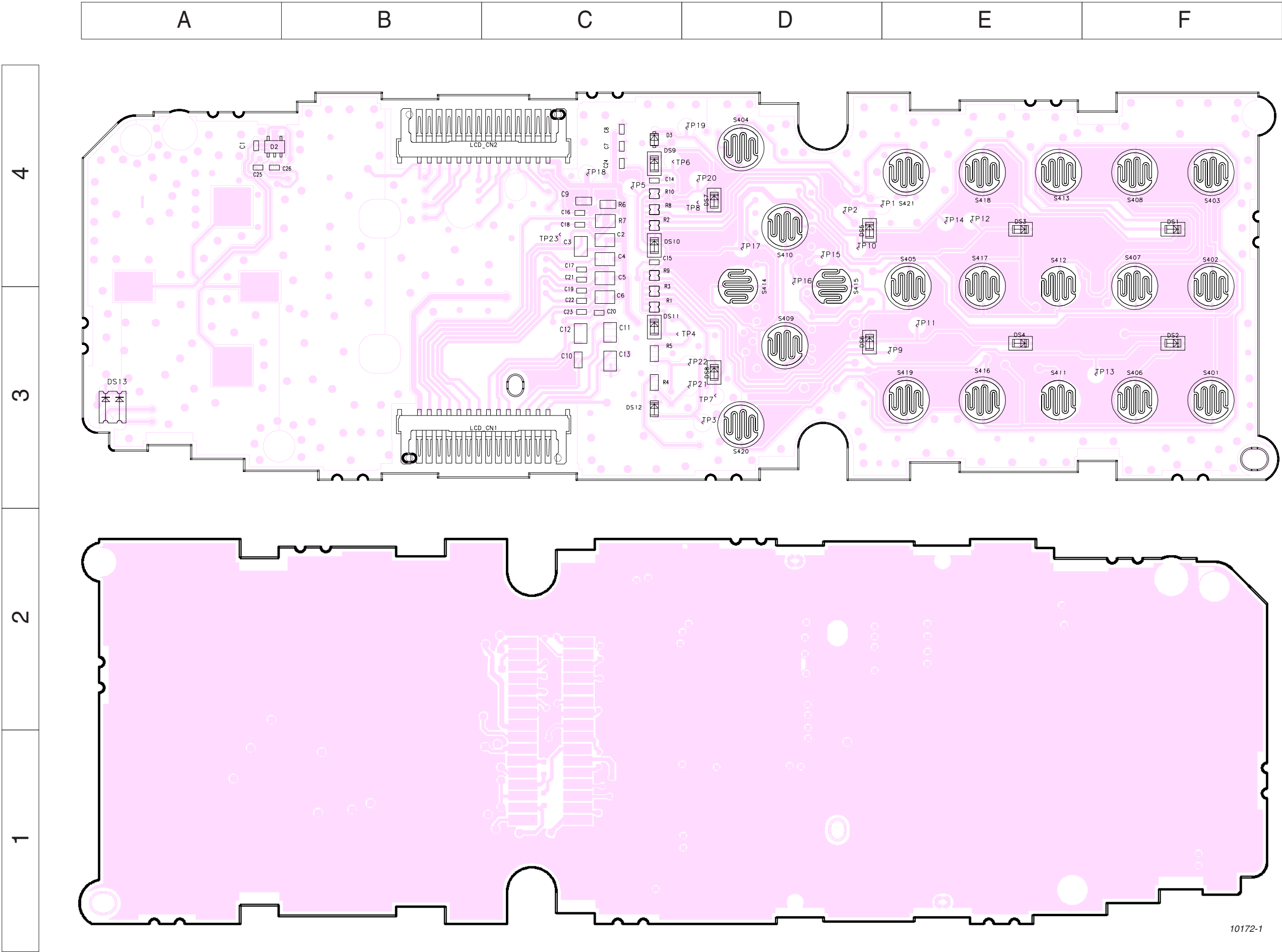




MCUK991001C8  
Service Manual



8.2 Keypad PCB



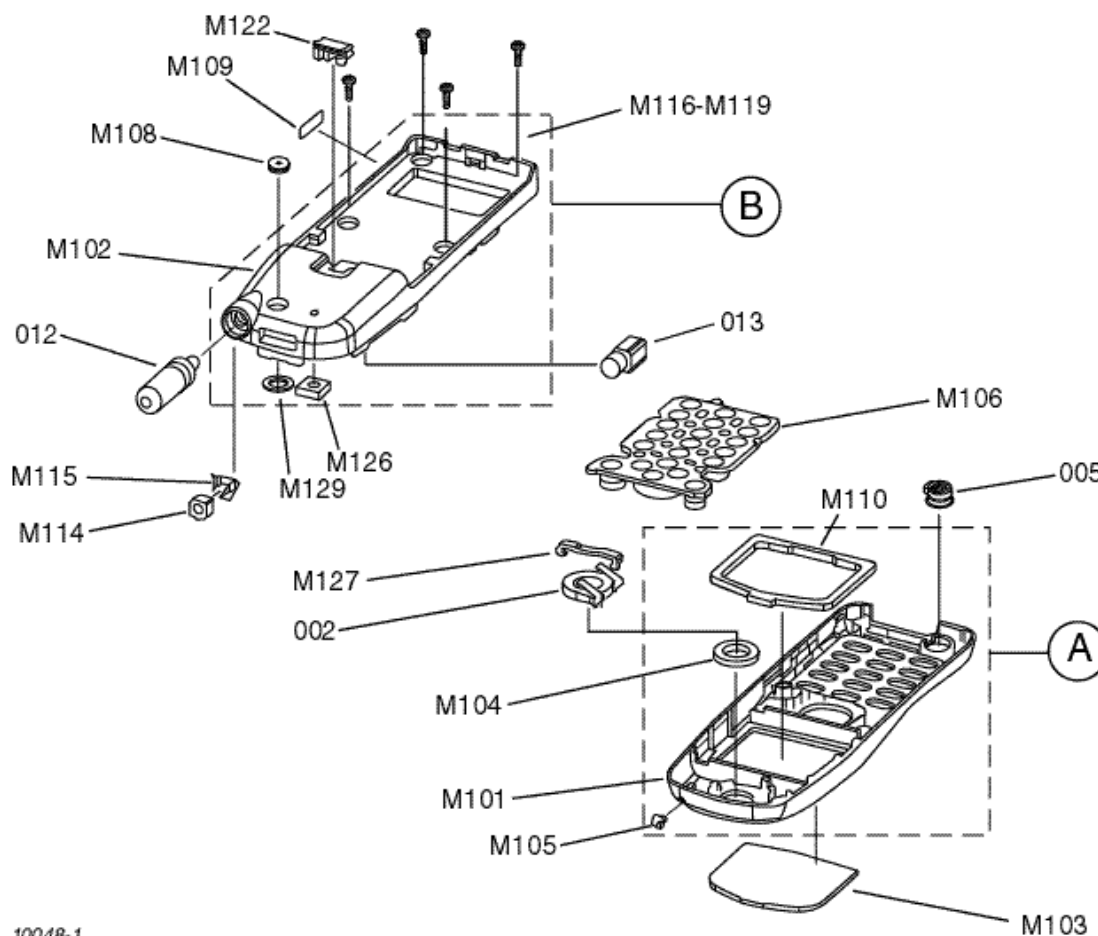
10172-1



## 9 REPLACEMENT PARTS LIST

### 9.1 Case Parts and Sub-Assemblies

#### 9.1.1 GD30 Case Parts



10048-1

Figure 9.1: GD30 Case Parts

| Ref  | Part Number | Description                 |
|------|-------------|-----------------------------|
| M103 | 2EA551AA    | LCD PANEL, STD<br>PANASONIC |
| M106 | 2BA517BAAA  | KEYPAD                      |
| M108 | 6RA507A     | CAP                         |
| M109 | G5MDS002C   | PATENT LABEL                |
| M114 | 4GA545A     | ANTENNA NUT                 |
| M115 | 4GA543A     | ANTENNA TERMINAL            |
| M116 | 3Z70054B    | SCREW, M1.6 x 6mm           |
| M117 | "           | " "                         |
| M118 | "           | " "                         |
| M119 | "           | " "                         |
| M122 | 2AA502A     | BATTERY HOOK                |
| M123 | 4N70042A    | BATTERY SPRING              |
| M127 | 2RA506AACA  | RECEIVER RETAINER           |
| 002  | HH76009A    | RECEIVER                    |
| 005  | 9ZA652A     | MICROPHONE ASSEMBLY         |
| 012  | AN76031A    | ANTENNA                     |
| 013  | BD76013A    | VIBRATE MOTOR ASSEMBLY      |

| Ref          | Part Number       | Description                        |
|--------------|-------------------|------------------------------------|
| <b>A</b>     | <b>GD30CVR01B</b> | <b>GD30 Cover (Service) Blue</b>   |
| <b>A</b>     | <b>GD30CVR01K</b> | <b>GD30 Cover (Service) Black</b>  |
| <b>A</b>     | <b>GD30CVR01S</b> | <b>GD30 Cover (Service) Silver</b> |
| consists of: |                   |                                    |
| M101         | 1GA532AA**        | GD30 COVER, COLOURED               |
| M104         | 6HA623A           | RECEIVER CUSHION                   |
| M105         | 2QA543A           | INDICATOR                          |
| M110         | 6HA617A           | LCD CUSHION                        |
| <b>B</b>     | <b>GD30CAS01</b>  | <b>Case Assembly (Service)</b>     |
| consists of: |                   |                                    |
| M102         | 1HA519B           | GD30/GD50 CASE BACK                |
| M126         | 6HA661A           | BUZZER CUSHION                     |
| M129         | 6HA567A           | CUSHION (EXT. ANT. CONN.)          |



### Figure 9.2: GD50 Case Parts

| Ref  | Part Number | Description                 |
|------|-------------|-----------------------------|
| M103 | 2EA563AA    | LCD PANEL, STD<br>PANASONIC |
| M106 | 2BA518AA    | KEYPAD                      |
| M108 | 6RA507A     | CAP                         |
| M109 | G5MDS002C   | PATENT LABEL                |
| M114 | 4GA545A     | ANTENNA NUT                 |
| M115 | 4GA543A     | ANTENNA TERMINAL            |
| M116 | 6FA513A     | SCREW, M1.6 x 6mm           |
| M117 | "           | " "                         |
| M118 | "           | " "                         |
| M119 | "           | " "                         |
| M122 | 2AA502A     | BATTERY HOOK                |
| M123 | 4N70042A    | BATTERY SPRING              |
| M127 | 2RA516B     | RECEIVER RETAINER           |
| 002  | HH76002A    | RECEIVER                    |
| 005  | 9ZA652A     | MICROPHONE ASSEMBLY         |
| 012  | AN76031A    | ANTENNA                     |
| 013  | BD76013A    | VIBRATE MOTOR ASSEMBLY      |

| Ref          | Part Number                                                                      | Description                                                                                                                                    |
|--------------|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A</b>     | <b>GD50CVR01B</b><br><b>GD50CVR01K</b><br><b>GD50CVR01N</b><br><b>GD50CVR01Y</b> | <b>GD50 Cover (Service) Blue</b><br><b>GD50 Cover (Service) Black</b><br><b>GD50 Cover (Service) Green</b><br><b>GD50 Cover (Service) Grey</b> |
| consists of: |                                                                                  |                                                                                                                                                |
| M101         | 1GA539AA**                                                                       | GD50 COVER, COLOURED                                                                                                                           |
| M104         | 6HA654A                                                                          | RECEIVER CUSHION                                                                                                                               |
| M105         | 2QA555A                                                                          | INDICATOR                                                                                                                                      |
| M110         | 6HA617A                                                                          | LCD CUSHION                                                                                                                                    |
| <b>B</b>     | <b>GD30CAS01</b>                                                                 | <b>Case Assembly (Service)</b>                                                                                                                 |
| consists of: |                                                                                  |                                                                                                                                                |
| M102         | 1HA519B                                                                          | GD30/GD50 CASE BACK                                                                                                                            |
| M126         | 6HA622A                                                                          | BUZZER CUSHION                                                                                                                                 |
| M129         | 6HA567A                                                                          | CUSHION (EXT. ANT. CONN.)                                                                                                                      |

### 9.1.3 GD30 and GD50 Sub-Assemblies

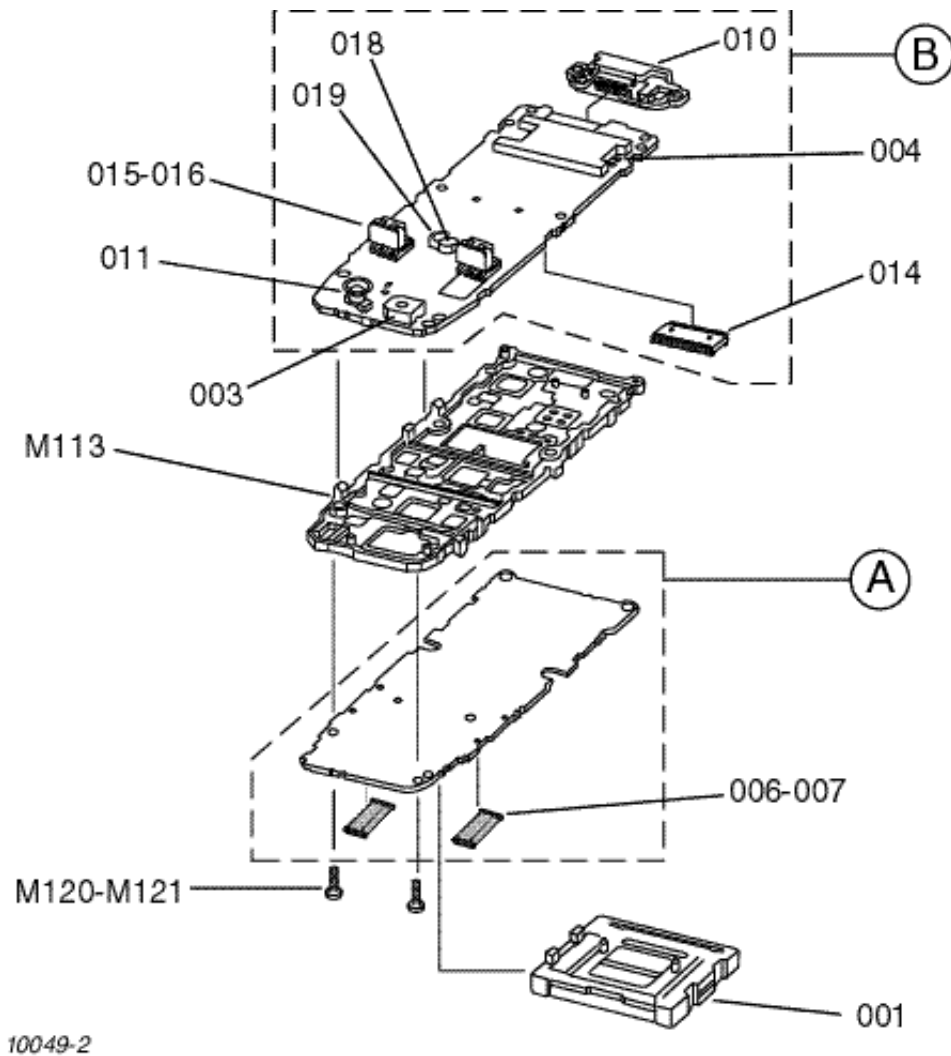


Figure 9.3: GD30/GD50 Sub-Assemblies

| Ref       | Part Number       | Description                | Ref       | Part Number       | Description                           |
|-----------|-------------------|----------------------------|-----------|-------------------|---------------------------------------|
| M113      | 2FA525A           | CHASSIS                    | <b>B</b>  | (see Sect. 7.2.2) | <b>Main PCB Assembly</b>              |
| M120      | 3Z70054B (GD30)   | SCREW M1.6 x 6mm           | includes: |                   |                                       |
| M121      | 6FA513A (GD50)    | " "                        | 003       | HB76004B          | BUZZER                                |
| 001       | EB-QB03D30UK      | LCD MODULE                 | 004       | JS8A00005         | SIM HOLDER                            |
| <b>A</b>  | <b>GD30KPCB01</b> | <b>Keypad PCB Assembly</b> | 010       | JA76020B          | I/O CONNECTOR                         |
| includes: |                   |                            | 011       | PY76011B          | RF CONNECTOR                          |
| 006       | K1MZ14A00001      | LCD CONNECTOR              | 014       | PY76018A          | MAIN PCB-TO-KEYBOARD<br>PCB CONNECTOR |
| 007       |                   |                            | 015       | JJ76002A          | BATTERY CONTACT                       |
|           |                   |                            | 016       |                   |                                       |
|           |                   |                            | 018       | ML616S            | BACKUP BATTERY                        |
|           |                   |                            | 019       | K3ZZ00200009      | HOLDER, BACKUP BATTERY                |

## 9.2 Printed Circuit Boards (PCBs)

### 9.2.1 Main PCB: Variants

| Model: EB-GD30 & EB-GD50 |             |            | Name: Main PCB (Variants)        |
|--------------------------|-------------|------------|----------------------------------|
| Ref.                     | Part Number |            | Description                      |
|                          | GD30        | GD50       |                                  |
| 003                      | GD30BRD001  | GD50BRD001 | MAIN PCB STANDARD PROGRAM        |
| 003                      | GD30BRD002  | GD50BRD002 | MAIN PCB BINARING PROGRAM        |
| 003                      | GD30BRD003  | GD50BRD003 | MAIN PCB CELCOM PROGRAM          |
| 003                      | GD30BRD004  | GD50BRD004 | MAIN PCB AIRTEL PROGRAM          |
| 003                      | GD30BRD005  | GD50BRD005 | MAIN PCB EUROTEL PROGRAM         |
| 003                      | GD30BRD006  | GD50BRD006 | MAIN PCB MOVISTAR PROGRAM        |
| 003                      | GD30BRD007  | GD50BRD007 | MAIN PCB S.F.R PROGRAM           |
| 003                      | GD30BRD008  | GD50BRD008 | MAIN PCB WESTEL PROGRAM          |
| 003                      | GD30BRD009  | GD50BRD009 | MAIN PCB HUTCHISON PROGRAM       |
| 003                      | GD30BRD010  | GD50BRD010 | MAIN PCB PLUS GSM PROGRAM        |
| 003                      | GD30BRD011  | GD50BRD011 | MAIN PCB TURKCELL PROGRAM        |
| 003                      | GD30BRD012  | GD50BRD012 | MAIN PCB FRANCETEL PROGRAM       |
| 003                      | GD30BRD013  | GD50BRD013 | MAIN PCB FT FTMS PROGRAM         |
| 003                      | GD30BRD014  | GD50BRD014 | MAIN PCB TELESTET PROGRAM        |
| 003                      | GD30BRD015  | GD50BRD015 | MAIN PCB ACTIVA PROGRAM          |
| 003                      | GD30BRD016  | GD50BRD016 | MAIN PCB TMN PROGRAM             |
| 003                      | GD30BRD017  | GD50BRD017 | MAIN PCB PANNON PROGRAM          |
| 003                      | GD30BRD018  | GD50BRD018 | MAIN PCB VODACOM PROGRAM         |
| 003                      | GD30BRD019  | GD50BRD019 | MAIN PCB NETCOM PROGRAM          |
| 003                      | GD30BRD020  | GD50BRD020 | MAIN PCB K.P.N PROGRAM           |
| 003                      | GD30BRD021  | GD50BRD021 | MAIN PCB MOBILCOM PROGRAM        |
| 003                      | GD30BRD022  | GD50BRD022 | MAIN PCB TELSTRA PROGRAM         |
| 003                      | GD30BRD023  | GD50BRD023 | MAIN PCB E.R.A PROGRAM           |
| 003                      | GD30BRD024  | GD50BRD024 | MAIN PCB PAYT VODAFONE PROGRAM   |
| 003                      | GD30BRD025  | GD50BRD025 | MAIN PCB CHINESE ENABLED PROGRAM |

### 9.2.2 Main PCB: Common Items

| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| C101                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | F2   |
| C102                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | F2   |
| C103                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | F2   |
| C104                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | E2   |
| C105                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | F2   |
| C106                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | F2   |
| C107                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | F1   |
| C108                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | F2   |
| C109                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | F2   |
| C110                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | E2   |
| C111                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | F2   |
| C112                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | F1   |
| C113                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | F2   |
| C114                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | F2   |
| C115                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | F1   |
| C116                     | ECUE1H102KBQ | CAP CER 1nF 10% 50V X7R SMD 10 | F1   |
| C117                     | ECUE1H102KBQ | CAP CER 1nF 10% 50V X7R SMD 10 | F2   |
| C118                     | ECUE1H331KBQ | CAP CER 330pF 10% 50V X7R SMD  |      |
| C119                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | E2   |
| C120                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | E2   |
| C122                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | E2   |
| C123                     | ECUE1H102KBQ | CAP CER 1nF 10% 50V X7R SMD 10 | C2   |
| C124                     | ECUE1H101JCQ | CAP CER 100pF 5% 50V NP0 SMD 1 | C2   |
| C125                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | C2   |
| C127                     | ECUE1H040CCQ | CAP CER 4pF +/-0.25pF 50V NP0  | C2   |
| C128                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | D4   |
| C129                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | D4   |
| C130                     | ECUE1H030CCQ | CAP CER 3pF +/-0.25pF 50V NP0  | D4   |
| C131                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | C4   |
| C132                     | ECUE1H101JCQ | CAP CER 100pF 5% 50V NP0 SMD 1 | C4   |

| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| C133                     | ECUE1H102KBQ | CAP CER 1nF 10% 50V X7R SMD 10 | C4   |
| C135                     | ECUE1E271KBQ | CAP CER 270pF 10% 25V X7R SMD  | C4   |
| C136                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 |      |
| C137                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | D2   |
| C138                     | ECUE1H101JCQ | CAP CER 100pF 5% 50V NP0 SMD 1 | D2   |
| C139                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | D2   |
| C140                     | ECUE1H102KBQ | CAP CER 1nF 10% 50V X7R SMD 10 | C4   |
| C141                     | ECUE1H101JCQ | CAP CER 100pF 5% 50V NP0 SMD 1 | D4   |
| C142                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 |      |
| C401                     | ECJ1VB1C104K | CAP CER 100nF 10% 16V X7R SMD  | D1   |
| C402                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | D1   |
| C403                     | ECUE1H102KBQ | CAP CER 1nF 10% 50V X7R SMD 10 | E2   |
| C404                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | D1   |
| C405                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | D1   |
| C407                     | ECUE1H102KBQ | CAP CER 1nF 10% 50V X7R SMD 10 | D1   |
| C408                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | D1   |
| C409                     | F3E0J1060006 | CAP TANT 10uF 20% 6.3V SMD CAS | B3   |
| C410                     | F3E0J1060006 | CAP TANT 10uF 20% 6.3V SMD CAS | B3   |
| C411                     | F3F1A1060002 | CAP TANT 10uF 20% 10V SMD CASE | E1   |
| C412                     | YTAJB336M006 | CAP TANT 33uF 20% 6V3 SMD CASE | E1   |
| C413                     | YTAJB336M006 | CAP TANT 33uF 20% 6V3 SMD CASE | E1   |
| C414                     | ECST1CZ474R  | CAP TANT 0.47uF 20% 16V SMD CA | E1   |
| C415                     | F3E0J1060006 | CAP TANT 10uF 20% 6.3V SMD CAS | E1   |
| C416                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | F1   |
| C417                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | F1   |
| C501                     | ECJ1VB1C104K | CAP CER 100nF 10% 16V X7R SMD  | E1   |
| C502                     | ECJ1VB1C104K | CAP CER 100nF 10% 16V X7R SMD  | F1   |
| C503                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | E2   |
| C505                     | ECST1CZ474R  | CAP TANT 0.47uF 20% 16V SMD CA | E2   |
| C506                     | F3F1A1060002 | CAP TANT 10uF 20% 10V SMD CASE | F1   |
| C507                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | E1   |

| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| C508                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | B4   |
| C509                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | C4   |
| C510                     | F3E0J1060006 | CAP TANT 10uF 20% 6.3V SMD CAS | C3   |
| C511                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | C3   |
| C512                     | F3E0J1060006 | CAP TANT 10uF 20% 6.3V SMD CAS | B4   |
| C513                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | B4   |
| C514                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | C3   |
| C515                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | E2   |
| C516                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | E2   |
| C517                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | E2   |
| C518                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | E2   |
| C519                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | E2   |
| C520                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | E2   |
| C521                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | E1   |
| C522                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | D2   |
| C523                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | E1   |
| C524                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | E2   |
| C525                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | E2   |
| C526                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | E2   |
| C527                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | B3   |
| C528                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | E1   |
| C529                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | B4   |
| C530                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | C3   |
| C531                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | C3   |
| C532                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  |      |
| C533                     | ECJ1VB1C104K | CAP CER 100nF 10% 16V X7R SMD  | F1   |
| C603                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | C2   |
| C604                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | C2   |
| C605                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | C2   |
| C606                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | C2   |
| C607                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | C2   |

| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| C608                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | C2   |
| C618                     | ECST0JZ106R  | CAP TANT 10uF 20% 6.3V SMD CAS | F2   |
| C619                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | F2   |
| C620                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | A4   |
| C621                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 |      |
| C622                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | E2   |
| C623                     | YCCIX024K333 | CAP CER 33nF 10% 10V X5R SMD 1 | E2   |
| C624                     | YCCIX024K333 | CAP CER 33nF 10% 10V X5R SMD 1 | E2   |
| C625                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | F2   |
| C626                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | F2   |
| C627                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | F2   |
| C628                     | YCCIX027K223 | CAP CER 22nF 10% 16V X7R SMD 1 | F2   |
| C700                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | B1   |
| C701                     | ECUE1H391KBQ | CAP CER 390pF 10% 50V X7R SMD  | B1   |
| C702                     | ECUE1H471KBQ | CAP CER 470pF 10% 50V X7R SMD  | E3   |
| C703                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | B1   |
| C704                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | B1   |
| C705                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | B1   |
| C706                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | B1   |
| C707                     | ECUE1H020CCQ | CAP CER 2pF +/-0.25pF 50V NP0  | E3   |
| C708                     | ECUE1H010CCQ | CAP CER 1pF +/-0.25pF 50V NP0  | E3   |
| C709                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | B1   |
| C710                     | ECUE1H020CCQ | CAP CER 2pF +/-0.25pF 50V NP0  | B1   |
| C711                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | B1   |
| C712                     | ECUE1H470JCQ | CAP CER 47pF 5% 50V NP0 SMD 10 | B1   |
| C715                     | ECUE1H101JCQ | CAP CER 100pF 5% 50V NP0 SMD 1 | B1   |
| C716                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | B1   |
| C717                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | B1   |
| C718                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | B1   |
| C721                     | ECUE1H010CCQ | CAP CER 1pF +/-0.25pF 50V NP0  | B1   |
| C722                     | ECUE1H040CCQ | CAP CER 4pF +/-0.25pF 50V NP0  | E3   |

| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| C723                     | ECUE1H040CCQ | CAP CER 4pF +/-0.25pF 50V NP0  | E3   |
| C724                     | ECUE1H101JCQ | CAP CER 100pF 5% 50V NP0 SMD 1 | A1   |
| C725                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | B1   |
| C728                     | ECUE1H0R5CCQ | CAP CER 0.5pF +/-0.25pF 50V NP | B1   |
| C729                     | ECUE1H030CCQ | CAP CER 3pF +/-0.25pF 50V NP0  | B1   |
| C733                     | ECUE1H080DCQ | CAP CER 8pF +/-0.5pF 50V NP0 S | B1   |
| C734                     | ECUE1H470JCQ | CAP CER 47pF 5% 50V NP0 SMD 10 | B1   |
| C735                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | B1   |
| C736                     | ECUE1H101JCQ | CAP CER 100pF 5% 50V NP0 SMD 1 | F3   |
| C737                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | F3   |
| C738                     | ECUE1H020CCQ | CAP CER 2pF +/-0.25pF 50V NP0  | B1   |
| C739                     | ECUE1H102KBQ | CAP CER 1nF 10% 50V X7R SMD 10 | B1   |
| C740                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | B1   |
| C743                     | ECUE1H102KBQ | CAP CER 1nF 10% 50V X7R SMD 10 | B1   |
| C744                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | B1   |
| C745                     | ECUE1H470JCQ | CAP CER 47pF 5% 50V NP0 SMD 10 | B1   |
| C748                     | ECUE1H020CCQ | CAP CER 2pF +/-0.25pF 50V NP0  | B1   |
| C749                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | E4   |
| C750                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | F3   |
| C751                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | E4   |
| C752                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | A1   |
| C753                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | B2   |
| C754                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | B1   |
| C755                     | ECUE1H470JCQ | CAP CER 47pF 5% 50V NP0 SMD 10 | B1   |
| C760                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | F3   |
| C761                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | A1   |
| C762                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | A1   |
| C763                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | F3   |
| C764                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | B2   |
| C766                     | ECUE1H101JCQ | CAP CER 100pF 5% 50V NP0 SMD 1 | F3   |
| C767                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | A1   |

| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| C768                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | E4   |
| C769                     | ECUE1H102KBQ | CAP CER 1nF 10% 50V X7R SMD 10 | E4   |
| C770                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | E4   |
| C771                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | A1   |
| C772                     | ECUE1H390JCQ | CAP CER 39pF 5% 50V NP0 SMD 10 | B2   |
| C773                     | ECUE1H181JCQ | CAP CER 180pF 5% 50V X7R SMD 1 | B2   |
| C774                     | ECUE1H181JCQ | CAP CER 180pF 5% 50V X7R SMD 1 | B2   |
| C775                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | B2   |
| C778                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | B2   |
| C779                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | E4   |
| C780                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | E4   |
| C781                     | ECUE1H471KBQ | CAP CER 470pF 10% 50V X7R SMD  | B1   |
| C782                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | E3   |
| C783                     | ECJ1VB1E273K | CAP CER 27nF 10% 25V X7R SMD 1 | B2   |
| C784                     | ECUE1H101JCQ | CAP CER 100pF 5% 50V NP0 SMD 1 | E3   |
| C785                     | ECUE1H010CCQ | CAP CER 1pF +/-0.25pF 50V NP0  | B1   |
| C786                     | ECUE1H471KBQ | CAP CER 470pF 10% 50V X7R SMD  | E3   |
| C787                     | ECUE1H090DCQ | CAP CER 9pF +/-0.5pF 50V NP0 S | B1   |
| C788                     | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD  | E4   |
| C789                     | ECUE1H470JCQ | CAP CER 47pF 5% 50V NP0 SMD 10 | E4   |
| C801                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | F4   |
| C802                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | F4   |
| C803                     | ECUE1H151JCQ | CAP CER 150pF 5% 50V NP0 SMD 1 | F3   |
| C804                     | ECUE1H151JCQ | CAP CER 150pF 5% 50V NP0 SMD 1 | F4   |
| C805                     | ECUE1H020CCQ | CAP CER 2pF +/-0.25pF 50V NP0  | F3   |
| C806                     | ECUE1H020CCQ | CAP CER 2pF +/-0.25pF 50V NP0  | F3   |
| C807                     | ECUE1H2R7CCQ | CAP CER 2.7pF +/-0.25pF 50V NP | F3   |
| C808                     | ECUE1H030CCQ | CAP CER 3pF +/-0.25pF 50V NP0  | F3   |
| C809                     | ECUE1H820JCQ | CAP CER 82pF 5% 50V NP0 SMD 10 | F4   |
| C811                     | ECUE1H820JCQ | CAP CER 82pF 5% 50V NP0 SMD 10 | F4   |
| C814                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | B2   |

| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| C815                     | F3F1A1060002 | CAP TANT 10uF 20% 10V SMD CASE | B2   |
| C816                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | A1   |
| C820                     | F3F1A1060002 | CAP TANT 10uF 20% 10V SMD CASE | A1   |
| C821                     | ECUE1H120JCQ | CAP CER 12pF 5% 50V NP0 SMD 10 | A1   |
| C822                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | A2   |
| C823                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | A2   |
| C824                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | E4   |
| C825                     | ECUE1H030CCQ | CAP CER 3pF +/-0.25pF 50V NP0  | B2   |
| C826                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | B2   |
| C827                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | E4   |
| C832                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | E4   |
| C833                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | E4   |
| C834                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | F3   |
| C835                     | ECUE1H020CCQ | CAP CER 2pF +/-0.25pF 50V NP0  | B2   |
| C900                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | C1   |
| C901                     | ECST0JZ106R  | CAP TANT 10uF 20% 6.3V SMD CAS | C2   |
| C902                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | D4   |
| C903                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | D4   |
| C904                     | F3F1C475A004 | CAP TANT 4.7uF 20% 16V SMD CAS | C2   |
| C906                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | C1   |
| C907                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | C1   |
| C908                     | ECUE1H470JCQ | CAP CER 47pF 5% 50V NP0 SMD 10 | B2   |
| C909                     | ECUE1H030CCQ | CAP CER 3pF +/-0.25pF 50V NP0  | C1   |
| C910                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | C1   |
| C911                     | ECST0JZ106R  | CAP TANT 10uF 20% 6.3V SMD CAS | C1   |
| C912                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | B1   |
| C913                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | C1   |
| C914                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | C1   |
| C915                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | C1   |
| C916                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | C1   |
| C917                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | C1   |

| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| C918                     | ECUE1H470JCQ | CAP CER 47pF 5% 50V NP0 SMD 10 | C1   |
| C919                     | F3F1C475A004 | CAP TANT 4.7uF 20% 16V SMD CAS | C1   |
| C920                     | ECUE1H101JCQ | CAP CER 100pF 5% 50V NP0 SMD 1 | D4   |
| C921                     | ECST0JZ106R  | CAP TANT 10uF 20% 6.3V SMD CAS | C1   |
| C922                     | ECUE1H470JCQ | CAP CER 47pF 5% 50V NP0 SMD 10 | C1   |
| C923                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | C1   |
| C924                     | F3F1C475A004 | CAP TANT 4.7uF 20% 16V SMD CAS | C1   |
| C925                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | C1   |
| C926                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | C1   |
| C928                     | ECUE1H102KBQ | CAP CER 1nF 10% 50V X7R SMD 10 | D4   |
| C929                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | C2   |
| C930                     | ECST0JZ106R  | CAP TANT 10uF 20% 6.3V SMD CAS | D4   |
| C931                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | D4   |
| C932                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | D4   |
| C933                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | D4   |
| C934                     | ECUE1H030CCQ | CAP CER 3pF +/-0.25pF 50V NP0  | D4   |
| C935                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | B2   |
| C936                     | ECST0JZ106R  | CAP TANT 10uF 20% 6.3V SMD CAS | B2   |
| C937                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | B2   |
| C938                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | B2   |
| C939                     | ECUE1H470JCQ | CAP CER 47pF 5% 50V NP0 SMD 10 | B2   |
| C940                     | F3F1C475A004 | CAP TANT 4.7uF 20% 16V SMD CAS | B2   |
| C941                     | ECUE1C103KBQ | CAP CER 10nF 10% 16V X7R SMD 1 | B2   |
| C942                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | B2   |
| C944                     | ECUE1H121JCQ | CAP CER 120pF 5% 50V NP0 SMD 1 | D4   |
| C945                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | D4   |
| C946                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | D4   |
| C947                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | D4   |
| C948                     | ECUE1C682KBQ | CAP CER 6.8nF 10% 16V X7R SMD  | C2   |
| C949                     | ECUE1H121JCQ | CAP CER 120pF 5% 50V NP0 SMD 1 | C2   |
| C950                     | ECUE1E332KBQ | CAP CER 3.3nF 10% 25V X7R SMD  | C2   |

| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| C951                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | C2   |
| C952                     | ECJ1VB1H103K | CAP CER 10nF 10% 50V X7R SMD 1 | C2   |
| C953                     | F1H1C4730003 | CAP CER 47nF 10% 16V X7R SMD 1 | C2   |
| C954                     | ECUE1H221JCQ | CAP CER 220pF 5% 50V NP0 SMD 1 | C2   |
| C955                     | ECUE1H391KBQ | CAP CER 390pF 10% 50V X7R SMD  | C2   |
| C956                     | ECUE1H102KBQ | CAP CER 1nF 10% 50V X7R SMD 10 | C2   |
| C957                     | ECST0JZ106R  | CAP TANT 10uF 20% 6.3V SMD CAS | C2   |
| C959                     | F1G1A104A012 | CAP CER 100nF 10% 10V X5R SMD  | C2   |
| C960                     | ECST0JZ106R  | CAP TANT 10uF 20% 6.3V SMD CAS | C2   |
| C961                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | C2   |
| C962                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | C1   |
| C964                     | ECHU1C333JB5 | CAP FILM 33nF 5% 16V SMD 3216  | C2   |
| C965                     | ECUE1H681KBQ | CAP CER 680pF 10% 50V X7R SMD  | C2   |
| C966                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | F4   |
| C967                     | ECUE1H101JCQ | CAP CER 100pF 5% 50V NP0 SMD 1 | F4   |
| C968                     | ECUE1H101JCQ | CAP CER 100pF 5% 50V NP0 SMD 1 | F4   |
| C969                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | E4   |
| C970                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | E3   |
| C971                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | C1   |
| C972                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | E3   |
| C973                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | D4   |
| C974                     | ECUE1H060DCQ | CAP CER 6pF +/-0.5pF 50V NP0 S | E4   |
| C975                     | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10 | D4   |
| C976                     | ECUE1H020CCQ | CAP CER 2pF +/-0.25pF 50V NP0  | C1   |
| C977                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | D4   |
| C978                     | ECUE1H120JCQ | CAP CER 12pF 5% 50V NP0 SMD 10 | E3   |
| C979                     | ECUE1H102KBQ | CAP CER 1nF 10% 50V X7R SMD 10 | E3   |
| C980                     | ECUE1H120JCQ | CAP CER 12pF 5% 50V NP0 SMD 10 | E3   |
| D101                     | B0KB00000010 | SUPPRESSOR ESD 4 ELEMENTS SMD  | A3   |
| D102                     | B0KB00000010 | SUPPRESSOR ESD 4 ELEMENTS SMD  | A4   |
| D103                     | B0KB00000010 | SUPPRESSOR ESD 4 ELEMENTS SMD  | A3   |



| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| D104                     | B0KB00000010 | SUPPRESSOR ESD 4 ELEMENTS SMD  | A3   |
| D105                     | B0JCDD000001 | DIODE RB521S-30 SCHOTTKY 30V 2 | F2   |
| D106                     | B0JCDD000001 | DIODE RB521S-30 SCHOTTKY 30V 2 | F1   |
| D107                     | B0KB00000010 | SUPPRESSOR ESD 4 ELEMENTS SMD  | F2   |
| D108                     | MA2Z07700L   | DIODE MA77 100mA SMD S-MINI 2  | C4   |
| D401                     | B0ADEJ000010 | DIODE ARRAY QUAD SW SMD UMD6   | F1   |
| D402                     | MA2S111TX    | DIODE MA2S111 80V 100mA SMD SS | F1   |
| D403                     | MA2S111TX    | DIODE MA2S111 80V 100mA SMD SS | F1   |
| D404                     | B0JCMC000004 | DIODE SHOTTKY 20V 1A SMD SC-59 | E1   |
| D405                     | B0JCDD000001 | DIODE RB521S-30 SCHOTTKY 30V 2 | D1   |
| D406                     | MA2S111TX    | DIODE MA2S111 80V 100mA SMD SS | F1   |
| D501                     | B0JCDD000001 | DIODE RB521S-30 SCHOTTKY 30V 2 | F1   |
| D502                     | B0JCDD000001 | DIODE RB521S-30 SCHOTTKY 30V 2 | B4   |
| D503                     | B0JCDD000001 | DIODE RB521S-30 SCHOTTKY 30V 2 | B4   |
| D504                     | B0JCDD000001 | DIODE RB521S-30 SCHOTTKY 30V 2 | B4   |
| D601                     | MAZS0470GL   | DIODE MAZS0470G ZENER 4.7V SMD | A4   |
| D602                     | MAZS0470GL   | DIODE MAZS0470G ZENER 4.7V SMD | A4   |
| D900                     | MA2S111TX    | DIODE MA2S111 80V 100mA SMD SS | C1   |
| D901                     | MAZS0620ML   | DIODE ZENER 6V2 SMD SS-MINI 2P | D4   |
| D902                     | MAZS0620ML   | DIODE ZENER 6V2 SMD SS-MINI 2P | E3   |
| D903                     | MAZS0620ML   | DIODE ZENER 6V2 SMD SS-MINI 2P | D3   |
| E800                     | B9Z000000019 | COUPLER 1.747GHz SMD 2012 6PIN | A1   |
| E801                     | B9Z000000018 | COUPLER 897.5 MHz SMD 2012 6PI | A1   |
| FL700                    | EFCH225MDQP1 | FILTER IF SAW 225MHz SMD 7.2x5 | E3   |
| FL701                    | J0E1417B0001 | FILTER LC 1412.5MHz SMD 2012   | C1   |
| FL702                    | EFCH9418MTY2 | FILTER SAW RX GSM/PCN SMD 3.8x | A1   |
| FL703                    | EFCH9418MTY2 | FILTER SAW RX GSM/PCN SMD 3.8x | B1   |
| J100                     | JA76020B     | CONNECTOR SKT I/O 18 WAY SMD   | F1   |
| J101                     | K3ZZ00200009 | HOLDER FOR BATTERY CELL        | D4   |
| J900                     | JJ76002A     | CONNECTOR BATTERY 2 WAY SMD    | E3   |
| J901                     | JJ76002A     | CONNECTOR BATTERY 2 WAY SMD    | E4   |

| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| L101                     | G1CR47J00006 | INDUCTOR 470nH 5% SMD 2012     | C4   |
| L102                     | G1CR47J00006 | INDUCTOR 470nH 5% SMD 2012     | C4   |
| L103                     | G1C82NJ00010 | INDUCTOR 82nH 5% SMD 1005      | C4   |
| L104                     | G1C10NJ00008 | INDUCTOR 10nH 5% SMD 1005      | C4   |
| L106                     | ELJRF47NJF2  | INDUCTOR 47nH 5% SMD 1005      | C4   |
| L501                     | G1A101C00002 | INDUCTOR 100uH 30% 1.73 OHM 0. | E1   |
| L601                     | G1C82NJ00008 | INDUCTOR 82nH 5% SMD 1608      | D2   |
| L602                     | G1C82NJ00008 | INDUCTOR 82nH 5% SMD 1608      | D2   |
| L700                     | G1CR10J00010 | INDUCTOR 100nH 5% SMD 1005     | B2   |
| L701                     | G1CR10J00010 | INDUCTOR 100nH 5% SMD 1005     | B1   |
| L702                     | G1CR12J00003 | INDUCTOR 120nH 5% SMD 1608     | E3   |
| L703                     | G1C82NJ00009 | INDUCTOR 82nH 5% SMD 1608      | E3   |
| L704                     | ELJRF18NJF2  | INDUCTOR 18nH 5% SMD 1005      | B2   |
| L705                     | G1C4N7Z00004 | INDUCTOR 4.7nH +/-0.3nH SMD 10 | B1   |
| L706                     | G1C2N7Z00007 | INDUCTOR 2.7nH +/-0.3nH SMD 10 | B2   |
| L709                     | G1C68NJ00007 | INDUCTOR 68nH 5% SMD 1608      | E3   |
| L711                     | ELJRF12NJF2  | INDUCTOR 12nH 5% SMD 1005      | B1   |
| L713                     | G1CR10J00010 | INDUCTOR 100nH 5% SMD 1005     | E3   |
| L715                     | ELJRF33NJF2  | INDUCTOR 33nH 5% SMD 1005      | B1   |
| L716                     | ELJRF12NJF2  | INDUCTOR 12nH 5% SMD 1005      | B1   |
| L717                     | ELJRF22NJF2  | INDUCTOR 22nH 5% SMD 1005      | B1   |
| L718                     | ELJRF12NJF2  | INDUCTOR 12nH 5% SMD 1005      | B1   |
| L720                     | G1C10NJ00008 | INDUCTOR 10nH 5% SMD 1005      | A1   |
| L721                     | G1CR22J00006 | INDUCTOR 220nH 5% SMD 1608     | B2   |
| L722                     | ELJRF18NJF2  | INDUCTOR 18nH 5% SMD 1005      | A1   |
| L723                     | ELJRF39NJF2  | INDUCTOR 39nH 5% SMD 1005      | B2   |
| L724                     | ELJRF39NJF2  | INDUCTOR 39nH 5% SMD 1005      | B2   |
| L725                     | ELJRF18NJF2  | INDUCTOR 18nH 5% SMD 1005      | B1   |
| L726                     | ELJRF6N8JF2  | INDUCTOR 6.8nH 5% SMD 1005     | B2   |
| L727                     | ELJRF8N2JF2  | INDUCTOR 8.2nH 5% SMD 1005     | B2   |
| L729                     | ELJRF2N2DF2  | INDUCTOR 2.2nH +/-0.3nH SMD 10 | A1   |

| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| L730                     | ELJRF8N2JF2  | INDUCTOR 8.2nH 5% SMD 1005     | E4   |
| L731                     | ELJRF18NJF2  | INDUCTOR 18nH 5% SMD 1005      | F3   |
| L732                     | G1C5N6Z00005 | INDUCTOR 5.6nH +/-0.3nH SMD 10 | F3   |
| L733                     | ELJRF18NJF2  | INDUCTOR 18nH 5% SMD 1005      | B2   |
| L734                     | ELJRF18NJF2  | INDUCTOR 18nH 5% SMD 1005      | B1   |
| L800                     | G1C4N7Z00004 | INDUCTOR 4.7nH +/-0.3nH SMD 10 | F3   |
| L801                     | G1C15NJ00008 | INDUCTOR 15nH 5% SMD 1005      | F3   |
| L804                     | G1C5N6Z00005 | INDUCTOR 5.6nH +/-0.3nH SMD 10 | E4   |
| L807                     | ELJRF22NJF2  | INDUCTOR 22nH 5% SMD 1005      | E4   |
| L808                     | G1C15NJ00008 | INDUCTOR 15nH 5% SMD 1005      | B2   |
| L809                     | G1C15NJ00008 | INDUCTOR 15nH 5% SMD 1005      | B2   |
| L900                     | ELJRF6N8JF2  | INDUCTOR 6.8nH 5% SMD 1005     | C2   |
| L901                     | ELJRF8N2JF2  | INDUCTOR 8.2nH 5% SMD 1005     | C2   |
| L902                     | ELJRF22NJF2  | INDUCTOR 22nH 5% SMD 1005      | D4   |
| LS900                    | HB76004B     | BUZZER GD90                    | F4   |
| P100                     | PY76018A     | CONNECTOR BOARD TO BOARD 2x16  | D1   |
| Q101                     | B1GFCFEM0001 | TRANSISTOR UMH10TN DUAL NPN WI | F2   |
| Q102                     | B1ABCB000024 | TRANSISTOR 2SC4226 NPN SMD SOT | C2   |
| Q401                     | 2SD2216TX    | TRANSISTOR 2SD2216TX NPN SMD S | E1   |
| Q402                     | B1DHCC000012 | TRANSISTOR SI3441DV MOSFET -20 | E1   |
| Q403                     | B1GKGFBJ0001 | TRANSISTOR IMD14 DUAL SMD SMT6 | C1   |
| Q404                     | B1GKGFBJ0001 | TRANSISTOR IMD14 DUAL SMD SMT6 | C1   |
| Q405                     | B1CFJC000001 | TRANSISTOR FDG6301N DUAL N-CH  | E1   |
| Q406                     | B1ADPC000003 | TRANSISTOR 2SB1424T100R PNP SM | E1   |
| Q501                     | B1GKCFLL0006 | TRANSISTOR UMD2N DUAL SMD UMT6 | F2   |
| Q700                     | B1GKCFNE0001 | TRANSISTOR RN4905 DUAL NPN PNP | B1   |
| Q701                     | B1GKCFNE0001 | TRANSISTOR RN4905 DUAL NPN PNP | B2   |
| Q702                     | B1GKCFLL0006 | TRANSISTOR UMD2N DUAL SMD UMT6 | F3   |
| Q703                     | B1GFCFEM0001 | TRANSISTOR UMH10TN DUAL NPN WI |      |
| Q800                     | B1GKCFNE0001 | TRANSISTOR RN4905 DUAL NPN PNP | E4   |
| Q801                     | XP0431200L   | TRANSISTOR XP4312 DUAL NPN PNP | A2   |

| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| Q900                     | 2SD1511RSTX  | TRANSISTOR 2SD1511RSTX NPN HFE | C1   |
| Q901                     | B1GKCFNE0001 | TRANSISTOR RN4905 DUAL NPN PNP |      |
| R101                     | ERJ2GEJ102X  | RES 1K OHM 5% 1/16W SMD 1005   | F2   |
| R102                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | F2   |
| R103                     | ERJ2GEJ331X  | RES 330 OHM 5% 1/16W SMD 1005  | F2   |
| R104                     | EXB24V331JX  | RES NETWORK 330 OHMx2 5% 1/16W | F2   |
| R105                     | EXB24V331JX  | RES NETWORK 330 OHMx2 5% 1/16W | F1   |
| R106                     | ERJ2GEJ332X  | RES 3.3K OHM 5% 1/16W SMD 1005 | F2   |
| R107                     | ERJ3GEYF104V | RES 100K OHM 1% 1/16W SMD 1608 | F1   |
| R108                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | E1   |
| R109                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | F2   |
| R110                     | ERJ2GEJ331X  | RES 330 OHM 5% 1/16W SMD 1005  | F2   |
| R111                     | ERJ2GEJ104X  | RES 100K OHM 5% 1/16W SMD 1005 | E1   |
| R112                     | ERJ2GEJ472X  | RES 4.7K OHM 5% 1/16W SMD 1005 |      |
| R113                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | A4   |
| R114                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | B2   |
| R115                     | ERJ2GEJ472X  | RES 4.7K OHM 5% 1/16W SMD 1005 | D2   |
| R116                     | ERJ2GE0R00X  | RES JUMPER 0 OHM 1A SMD 1005   | C4   |
| R117                     | ERJ2GEJ101X  | RES 100 OHM 5% 1/16W SMD 1005  | C4   |
| R118                     | ERJ2GEJ682X  | RES 6.8K OHM 5% 1/16W SMD 1005 | C4   |
| R119                     | ERJ2GEJ221X  | RES 220 OHM 5% 1/16W SMD 1005  | D2   |
| R120                     | ERJ2GEJ681X  | RES 680 OHM 5% 1/16W SMD 1005  | D2   |
| R121                     | ERJ2GEJ223X  | RES 22K OHM 5% 1/16W SMD 1005  | C2   |
| R122                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | C4   |
| R123                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | D4   |
| R124                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | D4   |
| R125                     | EXB24V331JX  | RES NETWORK 330 OHMx2 5% 1/16W | F2   |
| R126                     | EXB24V331JX  | RES NETWORK 330 OHMx2 5% 1/16W | F1   |
| R401                     | ERJ2GEJ104X  | RES 100K OHM 5% 1/16W SMD 1005 | D1   |
| R403                     | ERJ2GEJ104X  | RES 100K OHM 5% 1/16W SMD 1005 | B3   |
| R404                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | F1   |

| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| R405                     | ERJ2GEJ104X  | RES 100K OHM 5% 1/16W SMD 1005 | E1   |
| R406                     | ERJ2GEJ104X  | RES 100K OHM 5% 1/16W SMD 1005 | D1   |
| R407                     | ERJ2GEJ104X  | RES 100K OHM 5% 1/16W SMD 1005 | D1   |
| R408                     | ERJ2GEJ473X  | RES 47K OHM 5% 1/16W SMD 1005  | E1   |
| R409                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | E1   |
| R410                     | ERJ2GEJ123X  | RES 12K OHM 5% 1/16W SMD 1005  | E1   |
| R411                     | D1BDR1500001 | RESISTOR 0.15 OHM 1% 1/4W SMD  | D1   |
| R412                     | ERJ6GEYJ330V | RES 33 OHM 5% 1/10W SMD 2012   | D1   |
| R413                     | ERJ2GEJ153X  | RES 15K OHM 5% 1/16W SMD 1005  | D1   |
| R414                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | D1   |
| R415                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | D1   |
| R416                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | D1   |
| R417                     | ERJ6GEYJ270V | RES 27 OHM 5% 1/10W SMD 2012   | C1   |
| R418                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | D1   |
| R419                     | ERJ6GEYJ560V | RES 56 OHM 5% 1/10W SMD 2012   | C1   |
| R420                     | ERJ2GEJ104X  | RES 100K OHM 5% 1/16W SMD 1005 | E1   |
| R421                     | ERJ2GEJ103X  | RES 10K OHM 5% 1/16W SMD 1005  | E1   |
| R502                     | ERJ2GEJ470X  | RES 47 OHM 5% 1/16W SMD 1005   | E1   |
| R503                     | ERJ2GEJ222X  | RES 2.2K OHM 5% 1/16W SMD 1005 | B4   |
| R504                     | ERJ2GEJ472X  | RES 4.7K OHM 5% 1/16W SMD 1005 | B4   |
| R505                     | ERJ2GEJ104X  | RES 100K OHM 5% 1/16W SMD 1005 | B4   |
| R506                     | ERJ2GEJ223X  | RES 22K OHM 5% 1/16W SMD 1005  | B4   |
| R507                     | ERJ2GEJ104X  | RES 100K OHM 5% 1/16W SMD 1005 | E1   |
| R508                     | ERJ2GEJ104X  | RES 100K OHM 5% 1/16W SMD 1005 | E2   |
| R510                     | ERJ2GE0R00X  | RES JUMPER 0 OHM 1A SMD 1005   | C3   |
| R511                     | ERJ2GEJ102X  | RES 1K OHM 5% 1/16W SMD 1005   | E1   |
| R512                     | ERJ2GEJ102X  | RES 1K OHM 5% 1/16W SMD 1005   | B4   |
| R513                     | ERJ2GEJ102X  | RES 1K OHM 5% 1/16W SMD 1005   | E2   |
| R604                     | ERJ2GEJ223X  | RES 22K OHM 5% 1/16W SMD 1005  | D2   |
| R605                     | EXB24V331JX  | RES NETWORK 330 OHMx2 5% 1/16W | F2   |
| R606                     | EXB24V122JX  | RES NETWORK 1.2K OHMx2 5% 1/16 | F2   |

| Model: EB-GD30 & EB-GD50 |             | Name: Main PCB (Common Items)  |      |
|--------------------------|-------------|--------------------------------|------|
| Ref.                     | Part Number | Description                    | Grid |
| R607                     | EXB24V331JX | RES NETWORK 330 OHMx2 5% 1/16W | F2   |
| R701                     | ERJ2GEJ393X | RES 39K OHM 5% 1/16W SMD 1005  | B1   |
| R702                     | ERJ2GEJ392X | RES 3.9K OHM 5% 1/16W SMD 1005 | B1   |
| R703                     | ERJ2GEJ510X | RES 51 OHM 5% 1/16W SMD 1005   | B1   |
| R705                     | ERJ2GEJ392X | RES 3.9K OHM 5% 1/16W SMD 1005 | B1   |
| R706                     | ERJ2GE0R00X | RES JUMPER 0 OHM 1A SMD 1005   | B2   |
| R707                     | ERJ2GEJ100X | RES 10 OHM 5% 1/16W SMD 1005   | B2   |
| R708                     | ERJ2GEF223X | RES 22K OHM 1% 1/16W SMD 1005  | B2   |
| R709                     | ERJ2GEJ4R7X | RES 4.7 OHM 5% 1/16W SMD 1005  | E4   |
| R710                     | ERJ2GEF682X | RES 6.8K OHM 1% 1/16W SMD 1005 | B2   |
| R711                     | ERJ2GEF682X | RES 6.8K OHM 1% 1/16W SMD 1005 | B2   |
| R712                     | ERJ2GEF222X | RES 2.2K OHM 1% 1/16W SMD 1005 | B2   |
| R713                     | ERJ2GEF222X | RES 2.2K OHM 1% 1/16W SMD 1005 | B2   |
| R714                     | ERJ2GEF222X | RES 2.2K OHM 1% 1/16W SMD 1005 | B2   |
| R715                     | ERJ2GEF222X | RES 2.2K OHM 1% 1/16W SMD 1005 | B2   |
| R716                     | ERJ2GEJ391X | RES 390 OHM 5% 1/16W SMD 1005  | E4   |
| R719                     | ERJ2GEJ100X | RES 10 OHM 5% 1/16W SMD 1005   | E3   |
| R720                     | ERJ2GEJ471X | RES 470 OHM 5% 1/16W SMD 1005  | E3   |
| R723                     | ERJ2GEJ470X | RES 47 OHM 5% 1/16W SMD 1005   | B2   |
| R724                     | ERJ2GEJ122X | RES 1.2K OHM 5% 1/16W SMD 1005 | F3   |
| R725                     | ERJ2GEJ122X | RES 1.2K OHM 5% 1/16W SMD 1005 | F3   |
| R726                     | ERJ2GEJ122X | RES 1.2K OHM 5% 1/16W SMD 1005 | F3   |
| R727                     | ERJ2GEJ122X | RES 1.2K OHM 5% 1/16W SMD 1005 | F3   |
| R800                     | ERJ2GEJ820X | RES 82 OHM 5% 1/16W SMD 1005   | A1   |
| R801                     | ERJ2GEJ101X | RES 100 OHM 5% 1/16W SMD 1005  | A1   |
| R802                     | ERJ2GEJ510X | RES 51 OHM 5% 1/16W SMD 1005   | A1   |
| R803                     | ERJ2GEJ820X | RES 82 OHM 5% 1/16W SMD 1005   | A1   |
| R804                     | ERJ2GEJ223X | RES 22K OHM 5% 1/16W SMD 1005  | F3   |
| R805                     | ERJ2GEJ123X | RES 12K OHM 5% 1/16W SMD 1005  | F3   |
| R806                     | ERJ2GEJ750X | RES 75 OHM 5% 1/16W SMD 1005   | A1   |
| R807                     | ERJ2GEJ101X | RES 100 OHM 5% 1/16W SMD 1005  | A1   |

| Model: EB-GD30 & EB-GD50 |             | Name: Main PCB (Common Items)  |      |
|--------------------------|-------------|--------------------------------|------|
| Ref.                     | Part Number | Description                    | Grid |
| R808                     | ERJ2GEJ510X | RES 51 OHM 5% 1/16W SMD 1005   | A1   |
| R809                     | ERJ2GEJ103X | RES 10K OHM 5% 1/16W SMD 1005  | F4   |
| R810                     | ERJ2GEJ103X | RES 10K OHM 5% 1/16W SMD 1005  | F4   |
| R811                     | ERJ2GEJ103X | RES 10K OHM 5% 1/16W SMD 1005  |      |
| R812                     | ERJ2GE0R00X | RES JUMPER 0 OHM 1A SMD 1005   | B2   |
| R813                     | ERJ2GEJ750X | RES 75 OHM 5% 1/16W SMD 1005   | A1   |
| R814                     | ERJ2GEJ223X | RES 22K OHM 5% 1/16W SMD 1005  | F4   |
| R816                     | ERJ2GEJ150X | RES 15 OHM 5% 1/16W SMD 1005   | B2   |
| R817                     | ERJ2GEJ391X | RES 390 OHM 5% 1/16W SMD 1005  | B2   |
| R818                     | ERJ2GEJ391X | RES 390 OHM 5% 1/16W SMD 1005  | B2   |
| R822                     | ERJ2GEJ223X | RES 22K OHM 5% 1/16W SMD 1005  | A2   |
| R824                     | ERJ2GE0R00X | RES JUMPER 0 OHM 1A SMD 1005   | B2   |
| R825                     | ERJ2GE0R00X | RES JUMPER 0 OHM 1A SMD 1005   | B2   |
| R900                     | ERJ2GEJ182X | RES 1.8K OHM 5% 1/16W SMD 1005 | C1   |
| R902                     | ERJ2GEJ103X | RES 10K OHM 5% 1/16W SMD 1005  | D4   |
| R903                     | ERJ2GE0R00X | RES JUMPER 0 OHM 1A SMD 1005   | D4   |
| R904                     | ERJ2GEJ751X | RES 750 OHM 5% 1/16W SMD 1005  | C2   |
| R905                     | ERJ2GEJ332X | RES 3.3K OHM 5% 1/16W SMD 1005 | C2   |
| R906                     | ERJ2GEJ220X | RES 22 OHM 5% 1/16W SMD 1005   | B1   |
| R908                     | ERJ2GE0R00X | RES JUMPER 0 OHM 1A SMD 1005   | C2   |
| R909                     | ERJ2GEJ4R7X | RES 4.7 OHM 5% 1/16W SMD 1005  | C2   |
| R910                     | ERJ2GEJ150X | RES 15 OHM 5% 1/16W SMD 1005   | C2   |
| R912                     | ERJ2GEJ152X | RES 1.5K OHM 5% 1/16W SMD 1005 | C2   |
| R913                     | ERJ2GEJ272X | RES 2.7K OHM 5% 1/16W SMD 1005 | B2   |
| R914                     | ERJ2GE0R00X | RES JUMPER 0 OHM 1A SMD 1005   | B2   |
| R915                     | ERJ2GEJ331X | RES 330 OHM 5% 1/16W SMD 1005  | E3   |
| R916                     | ERJ2GEJ331X | RES 330 OHM 5% 1/16W SMD 1005  | D4   |
| R918                     | ERJ2GEJ100X | RES 10 OHM 5% 1/16W SMD 1005   | D4   |
| S700                     | PY76011B    | CONNECTOR RF COAXIAL           | F3   |
| S701                     | SY76003A    | DIPLEXER ANTENNA SWITCH GSM/DS | F3   |

| Model: EB-GD30 & EB-GD50 |              | Name: Main PCB (Common Items)  |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| U101                     | TX76001A     | TCVCXO 13MHz SMD 7.0x5.0x1.7 4 | D2   |
| U401                     | UY76051A     | IC BA3891KV CHARGE ASIC SMD QF | D1   |
| U402                     | C0DBAFC00007 | IC R1111N181B REG 1.8V SMD SOT | B3   |
| U403                     | C0DBFGG00001 | IC R5102V001A-E2 REG WDT SMD S | E1   |
| U404                     | C0EBD0000030 | IC S-80824ANNP-EDM-T2 VOL DET  | D4   |
| U501                     | UY76046A     | IC BH6107KV INTERFACE ASIC SMD | E1   |
| U503                     | UY76102A     | IC F731741B GEMINI 0.18u SMD 0 | B4   |
| U504                     | C1CB00000746 | IC TCM4400E BB/RF VEGA 3E 0.4m | E2   |
| U505                     | YRS5C348A    | IC RS5C348A REAL TIME CLOCK SM | C4   |
| U700                     | GN01073B01MC | LNA DUAL GSM/DCS SMD 0.65mm PI | B1   |
| U701                     | C1CB00000803 | IC HD155123FEB RF BRIGHT 2 GSM | B1   |
| U702                     | UY76044A     | VCO TX SMD 9.3x7.2x2.0         | E3   |
| U800                     | C1CB00000711 | IC DUAL BAND APC TSSOP20       | F4   |
| U801                     | C5CB00000023 | PA PF08103B-02-TB DUAL GSM/DCS | A2   |
| U802                     | C1CB00000794 | IC MGA-81563-1HA MMIC AMP SMD  | E4   |
| U900                     | C0DBAFC00004 | IC R1111N281B REG 2.8V SMD SOT | D4   |
| U901                     | C0DBZFC00006 | IC ADP3307ART REG 2.75V 100mA  | C1   |
| U902                     | C0DBAFC00004 | IC R1111N281B REG 2.8V SMD SOT | C1   |
| U903                     | C0DBZFC00006 | IC ADP3307ART REG 2.75V 100mA  | B2   |
| U904                     | C1CB00000795 | IC MB15F03SLPFV1-G-BND-ER DUAL | D4   |
| U905                     | UY76084A     | VCO IF DUAL 520/540MHz SMD 5.3 | C2   |
| U906                     | UY76043A     | VCO RF SMD 9.3x7.2x2.0         | C2   |
| X100                     | K1ZZ00001018 | SIMLOCK 12V 10uA 6 PIN SMD DEV | A4   |
| Y501                     | H0J327200022 | CRYSTAL 32.768KHz SMD 7.0x1.5x | B4   |

## 9.2.3 Main PCB: GD30-Specific Items

| Model: EB-GD30 |              | Name: Main PCB (GD30-Specific Items)   |      |
|----------------|--------------|----------------------------------------|------|
| Ref.           | Part Number  | Description                            | Grid |
| R601           | EXB24V180JX  | RES NETWORK 18 OHMx2 5% 1/16W SMD 1010 | D2   |
| R608           | ERJ6GEY0R00V | RES JUMPER 0 OHM 2A SMD 2012           | E2   |
| R609           | ERJ6GEY0R00V | RES JUMPER 0 OHM 2A SMD 2012           | E2   |

## 9.2.4 Main PCB: GD50-Specific Items

| Model: EB-GD50 |              | Name: Main PCB (GD50-Specific Items) |      |
|----------------|--------------|--------------------------------------|------|
| Ref.           | Part Number  | Description                          | Grid |
| C601           | ECST0JZ106R  | CAP TANT 10uF 20% 6.3V SMD CAS       | E2   |
| C602           | ECST0JZ106R  | CAP TANT 10uF 20% 6.3V SMD CAS       | E2   |
| C609           | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD        | D2   |
| C610           | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10       | D2   |
| C611           | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0        | D2   |
| C612           | ECUE1H222KBQ | CAP CER 2.2nF 10% 50V X7R SMD        | D2   |
| C613           | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0        | D1   |
| C614           | F1H1A4740005 | CAP CER 470nF 10% 10V X5R SMD        | D1   |
| C615           | ECUE1H330JCQ | CAP CER 33pF 5% 50V NP0 SMD 10       | D1   |
| C616           | F3F1A1060002 | CAP TANT 10uF 20% 10V SMD CASE       | D2   |
| C617           | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0        | D2   |
| L603           | G1C82NJ00008 | INDUCTOR 82nH 5% SMD 1608            | D2   |
| R601           | EXB24V120JX  | RES NETWORK 12 OHMx2 5% 1/16W        | D2   |
| R602           | ERJ2GEJ562X  | CHIP RESISTOR 5K6 OHM +/-5% 1/       | D2   |
| R603           | ERJ2GEJ104X  | RES 100K OHM 5% 1/16W SMD 1005       | D2   |
| U601           | C0ABAA000030 | IC LM4871M AUDIO PA 1.1W SMD S       | D2   |

## 9.2.5 Keypad PCB

| Model: EB-GD30 & EB-DG50 |              | Name: Keypad PCB               |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| C001                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | A4   |
| C002                     | F1J1C6840003 | CAP CER 680nF 10% 16V X7R SMD  | C4   |
| C003                     | F1J1C6840003 | CAP CER 680nF 10% 16V X7R SMD  | C4   |
| C004                     | F1J1C6840003 | CAP CER 680nF 10% 16V X7R SMD  | C4   |
| C005                     | F1J1C6840003 | CAP CER 680nF 10% 16V X7R SMD  | C4   |
| C006                     | F1J1C6840003 | CAP CER 680nF 10% 16V X7R SMD  | C3   |
| C007                     | ECUE1H470JCQ | CAP CER 47pF 5% 50V NP0 SMD 10 | C4   |
| C008                     | ECUE1H220JCQ | CAP CER 22pF 5% 50V NP0 SMD 10 | C4   |
| C009                     | F1H0J1050013 | CAP CER 1uF 10% 6.3V X5R SMD 1 | C4   |
| C010                     | F1H0J1050013 | CAP CER 1uF 10% 6.3V X5R SMD 1 | C3   |
| C011                     | F1J1C6840003 | CAP CER 680nF 10% 16V X7R SMD  | C3   |
| C012                     | F1J1A1050011 | CAP CER 1uF 10% 10V X5R SMD 20 | C3   |
| C013                     | F1J1C6840003 | CAP CER 680nF 10% 16V X7R SMD  | C3   |
| C014                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | C4   |
| C015                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | C4   |
| C016                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | C4   |
| C017                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | C3   |
| C018                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | C4   |
| C019                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | C3   |
| C020                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | C3   |
| C021                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | C3   |
| C022                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | C3   |
| C023                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | C3   |
| C024                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | C3   |
| C025                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | A4   |
| C026                     | ECUE1H100DCQ | CAP CER 10pF +/-0.5pF 50V NP0  | A4   |
| CN001                    | K1MZ14A00001 | CONNECTOR LCD 14 WAY SMD       | C3   |
| CN002                    | K1MZ14A00001 | CONNECTOR LCD 14 WAY SMD       | C4   |
| D002                     | B0KB00000010 | SUPPRESSOR ESD 4 ELEMENTS SMD  | A4   |

| Model: EB-GD30 & EB-DG50 |              | Name: Keypad PCB               |      |
|--------------------------|--------------|--------------------------------|------|
| Ref.                     | Part Number  | Description                    | Grid |
| D003                     | MA2S111TX    | DIODE MA2S111 80V 100mA SMD SS | C4   |
| DS001                    | B3ABB0000066 | DIODE LED GREEN 16-28mcd 2.2V  | F4   |
| DS002                    | B3ABB0000066 | DIODE LED GREEN 16-28mcd 2.2V  | F3   |
| DS003                    | B3ABB0000066 | DIODE LED GREEN 16-28mcd 2.2V  | E4   |
| DS004                    | B3ABB0000066 | DIODE LED GREEN 16-28mcd 2.2V  | E3   |
| DS005                    | B3ABB0000066 | DIODE LED GREEN 16-28mcd 2.2V  | D4   |
| DS006                    | B3ABB0000066 | DIODE LED GREEN 16-28mcd 2.2V  | D3   |
| DS007                    | B3ABB0000066 | DIODE LED GREEN 16-28mcd 2.2V  | D4   |
| DS008                    | B3ABB0000066 | DIODE LED GREEN 16-28mcd 2.2V  | D3   |
| DS009                    | B3ABB0000066 | DIODE LED GREEN 16-28mcd 2.2V  | C4   |
| DS010                    | B3ABB0000066 | DIODE LED GREEN 16-28mcd 2.2V  | C4   |
| DS011                    | B3ABB0000066 | DIODE LED GREEN 16-28mcd 2.2V  | C3   |
| DS012                    | B3ABB0000066 | DIODE LED GREEN 16-28mcd 2.2V  | C3   |
| DS013                    | CL155URGDT   | 2 COLOUR LED 5V 25mA 3.2Lx2.7W | A3   |
| R001                     | EXB24V121JX  | RES NETWORK 120 OHMx2 5% 1/16W | C3   |
| R002                     | EXB24V151JX  | RES NETWORK 150 OHMx2 5% 1/16W | C4   |
| R003                     | EXB24V151JX  | RES NETWORK 150 OHMx2 5% 1/16W | C3   |
| R004                     | D0GB151JA002 | RES 150 OHM 5% 1/10W SMD 1608  | C3   |
| R005                     | D0GB151JA002 | RES 150 OHM 5% 1/10W SMD 1608  | C3   |
| R006                     | ERJ3EKF3003V | RES 300K OHM 1% 1/16W SMD 1608 | C4   |
| R007                     | ERJ6ENF1204V | RES 1.2M OHM 1% 1/10W SMD 2012 | C4   |
| R008                     | EXB24V151JX  | RES NETWORK 150 OHMx2 5% 1/16W | C4   |
| R009                     | EXB24V151JX  | RES NETWORK 150 OHMx2 5% 1/16W | C4   |
| R010                     | EXB24V121JX  | RES NETWORK 120 OHMx2 5% 1/16W | C4   |
| SHIELD                   | GD30MDS030B  | GD30 RECEIVER SHIELD           |      |

## 9.3 Refurbishment Kits

### 9.3.1 GD30

| Model: EB-GD30 |                               | Name: Jigs and Tools                                                             |       |
|----------------|-------------------------------|----------------------------------------------------------------------------------|-------|
| Ref.           | Part Number                   | Description                                                                      | Notes |
|                | 9R3000B<br>9R3000K<br>9R3000S | REFURBISHMENT KIT, BLUE<br>REFURBISHMENT KIT, BLACK<br>REFURBISHMENT KIT, SILVER |       |

### 9.3.2 GD50

| Model: EB-GD50 |                                          | Name: Jigs and Tools                                                                                       |       |
|----------------|------------------------------------------|------------------------------------------------------------------------------------------------------------|-------|
| Ref.           | Part Number                              | Description                                                                                                | Notes |
|                | 9RD500B<br>9RD500K<br>9RD500N<br>9RD500Y | REFURBISHMENT KIT, BLUE<br>REFURBISHMENT KIT, BLACK<br>REFURBISHMENT KIT, GREEN<br>REFURBISHMENT KIT, GREY |       |

**NOTE:** Each refurbishment kit includes; Coloured Cover Assembly, Case Assembly, Key Sheet, Memo Key, LCD Panel, PCB Screw (x2), Cover Screw (x4), RF Cap, Antenna and Patent Label.

## 9.4 Repair Jigs and Tools

| Model: EB-GD30 |             | Name: Jigs and Tools                   |       |
|----------------|-------------|----------------------------------------|-------|
| Ref.           | Part Number | Description                            | Notes |
|                | IFB004      | INTERFACE BOX                          |       |
|                | JT00009     | GD30/GD50 RF ADAPTOR                   |       |
|                | JT00010     | BATTERY CALIBRATION VOLT. CONTROL UNIT |       |
|                | JT00011     | GD30/GD50 PCB REPAIR JIG               |       |
|                | JT00022     | TEST BATTERY                           |       |
|                | JT00004     | INTERFACE CABLE                        |       |

## 9.5 Printed Material

### 9.5.1 Document Packs

**NOTE:** Document Packs consist of language-specific User Guide, Quick Start and Warranty Card where applicable.

| Model: EB-GD30 & EB-GD50 |                                                                 |                                                                 | Name: Documentation                                                                                                                                                    |
|--------------------------|-----------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ref.                     | Part Number                                                     |                                                                 | Description                                                                                                                                                            |
|                          | GD30                                                            | GD50                                                            |                                                                                                                                                                        |
|                          | GD30DPKAR<br>GD30DPKCH                                          | GD50DPKAR<br>GD50DPKCH                                          | ARABIC, ENGLISH<br>FRENCH, GERMAN, ITALIAN, EUROPEAN WARRANTY                                                                                                          |
|                          | GD30DPKCZ<br>GD30DPKDN<br>GD30DPKES                             | GD50DPKCZ<br>GD50DPKDN<br>GD50DPKES                             | CZECH<br>DUTCHTONE<br>SPANISH                                                                                                                                          |
|                          | GD30DPKEUA<br>GD30DPKEUB<br>GD30DPKFN<br>GD30DPKFR<br>GD30DPKFT | GD50DPKEUA<br>GD50DPKEUB<br>GD50DPKFN<br>GD50DPKFR<br>GD50DPKFT | DANISH, GERMAN, EUROPEAN WARRANTY<br>FRENCH, GERMAN, EUROPEAN WARRANTY<br>FINNISH, EUROPEAN WARRANTY<br>FRENCH, EUROPEAN WARRANTY<br>FRANCE TELECOM, EUROPEAN WARRANTY |
|                          | GD30DPKGE<br>GD30DPKGR<br>GD30DPKHU<br>GD30DPKKPN<br>GD30DPKKU  | GD50DPKGE<br>GD50DPKGR<br>GD50DPKHU<br>GD50DPKKPN<br>GD50DPKKU  | GERMAN, EUROPEAN WARRANTY<br>GREEK, ENGLISH, EUROPEAN WARRANTY<br>HUNGARIAN<br>DUTCH PTT/KPN<br>ENGLISH, FRENCH, ARABIC                                                |
|                          | GD30DPKLE<br>GD30DPKMT                                          | GD50DPKLE<br>GD50DPKMT                                          | ENGLISH,FRENCH<br>ITALIAN, ENGLISH, ITALIAN WARRANTY<br>CARD, EUROPEAN WARRANTY CARD                                                                                   |
|                          | GD30DPKNL<br>GD30DPKNW<br>GD30DPKPL                             | GD50DPKNL<br>GD50DPKNW<br>GD50DPKPL                             | DUTCH, EUROPEAN WARRANTY<br>NORWEGIAN, EUROPEAN WARRANTY<br>POLISH                                                                                                     |
|                          | GD30DPKPR<br>GD30DPKPUK<br>GD30DPKRM<br>GD30DPKRU<br>GD30DPKSK  | GD50DPKPR<br>GD50DPKPUK<br>GD50DPKRM<br>GD50DPKRU<br>GD50DPKSK  | PORTUGUESE, EUROPEAN WARRANTY<br>PANASONIC UK<br>ROMANIAN<br>RUSSIAN<br>SLOVAKIAN                                                                                      |

| Model: EB-GD30 & EB-GD50 |                                                               |                                                               | Name: Documentation                                                                                                    |
|--------------------------|---------------------------------------------------------------|---------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| Ref.                     | Part Number                                                   |                                                               | Description                                                                                                            |
|                          | GD30                                                          | GD50                                                          |                                                                                                                        |
|                          | GD30DPKSL<br>GD30DPKSW<br>GD30DPKTA<br>GD30DPKTL<br>GD30DPKTU | GD50DPKSL<br>GD50DPKSW<br>GD50DPKTA<br>GD50DPKTL<br>GD50DPKTU | SLOVENIAN<br>SWEDISH, EUROPEAN WARRANTY<br>TAIWAN, ENGLISH<br>ITALIAN, EUROPEAN WARRANTY<br>TURKISH, EUROPEAN WARRANTY |
|                          | GD30DPKUK<br>GD30DPKYU<br>7QA959AAAA                          | GD50DPKUK<br>GD50DPKYU<br>7QA959AABA                          | ENGLISH, EUROPEAN WARRANTY<br>ENGLISH<br>BOX, PRINTED                                                                  |

### 9.5.2 Identification of Individual Instructions

On the rear cover of each manual there is a part number. The suffix to this number is the issue level of the manual. For Example, the part number for the English GD30 instruction is 7LB270A where the final 'A' shows the manual is issue 'A'.

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