

Service Manual

G450 Personal Cellular Telephone

Handheld Portable

EB-G450

Car Mount Kit

EB-HF501Z

Easy Fit Car Mount Kit

EB-HF450Z

Simple Car Kit

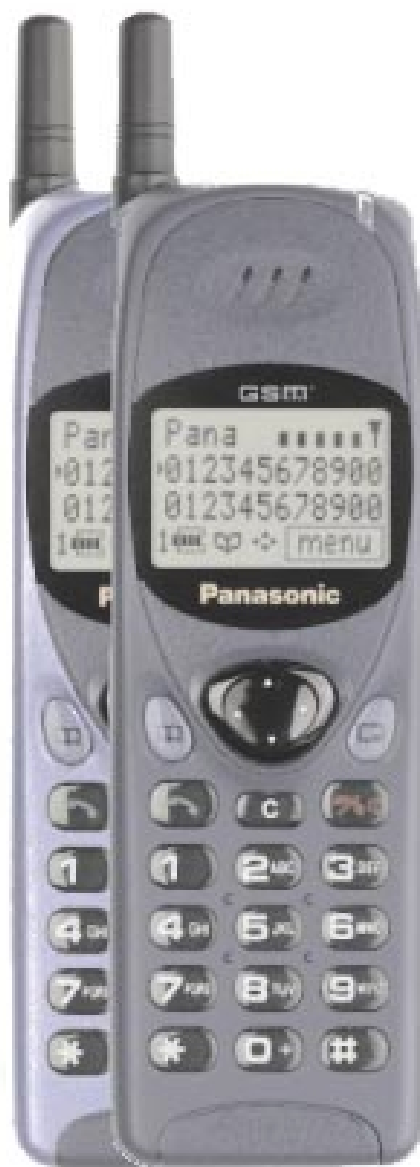
EB-KD500

Cable Adapter

EB-CD400A

Wall Charger

EB-CR500



Panasonic
GSM

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WARNINGS AND CAUTIONS

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 SERVICISE CORRECTLY WILL RESULT IN DAMAGE TO THE EQUIPMENT. AT RISK OF ELECTRICAL SHOCK. ELECTRICAL SHOCK CAN BE FATAL. EXTREME CARE MUST BE EXERCISED AT ALL TIMES. ALWAYS USE PROPER HANDLING TECHNIQUES.

Caution

The equipment described in this manual contains electrostatic sensitive devices. ESD damage can occur to these devices if the appropriate handling procedure is not adhered to.

ESD Handling precautions:

A working area where ESD 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. SAE or use with live equipment connect 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.

Batteries

This equipment contains 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 details of 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 Illustrate parts list - provides 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 the 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 hand-portable Telephone system and optional kits.

The GSM hand-portable may be configured as:

- 1 hand-portable unit
- 2 vehicle-portable Car adaptor hand-portable unit
- 3 handset vehicle-mount unit
- 4 Car sensor and receiver via CMCIA Interface car

2.2 Handportable Main Kit

The hand-portable main kit provides a stand-alone class 4 GSM telephone. The plug-in SIM contains the subscriber and network information necessary to operate the phone on a GSM network.

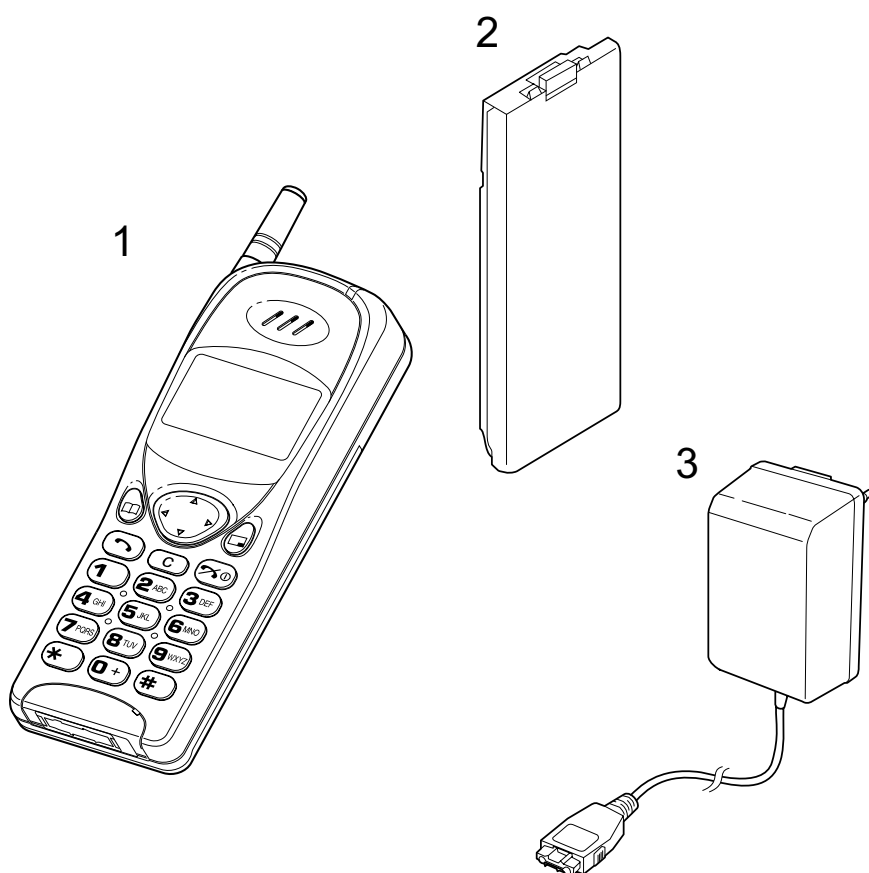


Figure 1: hand-portable Main Unit Kit

450-0201

IDENTIFICATION NUMBER	DESCRIPTION	PART NUMBER
1	Main unit	E -G450
2	Battery	E - S450
3	Adaptor	E -CA400 UK EU SA T
	Operating instructions	See Section 2.11

2.3 Handsfree Car Mount Kit

The an s ree Car Mount Kit enables the han portable to be ounte in a vehicle an to operate in han s ree o e

The an s ree Unit contains a speaker ith separate volu e control Speech is via a icrophone ounte on the ashboar or the sun visor

The telephone can be operate in han hel o e by re oving it ro the ol er This ill use the e ternal antenna an po er ro the an s ree Unit

The han s ree unit also provi es e ternal po er or the han hel internal charger

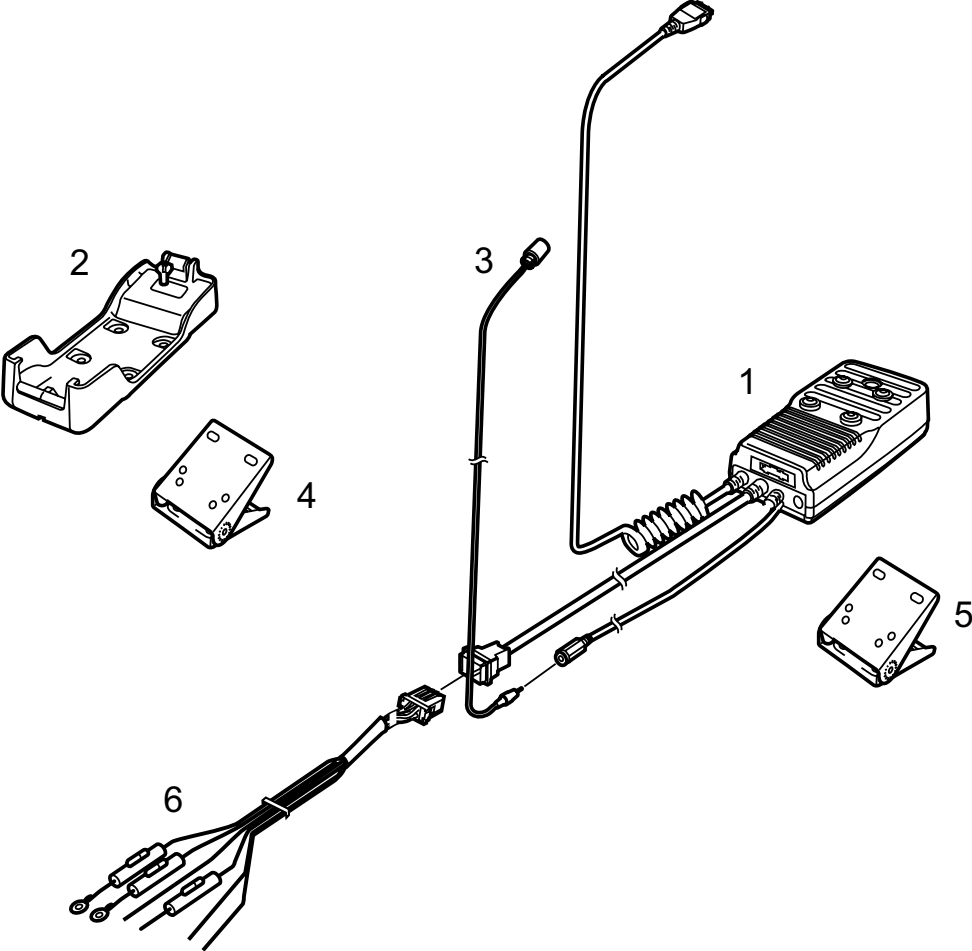


Figure 2: an s ree Car Mount Kit 450-0202

IDENTIFICATION NUMBER	DESCRIPTION	PART NUMBER
1	an s ree unit	E - 400
2	ol er G500	E -KA500
3	an s ree icrophone	E M1177
4	A ustable angle bracket	E 0001
5	A ustable angle bracket	E 0002
6	o er supply cable	E 70090

2.4 Easy Fit Car Kit

The Easy fit Car Mount Kit is very similar to the standard Car Mount Kit. The main difference with the Easy fit Car Mount kit is the addition of a cigar lighter adaptor or the supply of power. The cigar lighter adaptor makes installation of the kit very simple.

The standard Unit contains a speaker with separate volume control. Speech is via a microphone mounted on the dashboard or the sun visor.

Due to the length of cable from the standard Unit to the telephone the telephone can only be used in hand-free mode.

The standard Unit also provides external power or the handset internal charger.

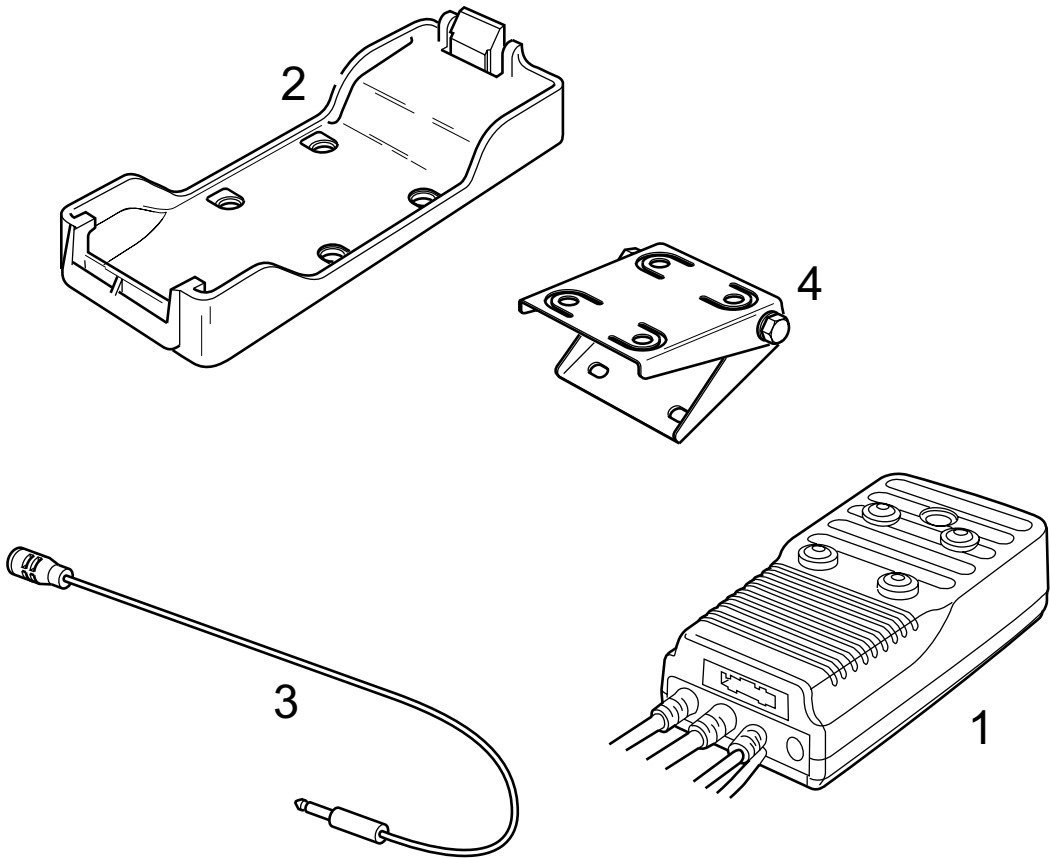


Figure 3: Easy fit Car Mount Kit 450-0203

IDENTIFICATION NUMBER	DESCRIPTION	PART NUMBER
1	standard unit	E - 501
2	power G500	E -KA500
3	standard microphone	E M1177
4	Adjustable Angle bracket	E 0001

2.5 Simple Car Kit

The Simple Car Kit enables the han portable unit to be powered from a vehicle battery provide that the vehicle has a cigar lighter socket and also has an external antenna connector for better signal quality when in a vehicle. One end of the C adaptor plugs into the han portable with the telephone battery connector. The other end of the adaptor is pushed into the cigar lighter socket. The external antenna connector is an ME type.

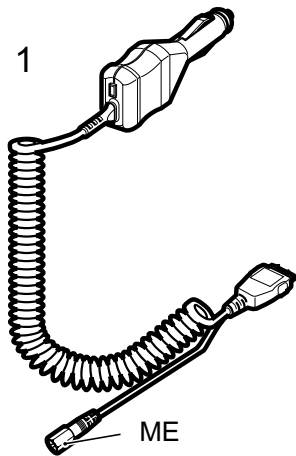


Figure 4: Simple Car Kit 450-0204

IDENTIFICATION NUMBER	DESCRIPTION	PART NUMBER
1	Simple Car Kit	E-K 500

2.6 DC Adaptor

The DC Adaptor kit enables the han portable unit to be powered from a vehicle battery provide that the vehicle has a cigar lighter socket. One end of the DC adaptor plugs into the han portable with the telephone battery connector. The other end of the adaptor is pushed into the cigar lighter socket.

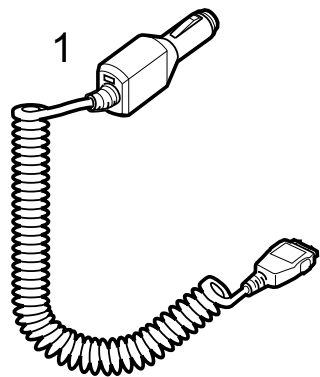


Figure 5: DC Adaptor 500-0203

IDENTIFICATION NUMBER	DESCRIPTION	PART NUMBER
1	DC Adaptor unit	E-C 400A

2.7 Holder Kit

The holder kit allows convenient mounting of the telephone in a vehicle. In conjunction with the Capacitor this can make a simple car mount kit. The adjustable angle bracket and telephone holder are attached to a convenient mounting point in the vehicle.

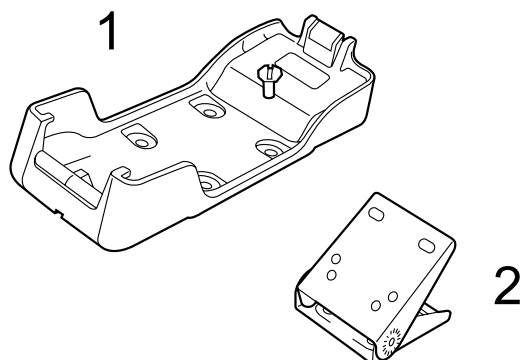


Figure 6: Holder Kit

500-0204

IDENTIFICATION NUMBER	DESCRIPTION	PART NUMBER
1	Holder	E-KA500
2	Adjustable Angle Bracket	E-0002

2.8 Dual Charger and Carry Case

The dual charger has two charging slots, enabling the telephone battery to be charged individually or as a part of the whole telephone assembly.

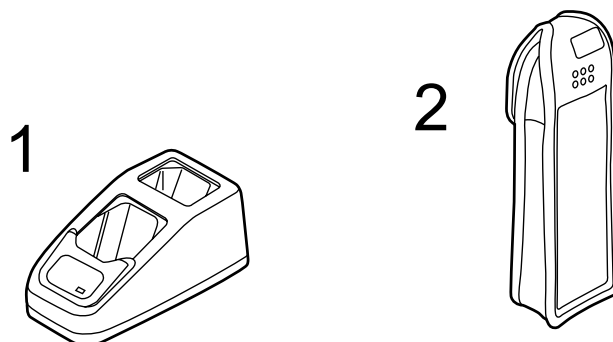


Figure 7: Dual Charger and Carry Case

500-0205

IDENTIFICATION NUMBER	DESCRIPTION	PART NUMBER
1	Dual charger	E-CR500
2	Carry case	E-K400

2.9 Battery Packs

There are four battery packs all of which use i-M. The battery pack S2 is 650 Ah the battery pack S is 600 Ah the battery pack M is 850 Ah and the battery pack L is 1600 Ah

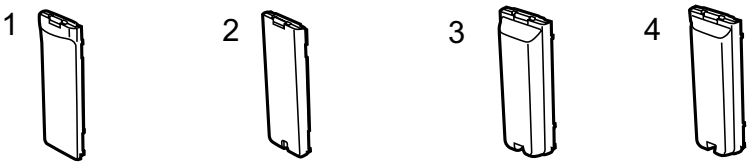


Figure 8: battery packs 450-0206

IDENTIFICATION NUMBER	DESCRIPTION	PART NUMBER
1	battery pack S	E - S500
2	battery pack M	E - M500
3	battery pack L	E - 500
4	battery pack S2	E - S450

2.10 PC Card

The PC Card interface is used with the hand portable and a laptop personal computer to provide a PC and radio facility

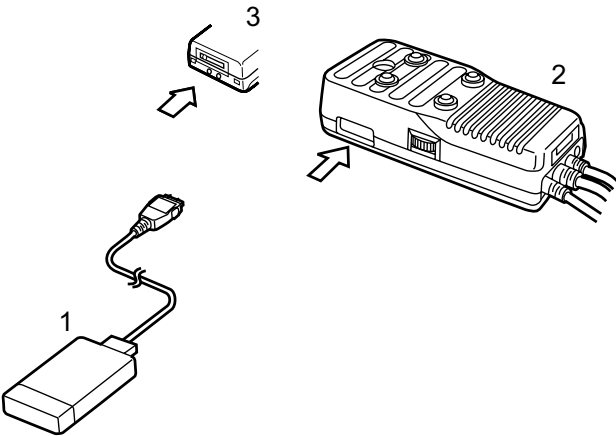


Figure 9: PC Card 500-0207

IDENTIFICATION NUMBER	DESCRIPTION	PART NUMBER
1	PC Card	E - A500
2	transceiver unit connection	
3	Telephone connection	

2.11 Documentation

In addition to the kit contents listed in this section all kits also contain user documentation. Some markets may require additional documentation e.g. a specific warranty that is not listed.

KIT TYPE	DOCUMENTATION			
Main Unit Kit	Operating Instructions			
	Arabic	71780A	Bulgarian	71802A
	Czech	71782A	Czech	71783A
Main Unit Kit	Dutch	71784A	English	71785A
	Finnish	71786A	French	71787A
	German	71788A	Greek	71789A
	Hungarian	71790A	Italian	71791A
	Polish	71792A	Polish	71793A
	Portuguese	71794A	Romanian	71801A
	Russian	71795A	Slovak	71800A
	Spanish	71796A	Slovenian	71797A
	Turkish	71798A		
	Quick Start			
	Arabic	71803A	Bulgarian	71804A
	Czech	71806A	Czech	71807A
	Dutch	71808A	English	71809A
	Finnish	71810A	French	71811A
	German	71812A	Greek	71813A
	Hungarian	71814A	Italian	71815A
	Polish	71816A	Polish	71817A
	Portuguese	71818A	Romanian	71819A
	Russian	71820A	Slovak	71821A
	Spanish	71822A	Slovenian	71823A
	Turkish	71824A		
Optional Accessories	European Warranty			
	Booklet	71556C	Car	71557C
	Answer Car Mount Kit			71849A
	Easy Fit Car Mount Kit			71828A
	Simple Car Kit			71857A
	Car Adapter			70744C
	Power Kit			71430A
	Universal Charger			71431A
	Carry Case			70748A
	Battery Pack S			71539
	Battery Pack M			71540
	Battery Pack L			71541
	AC Adapter			70745A
	SMS Cable			71432A

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3 OPERATING INSTRUCTIONS

3.1 General

This section provides a brief guide to the operation and facilities available on the G450 handheld portable unit. Refer to the Operating Instructions for full operational information.

3.2 LCD Display

The G450 handheld portable unit has a 3 line by 12 character chip on glass liquid crystal display in conjunction with the following icons:

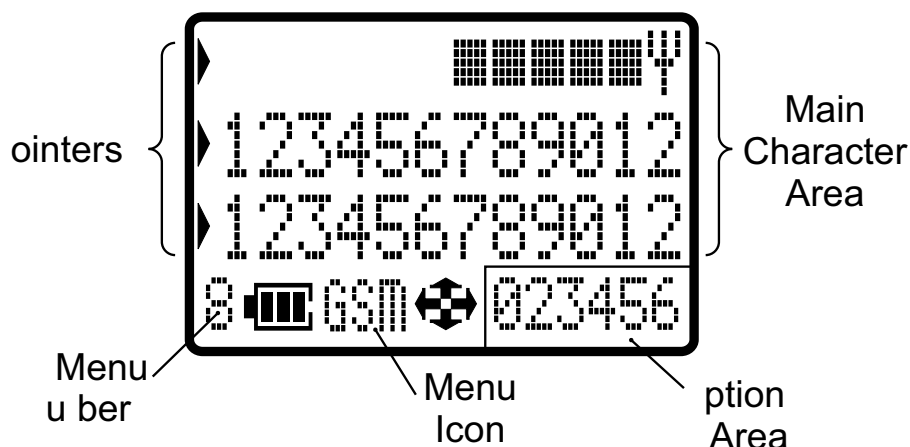


Figure 1: LCD display

450-0301

	Indicates receive signal strength strong signal area weak signal area
	Indicates that it is possible to make an emergency call
Menu number	The number of the feature pointed to by the pointer. To access the feature quickly enter the menu number on the keypad.
	Displays the battery charge level. battery is at full charge. battery requires recharging. 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: Key-guard is active and using the Key-guard feature Phonebook is in use using the Messages feature or you have unread Short Text Messages (SMS) using the Calls Service feature using the Call divert feature or the telephone has Call divert set Call divert profile 1 is set Call divert profile 2 is set using the Security feature or the telephone is locked using the networks feature using the personalise feature ABC shows that normal characters have been entered in Alpha Entry ABΓ shows that Greek characters have been entered in Alpha Entry AAA shows that eleven characters have been entered in Alpha Entry 1-9 shows that numbers have been entered in Alpha Entry
	Indicates that the navigation key can be pressed. Each arrow will light individually to indicate which direction is valid.
Option Area	Pressing the select key 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

3.3 Location of Controls

Incoming/Charge indicator:

- Green incoming call
- Red charging battery pack

External connector:

Use to connect to external accessories or charging equipment

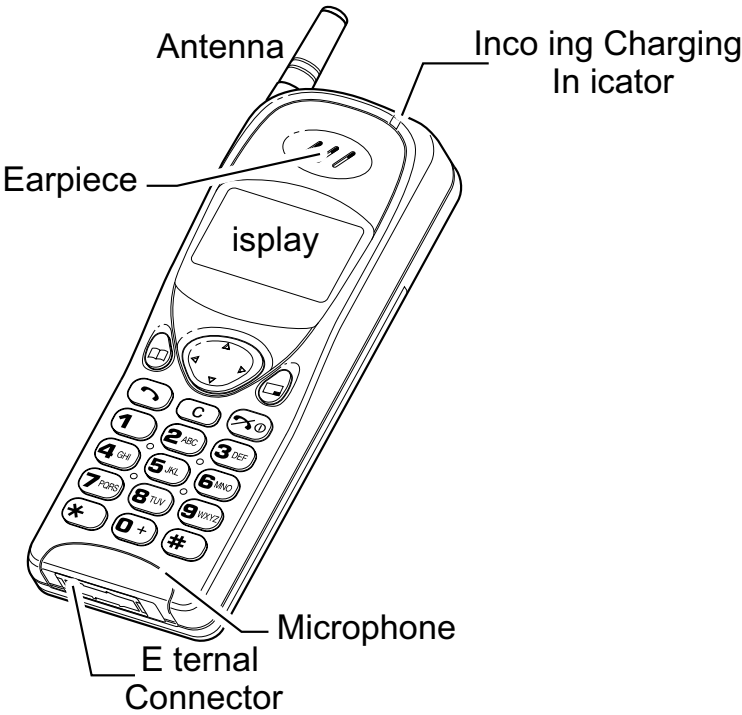


Figure 2: Location of controls for G450

450-0302

	Navigation Key Scrolls through options or features menu and increases or decreases volume
	Select Key Selects option shown in the Option Area of the display
	Phonebook Key Scrolls through the phonebook or stores a number in the phonebook Changes the type of characters entered using Alpha Entry
	Send Key Makes a call
	Clear Key Clears the last digit entered clears all digits when pressed and held or returns to the previous display
	End Key Ends a call or switches the telephone on or off when pressed and held
Digit keys 0+ to 9, *, and # where appropriate the 0+ key will enter the international access code if numbers or pauses when pressed and held	

3.4 Concept of Operation

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

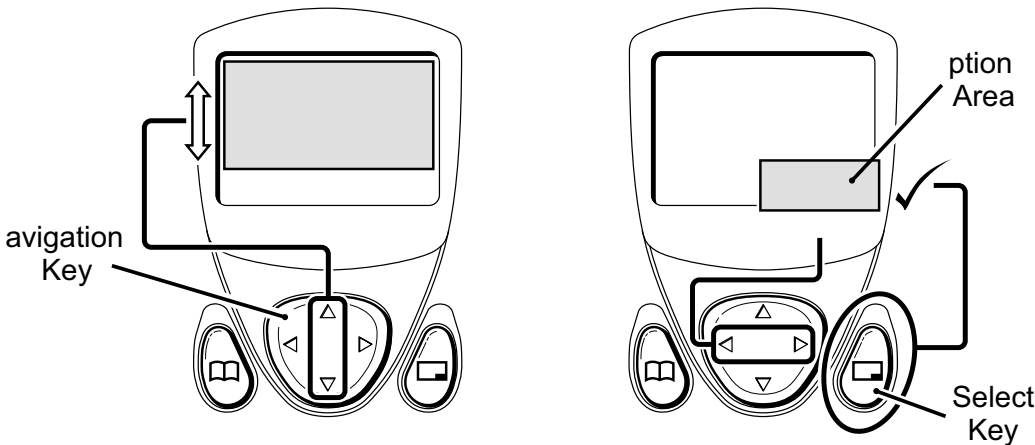


Figure 3: Concept of operation 450-0303

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

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

3.5 Alpha Entry

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

Key	Character operation			
	ABC	ABΓ	ÄÅ	1-9
1			1	
2 ^{ABC}	A C a b c	A B Γ	A C a b c	2
3 ^{DEF}	E e	Δ E Z	E e	3
4 ^{GHI}	G I g h i	H Θ I	G I g h i	4
5 ^{JKL}	K L k l	K Λ M	K L k l	5
6 ^{MNO}	M n o	N Ξ O	M n o	6
7 ^{PQRS}	R S p r s	Π Ρ Σ	R S p r s	7
8 ^{TUV}	T U t u v	Τ Υ Φ	T U t u v	8
9 ^{XYZ}	y	Ξ Ψ Ω	y	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, ABΓ, the ten numeric characters, ÄÅ, numerals 1-9 and standard characters ABC, press.

3.5.1 Editing Alpha Entry

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

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

3.6 Features Menu Structure

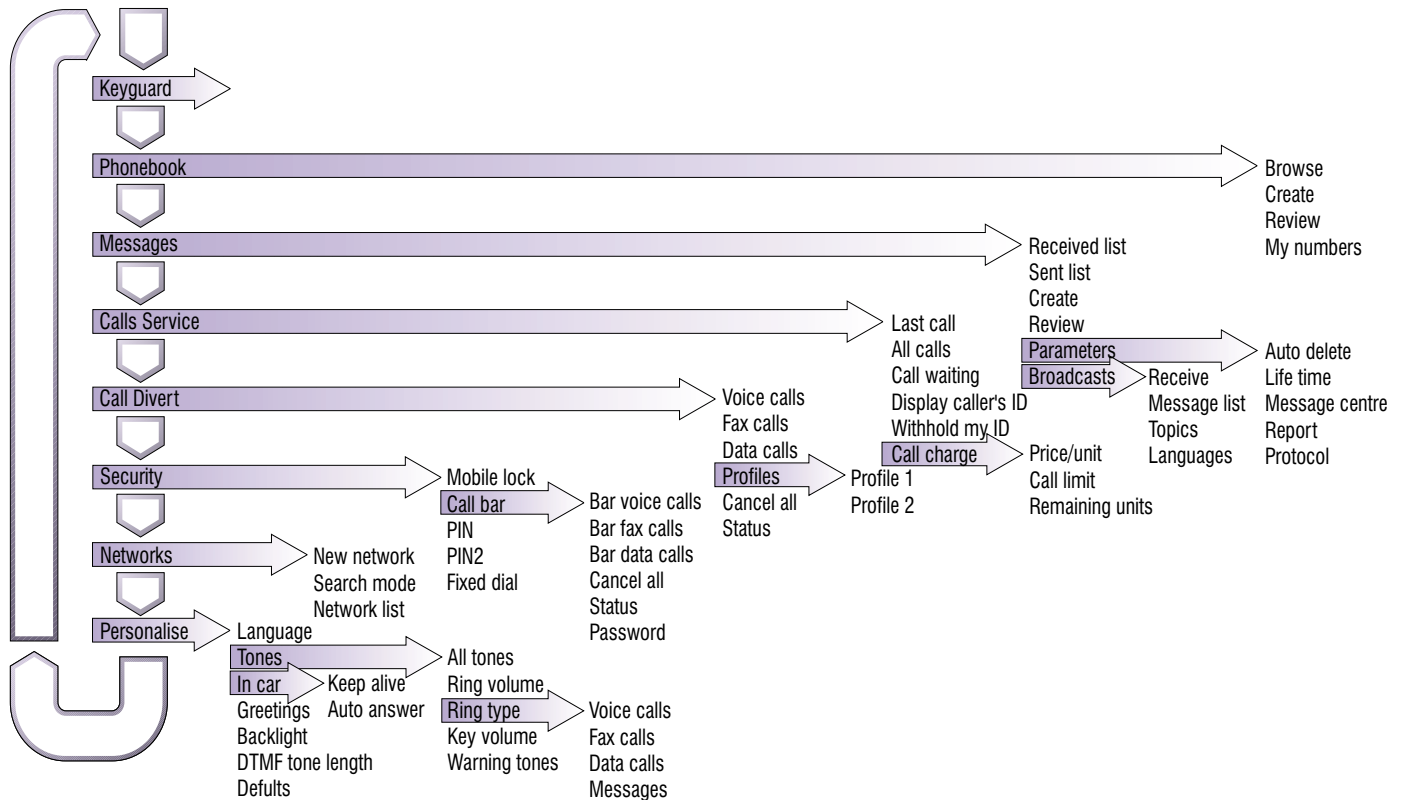


Figure 4: eature Menu

450-0304

3.7 Public Man Machine Interface (MMI)

It is possible to operate all GSM telephone 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 G450.

The * and # in the following procedures should be replaced by * and # receptivity. Also S and E should be replaced with and keys.

3.7.1 Reading Phonebook Memory Location

MEM R L CATI

Leaving a zero can be left out of the location number. e.g. 007 can be 7.

3.7.2 Presentation of IMEI

0 6

3.7.3 Security

Change PIN

0 4 L I E I E I

Change PIN2

0 4 2 L I 2 E I 2 E I 2

Unblock PIN

0 5 I U L C K I G K E E I E I

Unblock PIN2

0 5 2 I 2 U L C K I G K E E I 2 E I 2

3.7.4 Call Hold

Place a call on hold

2 S

Recall a held call

2 S

Make a second call

TELE E U M E R S

Swap between two held calls

2 S

End held call

S

End active call

1 S

Reject incoming call

0 S

3.7.5 Call Waiting

Enable Call Waiting

4 3 S

Disable Call Waiting

4 3 S

Call Waiting Status

4 3 S

3.7.6 Calling Line Identification

Calling Line Identification Feature	Service Code
Calling Line Identification Presentation CLI	30
Calling Line Identification Restriction CLIR	31
Connect Line Presentation CL	76
Connect Line Restriction CL R	77

Enable

SERVICE S

isable

SERVICE S

Temporary suppress identification

31 TELE EUMERS

Temporary display identification n 31 TELE EUMERS

3.7.7 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 to Reply Call ar

SERVICE RAR TELE EUMER TELECOMMUNICATIONS SERVICE S

Set to Reply Call ar

SERVICE RAR TELE EUMER TELECOMMUNICATIONS SERVICE

TIME TRIGGER seconds S

Clear

SERVICE TELECOMMUNICATIONS SERVICE S

Status

SERVICE TELECOMMUNICATIONS SERVICE S

Clear all Call diverts

002

3.7.8 Call Bar

Call Bar Type	Service Code
All outgoing calls	33
Outgoing international calls	331
Outgoing international calls except those to your LM country	332
All incoming calls	35
Incoming international calls when roaming	351

Set

ASS R TELECOMUNICATIONS SERVICES

Clear

ASS R TELECOMUNICATIONS SERVICES

Status

TELECOMUNICATIONS SERVICES

Clear all Call Bar Types

330 ASS R S

Change Call Bar status

03 L ASS R E ASS R E ASS R S

3.7.9 Telecommunication Services Used for Public MMI

Teleservice

Service	MMI Service Code
All teleservices	10
Telephony	11
All data telesevice	12
Accessible 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 async services	21
All synchronous services	22
All ata synchronous services	24
All ata asynchronous services	25
All e icate packet access	26
All e icate A access	27

3.8 Troubleshooting

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

Problem	Causes and Solutions
Telephone will not switch on	Check that the battery pack is fully charged and correctly connected to the telephone
Short battery life	Battery life is affected by the network you are using and the condition of the battery pack. The life of the battery pack is affected by improper charging; this is inherent in all Li-M and Li-C batteries. To maintain a full performance always use until the low battery warning and then fully recharge the battery pack. To revive the battery pack use the telephone until it switches off and then fully recharge three times. However, the battery pack will eventually wear out and must be replaced with a new one.
Battery level indicator  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 display the battery level indicator  . The battery pack must be charged in a temperature no lower than -5 °C and no higher than 35 °C.
Calls cannot be made	Calls cannot be made when the telephone is locked or outgoing calls are barred. Check that the telephone is registered to a network. Move to a coverage area and operate your telephone after it has registered with a network.
Calls cannot be made on international Meory	Check the telephone number is stored in international Meory or your SIM supports international Meory.
Calls cannot be received	To receive a call the telephone must be switched on. Calls cannot be received when incoming calls are barred.
Emergency calls cannot be made	Check that the antenna symbol  is displayed. Move to a coverage area and operate your telephone when the antenna symbol is displayed.
Telephone numbers cannot be recalled	Meory cannot be recalled when the telephone is fully locked or international is switched on.

3.9 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
Enter UK	The PIN has been entered incorrectly 10 times. To enter a new PIN you must first enter a UK
Network not allowed	Roaming with the selected network is not allowed
UK blocked	The PIN has been entered incorrectly 10 times. Contact your Service provider
Security failure	The network has detected authentication failure because your SIM is not registered with that network. Contact your Service provider
SIM blocked	The SIM is blocked because the wrong PIN has been entered ten times. Contact your 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 your Service provider

3.10 Security Codes

CODE TYPE	NUMBER OF DIGITS	DESCRIPTION
Personal Identification Number (PIN)	4 to 8	Controls SIM security. Supplied by the service provider
PUK 2	4 to 8	Controls emergency security. Supplied by the service provider
PUK 1/2 Unblocking Key UK PIN 2	8	Use to unblock PIN and PUK 2. A PIN or PUK 2 will become blocked if the wrong PIN or PUK 2 is entered three times. When the blocked PIN or PUK 2 is unblocked, a new PIN or PUK 2 must be entered. If the wrong UK PIN or UK PIN 2 is entered 10 times, your SIM will be unusable. Supplied by the service provider
Pass or	4	Controls the call barring function. If the wrong pass or is entered three times, this service will be revoked. Supplied by the service provider
Lock Code	4	Controls telephone security. Factory set to 0000

3.11 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	U I or o e	T or T
22	Asynchronous 1 2 kbps	Asynch	1 2 kbps	U I or o e	T or T
23	Asynchronous 1200 75 bps	Asynch	1200 75 bps	U I or o e	T or T
24	Asynchronous 2 4 kbps	Asynch	2 4 kbps	U I or o e	T or T
25	Asynchronous 4 8 kbps	Asynch	4 8 kbps	U I or o e	T or T
26	Asynchronous 9 6 kbps	Asynch	9 6 kbps	U I or o e	T or T
41	encapsulated Access 300 bps	Asynch	300 bps	U I	T or T
42	encapsulated Access 1 2 kbps	Asynch	1 2 kbps	U I	T or T
44	encapsulated Access 2 4 kbps	Asynch	2 4 kbps	U I	T or T
45	encapsulated Access 4 8 kbps	Asynch	4 8 kbps	U I	T or T
46	encapsulated Access 9 6 kbps	Asynch	9 6 kbps	U I	T or T

U I Unrestricted digital Information
T Transparent non-error correction
T Non-Transparent error correction

AT commands to select these services are C ST and CI

3.12 GSM Network Codes and Names

Country	Access Code	Network			
		Operator	Name	Abbreviation	Code
A	37	STA A RRA	M ILA M-A	213 03	
AUS	61	TELEC M Australia	M ILE ET M-ET	505	01
AUS	61	TUS Co unications ty Lt	TUS Mobile	TUS	505 02
AUS	61	o a one T	A E E	505 03	
A	43	T Austria	A1	A1	232 01
EL	32	elgaco Mobile	R IMUS R I	206	01
G	359	M ILTEL A	CITR GSM CITR	284	01
R	973	A REI Teleco unications Co	M ILE LUS	M LUS	426 01
C	41	S iss Teleco TT	ATEL GSM	AT	228 01
C	86	China Unite Teleco uni-cations Corporation	C I A U I C M	CU-GSM	460 01
C	357	Cyprus Teleco unication Authority	C TAGSM	C -GSM	280 01
	49	eTeMobil G b	Mobil unk 1 1	262	01
	49	Mannes ann Mobil unk	2 RI AT 2	262	02
E	34	TELE ICA M ILES	M ISTAR MSTAR	214	07
E	34	AIRTEL S AI	AIRTEL	AIRTL	214 01
EE	372	Eesti Mobiiltele on	EMT GSM	EMT	248 01
EE	372	RA I LI A EESTI AS	EESTI	RLE	248 02
K	45	TELE an ark Mobile	T K-M IL T M	238	01
K	45	ansk Mobil Tele on MT	S S	238	02
	33	rance Teleco	Itineris	ltime	208 01
	33	S R	S R	S R	208 10
	33	SRR	S R REU I	S R RU	647 10
	33	TIKI E	II	II	547 20
I	358	Teleco inlan	TELEC M I	TELE	244 91
I	358	Ra iolin a A	RA I LI A RL	244	05
GI	350	GI TEL	GI TEL	GI TEL	266 01
GR	30	ana on S A	A A A	202	05
GR	30	STET ELLAS	TELESTET	TLSTET	202 10
	36	estel 900 GSM RT	ESTEL 900 -900	216	30

Country	Access Code	Network			
		Operator	Name	Abbreviation	Code
	36	annon GSM RT	A GSM	A	216 01
K	852	ong Kong Teleco CSL Lt	TCSL GSM	TCSL	454 00
K	852	utchison Telephone Co Lt	TCLGSM	TCL	454 04
K	852	S arTone Mobile Co unications Lt	SMART E	KSMC	454 06
R	95	T	CR ET	CR	219 01
I	39	M ITEL R T ITALIA	M ITEL	M I	222 10
I	39	TELEC M ITALIA M ILE	ITALIA M ILE	TIM	222 01
I A	91	harti Cellular Li ite	AirTel	AIRTL	404 10
I A	91	L S STEMS R ECTS LT I IA L - M ILE L			404 21
I	62	T Teleko unikasi In onesia	TELK MSEL	T-SEL	510 10
I	62	T SATELIT ALA A I ESIA	SATELI C EL	SAT-C	510 01
I	62	T E CELC MI RATAMA	E CELC M	E -CEL	510 11
IRL	353	Teleco Irelan	EIRCELL-GSM	E-GSM	272 01
KSA	966	ELECTR IC A LICATI S ESTA LIS ME T	EAE- AL A AL	EAE	420 07
KT	96	Mobile Teleco unications Co	MTC Net	MTC	419 02
L	352	T Lu e bourg	LU GSM	T L	270 01
L	371	Latvian Mobile Telephone Co Lt	LMT GSM	LMT	247 01
MAC	853	C T M	TELEM EL	CTMGSM	455 01
M R	212	T M R CC	T	T	604 01
MRU	60	MAURITIUS TELEC M LT	CELL LUS	CELL	617 01
M	60	I ARIA G C MMU ICATI S S	a is obile	a is	502 12
	47	Telenor Mobil AS	Telenor Mobil	Tele	242 01
	47	etCo GSM A S	etCo GSM	C M	242 02
L	31	LI ERTEL	LI ERTEL	LI TEL	204 04
L	31	TT Teleco	TT TELEC M	L TT	204 08
	64	ELLS UT	ELLS UT	S	530 01
	351	Teleco unica oes Moveis acionais TM	TM	TM	268 06
	351	TELECEL	TELECEL	TLCL	268 01

Country	Access Code	Network			
		Operator	Name	Abbreviation	Code
	63	Globe Teleco GMCR Inc	Globe Teleco	GL E	515 02
	63	Isla Co unications Co Inc	Islaco ISLA		515 01
AT	974	-TEL	ATAR ET - ET	427	01
R C	886	L TA	L TA GSM L GSM	466	92
RL	961	Teleco inlan International	LibanCell Lib	CL	415 03
RUS	701	Mobile Telesyste s	MTS	MTS	250 01
RUS	701	orth- est GSM	orth- est GSM	GSM	250 02
S	46	Telia Mobitel	TELIA M ITEL	TELIA	240 01
S	46	C M I GSM A	C M I I		240 07
S	46	EUR LITA A	EUR LITA	EUR	240 08
SA	27	AC M	o aCo A		655 01
SA	27	Mobile Telephone et orks	MT	MT	655 10
SG	65	Singapore Teleco	ST-GSM	STGSM	525 01
SRI	94	MT ET RKS T SRI LA KA	IAL G	AL G	413 02
S R	963	Mobile Syria	M ILE S RIA	S R M	417 09
T	66	A vance In o Service ublic Co pany Li ite	AIS GSM	T AIS	520 01
TR	90	TT Turkey	TURKCELL GSM	TCELL	286 01
TR	90	TT Turkey	TT TELSİM GSM	TLSİM	286 02
UAE	971	ETISALAT	ETISALAT	ETSLT	424 02
UK	44	Cellnet	CELL ET	CL ET	234 10
UK	44	GUER SE TELECOMS	GUER SE TEL	GS -TEL	234 55
UK	44	ersey Teleco s	ersey Tele	ER1	234 50
UK	44	MA TELECOM	R T GSM	MA	234 58
UK	44	o a one	A E A		234 15

3.13 Glossary of Terms

TM	ual Tone Multiple re uency tones. The nu eric keys 0 to 9 an an ill generate i erent TM tones hen presse uring conversation. These are use to access voice ail, paging an co puterise ho e banking.
GSM	Global Syste or Mobile co unications. The na e given to the a vance igital technology that your telephone uses.
o e country	The country here your ho e net ork operates.
o e net ork	The GSM net ork on hich your subscription etails are hel.
Lock co e	Use or security o your telephone actory set to 0000.
Message Centre	here essages are sent be ore they are or ar e onto their estination. The Message Centre telephone nu ber ay be progra e into your SIM or supplie by your service provi er.
et ork operator	The organisation responsible or operating a GSM net ork. Each country ill have at least one net ork operator.
ass or	Use or the control o the call bar unction. Supplie by your service provi er.
I	ersonal I enti ication u ber use or SIM security. Supplie by your service provi er.
I 2	ersonal I enti ication u ber use or the control o i e ial Me ory an call charge etering. Supplie by your service provi er.
UK UK2	I I 2 Unblocking Key. Use to unblock the I I 2. Supplie by your service provi er.
Registration	The act o locking on to a GSM net ork. This is usually per or e auto atically by your telephone.
Roa ing	The ability to use your telephone on net orks other than your o e net ork.
Service provi er	The organisation responsible or provi ing access to the GSM net ork.
SIM	Subscriber I enti ication Mo ule. A s all s art-car hich stores uni ue subscriber an user-entere in or ation such as hone ook i e ial Me ory an short essages. Supplie by your service provi er.
Supple entary service	et ork-controlle GSM unctions hich your telephone ill support. Supple entary services ay only be available on a subscription bases.
il nu bers	Spaces in a store telephone nu ber hen the telephone nu ber is recalle pressing a nu eric key ill ill in a space. This can be use to restrict ialling to a speci ic area.

4 INSTALLATION GUIDE

4.1 General

This section describes the procedure used to install the GSM hand portable unit into a negative-ground vehicle.

Caution:

- o not attempt to install this equipment into a positive-ground vehicle
- o not attempt to supply power to the equipment from a positive-ground vehicle

Installation will be performed using either of the following kits

- 1 an s ree car ount kit
2 C a aptor

4.2 Handsfree Car Mount Kit

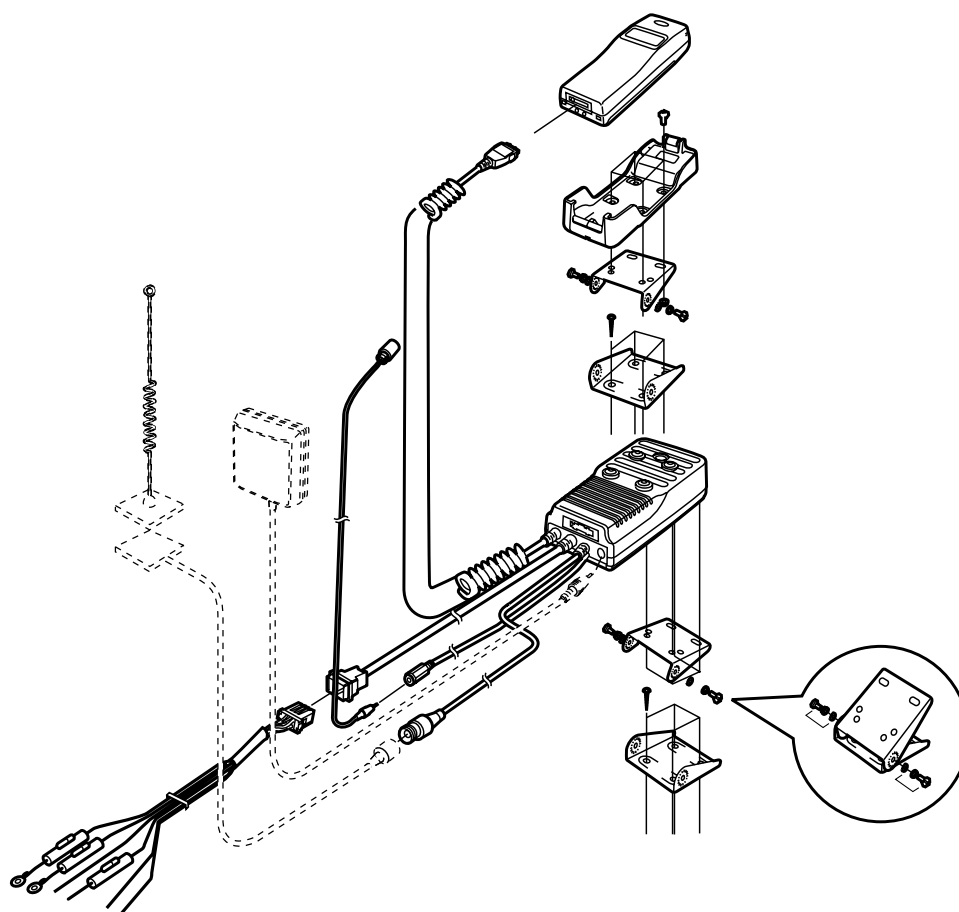


Figure 1: an s ree Car Mount Kit

500-0401

4.2.1 Selecting the Location for the Handsfree Unit

The following points should be considered when choosing a location for the handsfree unit

Ensure that the location does not obstruct normal operation of the vehicle

Ensure that the location does not affect passenger accommodation or is subject to excessive shocks

Ensure that the location will allow easy operation of the unit

Ensure that the location provides a secure fitting for the unit

Avoid direct exposure to the sun's rays or to rain

Ensure that the location takes due consideration of cable routing requirements

Considering the points listed above, the recommended locations for mounting the handsfree unit are the dashboard, Air Rest Storage Compartment or the Centre Console

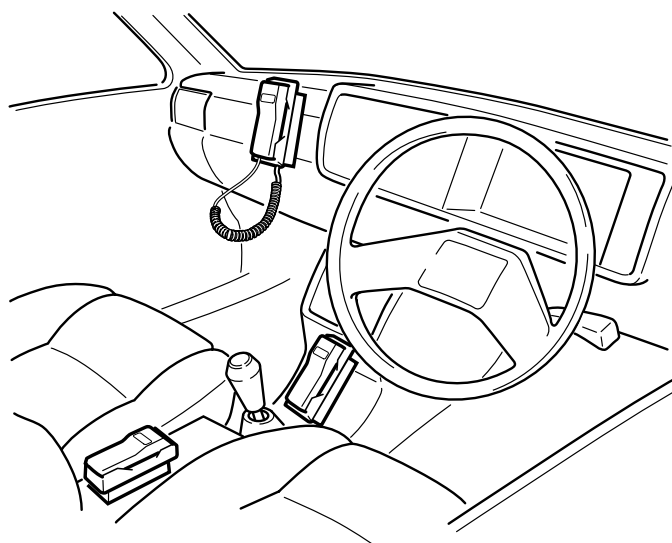


Figure 2: Handsfree Cradle Unit Locations

500-0402

4.2.2 Wiring

Locations for the hands free unit will vary according to the type of vehicle as will the routing of power and interconnecting cables. The following precautions should be observed:

Do not install or connect the unit into a positive ground vehicle. This equipment must be installed into a 12V negative ground vehicle.

Mount cables to the vehicle so that they are not prone to displacement or disconnection through vibration.

Route cables through existing holes in the dashboard, bulkheads etc. where possible.

Site cables so that contact with moving parts, brake/clutch pedals, seat mechanisms etc. is avoided.

Site cables as far away as possible from existing cabling to avoid electrical induction.

Shield cables to protect interference with the vehicle electronics.

When connecting cables to the vehicle circuitry ensure that the vehicle functions are not affected.

A typical car installation is illustrated below. The actual location of units may vary according to vehicle type.

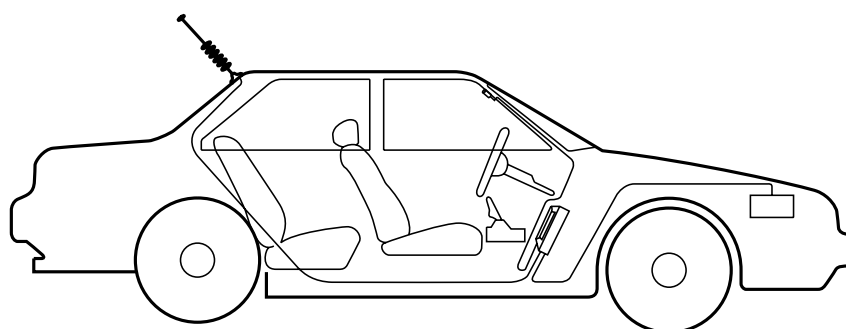


Figure 3: Car installation

500-0403

Wiring guide

Colour	Connection	Fuse
Black	Ground	4A
Blue	Ignition	3A
Red	Battery	3A
Yellow	Radio Mute	

4.2.3 Installation with the Adjustable Angle Bracket

The Adjustable Angle bracket can be used to install the Accessory Unit in the following configurations

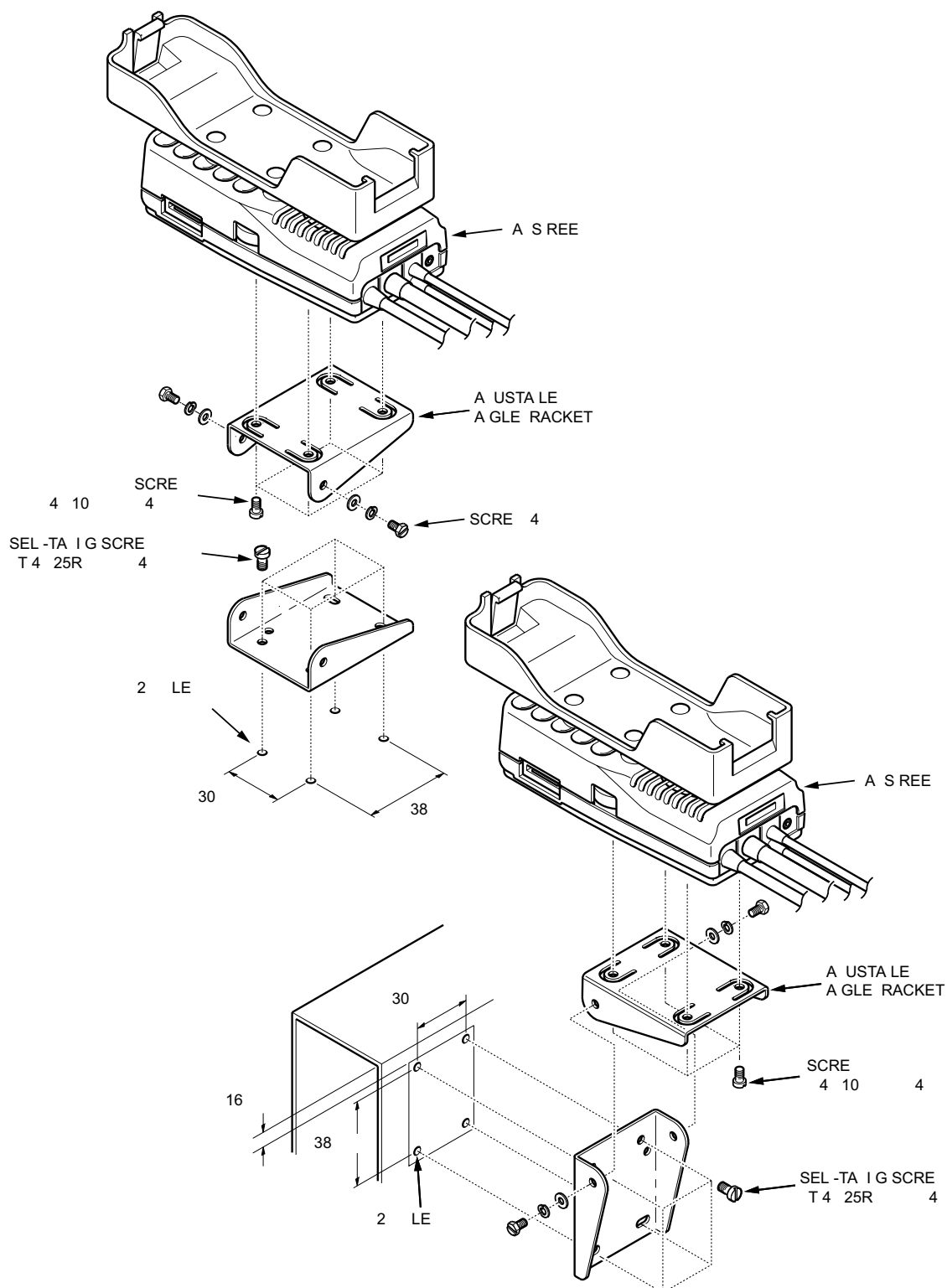


Figure 4: Adjustable angle bracket configurations

500-0404

4.2.4 Installing the Handsfree Microphone

The following points should be considered when installing the handsfree microphone:

That it does not obstruct the operation of the vehicle

That it does not affect the normal passenger accommodation

That the microphone should face the driver's mouth at a distance of approximately 30cm

Mounting the Microphone to the Sun Visor

- 1 Mount the microphone onto the sun visor clip by inserting the projection of the clip into the hole of the microphone base
- 2 Mount the microphone onto the sun visor as shown in figure 5
- 3 Connect the microphone to the lying lead for the handsfree cradle

Mounting the Microphone to the Dashboard

- 1 Attach the adhesive pad to the dashboard clip
- 2 Drill a 1mm hole at the mounting location and mount the clip using a M2.5 self-tapping screw
- 3 Insert the projection of the clip into the microphone base ensuring that it points towards the driver's mouth
- 4 Connect the handsfree microphone to the handsfree cradle

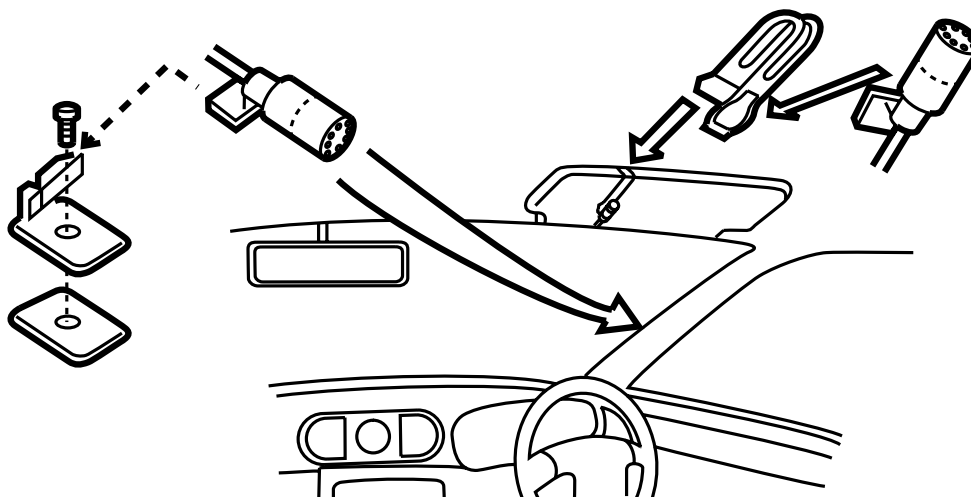


Figure 5: Microphone Installation

500-0405

4.3 DC Adaptor

The telephone is powered directly from the 12V car lighter socket. Switch the telephone power on and fit the DC power cable.

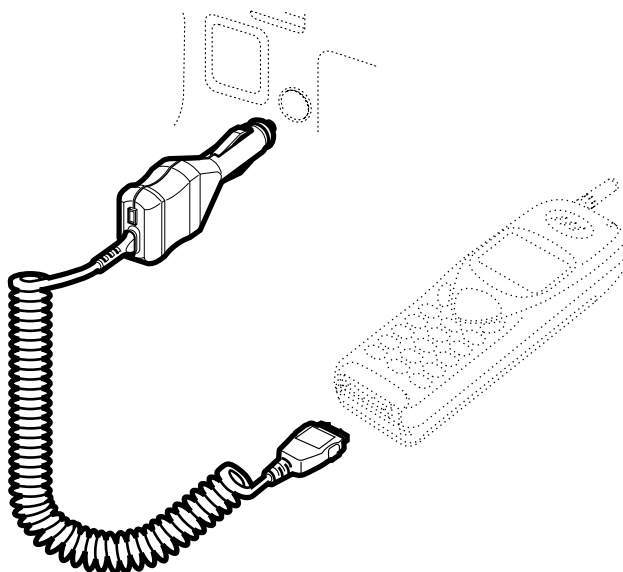


Figure 6: DC Adaptor Installation

450-0406

4.4 Simple Car Kit

The telephone is powered directly from the 12V car lighter socket. To improve signal quality the external antenna is connected to the ME type connector.

Switch the power on and fit the connector to the telephone.

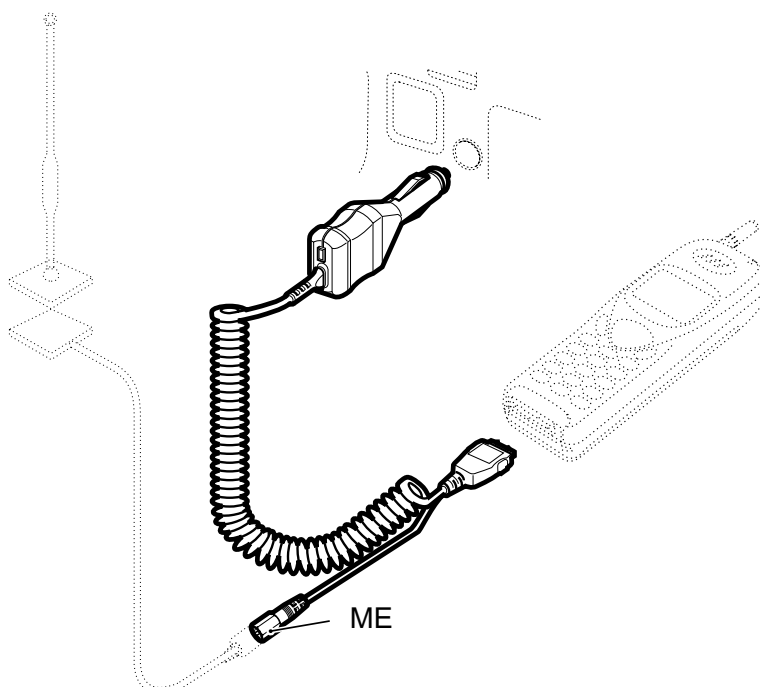


Figure 7: Simple Car Kit Installation

450-0407

5 DISASSEMBLY/REASSEMBLY INSTRUCTIONS

5.1 General

This section provides disassembly and reassembly procedures for the main components of the G450 system. These procedures MUST be performed by qualified service personnel at an authorised service centre. The following warnings and precautions MUST be observed during ALL disassembly and 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 SERE T IS A R I G C U L RESULT I N A M A G E T T E E U I M E T R A T R S T S S I L E I U R T E R S E L R E S U L T I G R M E L E C T R I C S C K R T E A E C T E C A A C I T R E L I G E T R E M E C A R E M U S T B E E X E R C I S E A T A L L T I M E S E A L I G T E S E E I C E S

Caution

The equipment described in this manual contains electrostatic sensitive devices. ESD damage can occur to these devices if the appropriate handling procedure is not adhered to.

ESD Handling precautions:

A working area where ESD 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 or use with live equipment connected via a 1M Ω 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 5k Ω and 1M Ω 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.

5.2 Handportable Unit

5.2.1 Disassembly

- Figure 1 Press the release clip then tilt up as shown to remove the battery from the telephone

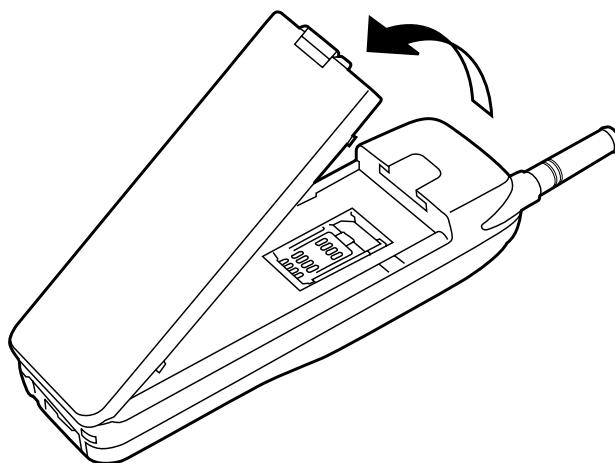


Figure 1: Battery removal

450-0501

- Figure 2 Remove the back cover of the telephone case. 2 screws

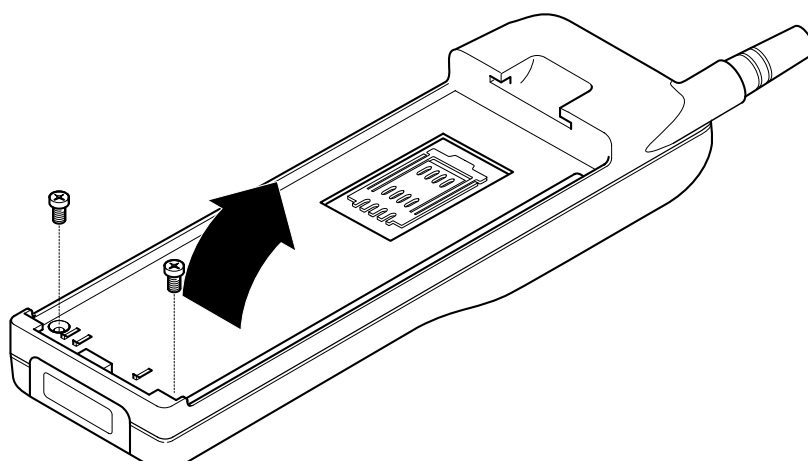


Figure 2: Case disassembly

450-0502

- Figure 3 Remove the C-assembly. 2 screws

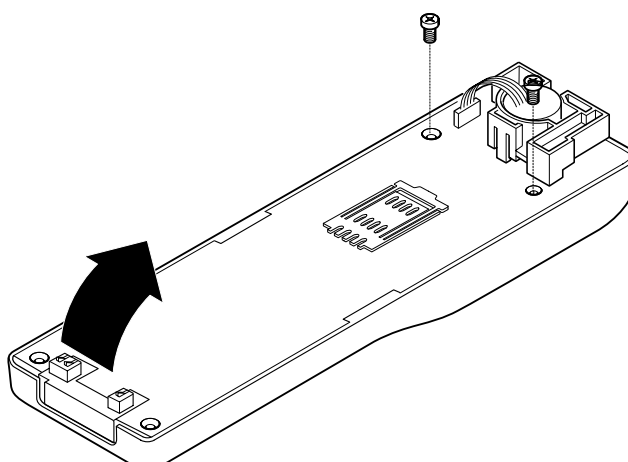


Figure 3: C-assembly removal

450-0503

4. Figure 4 Remove the R board from the C chassis

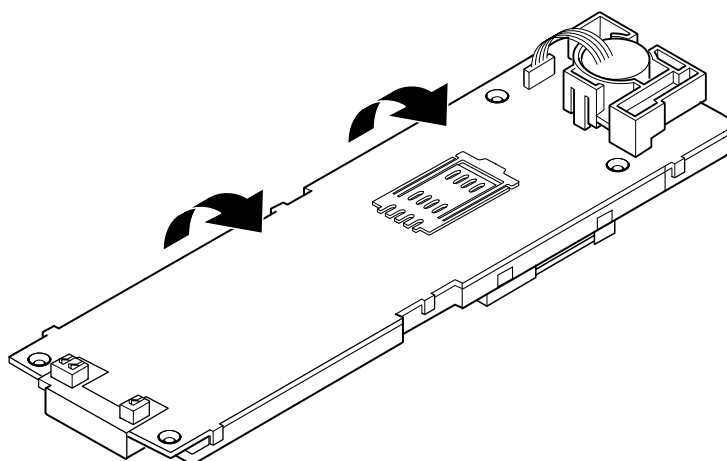


Figure 4: R board removal

450-0504

5. Figure 5 Remove the microphone from the C assembly

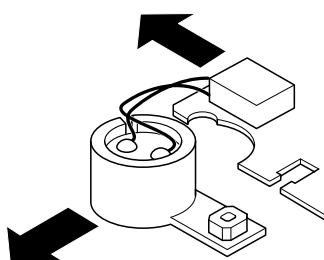


Figure 5: Microphone removal

450-00505

6. Figure 6 Remove the buffer recessed cable assembly from the cable clamp

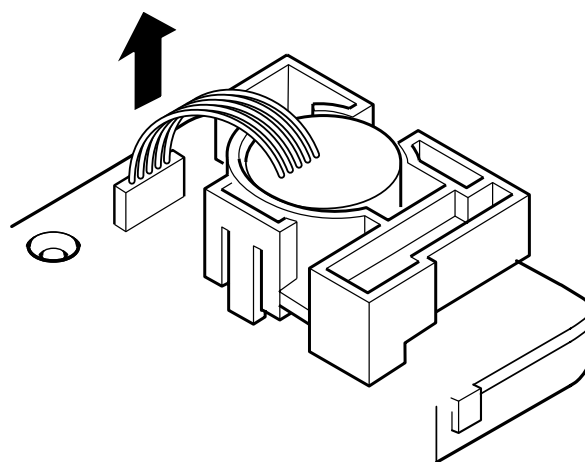


Figure 6: Buffer recessed cable removal

450-0506

7. Figure 6 Unclip the bumper recess assembly from the R/C

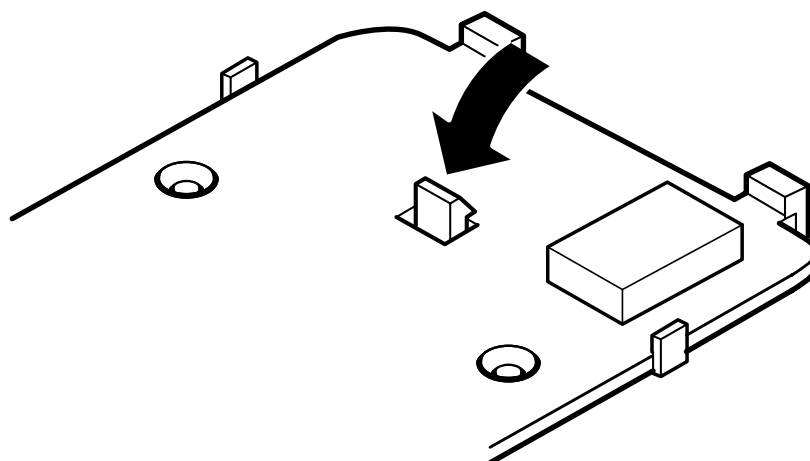


Figure 7: bumper recess assembly removal

450-0507

8. Figure 8 Tip LCD display forward to allow removal of the LCD earpiece holder

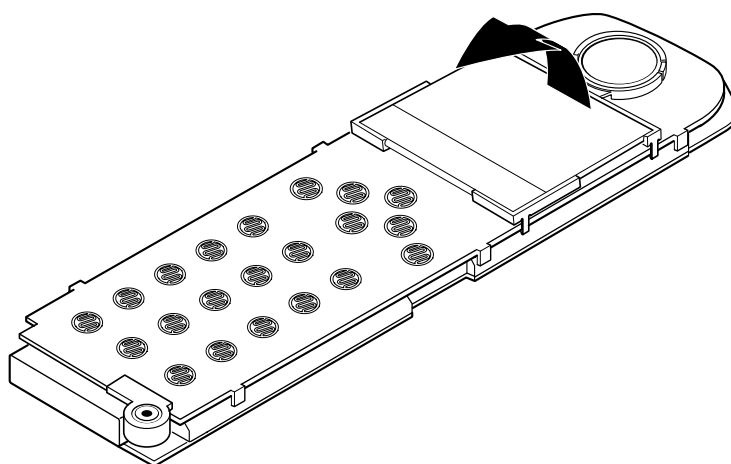


Figure 8: LCD removal 1

450-0508

9. Figure 9 Unplug the speaker connector from the logic C

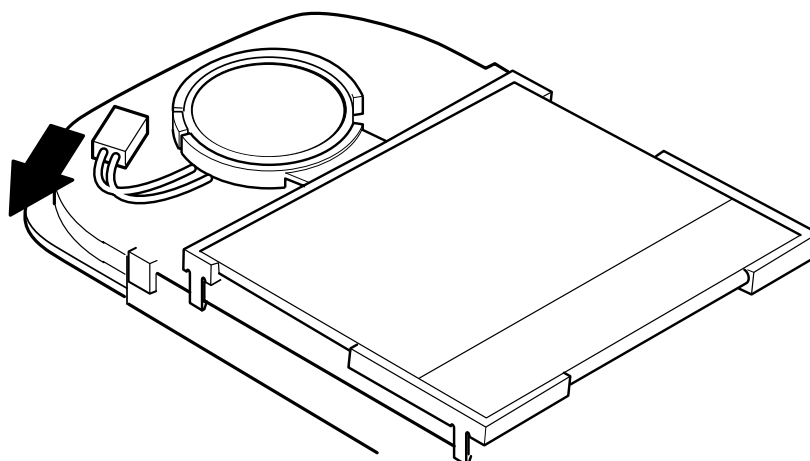


Figure 9: Speaker removal

450-0509

10. Figure 10 Gently bend the lugs on the LC earpiece holder outwards and lift it from the logic C

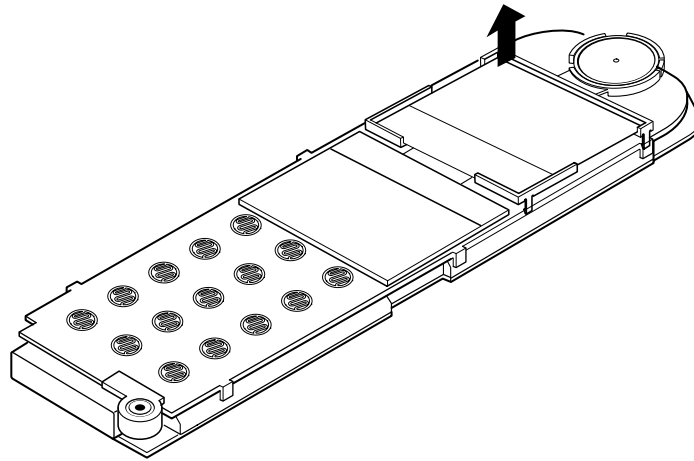


Figure 10: LC earpiece holder removal

450-0510

11. Figure 11 Disconnect the LC from the logic C

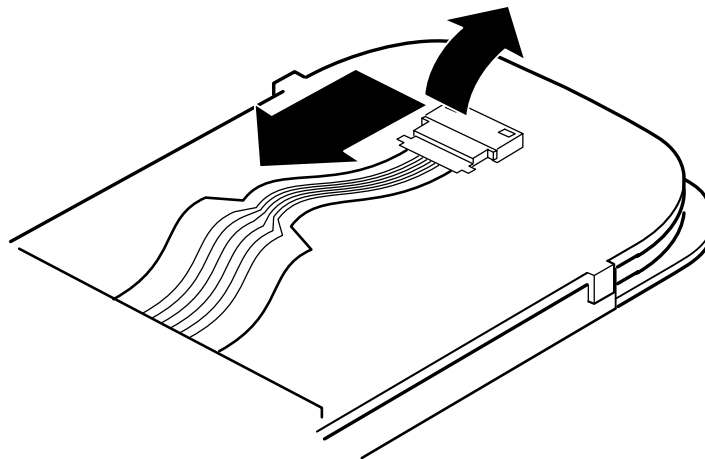


Figure 11: LC disassembly 2

450-0511

5.2.2 Reassembly

1. Figure 12 Care must be taken when reinstalling the back onto the telephone case. Ensure that the securing screws are not over-tightened as this may affect the operation of the keypad.

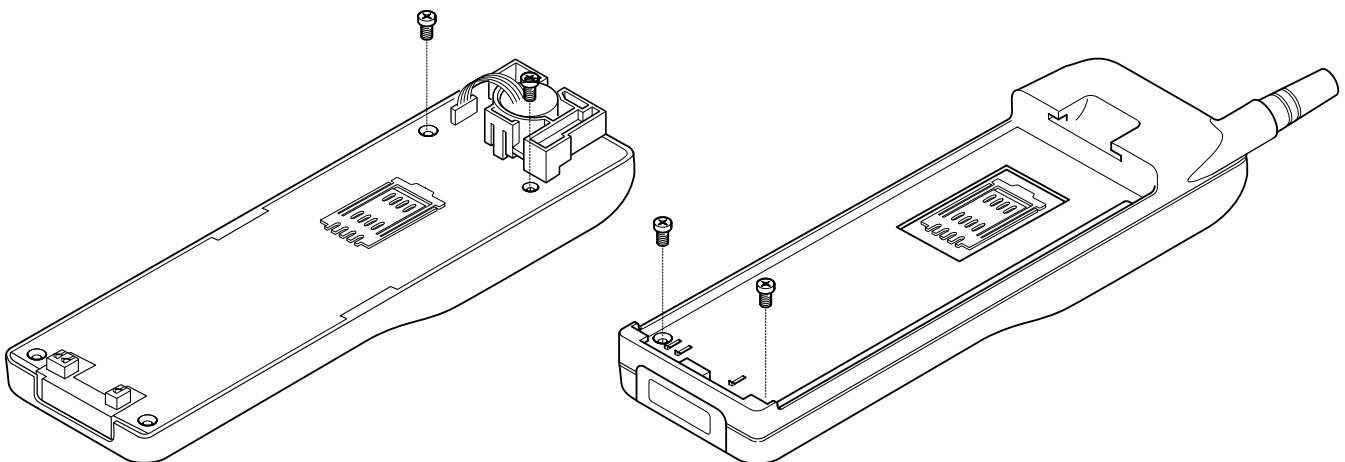


Figure 12: Case reassembly

450-0512

5.3 Dual Charger

5.3.1 Disassembly

- Figure 13 Place the Dual Charger upside down on a flat work surface. Remove the two case screws.

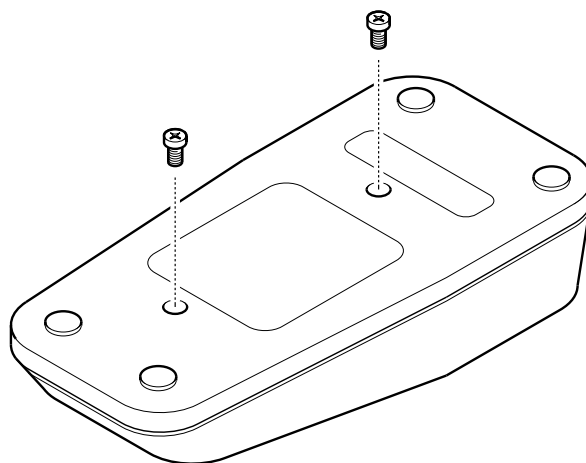


Figure 13: Case screw removal

500-0518

- Figure 14 Remove the case from the cover assembly.

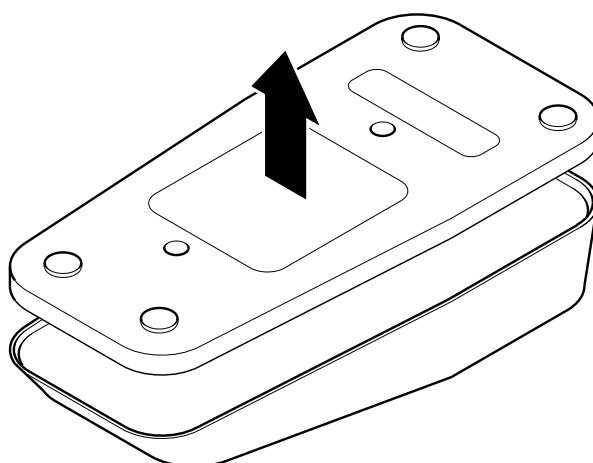


Figure 14: Case removal

500-0519

- Figure 15 Remove the Charge Assembly mounting screws.

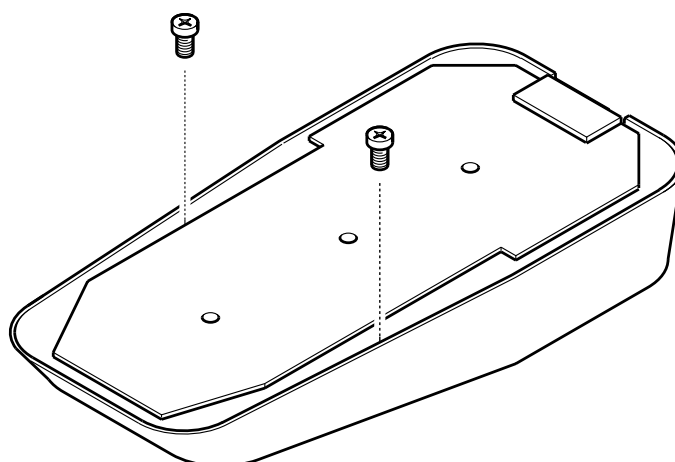


Figure 15: Screw removal

500-0520

4. Figure 16 Raise and tilt the charger C to expose the connector cable

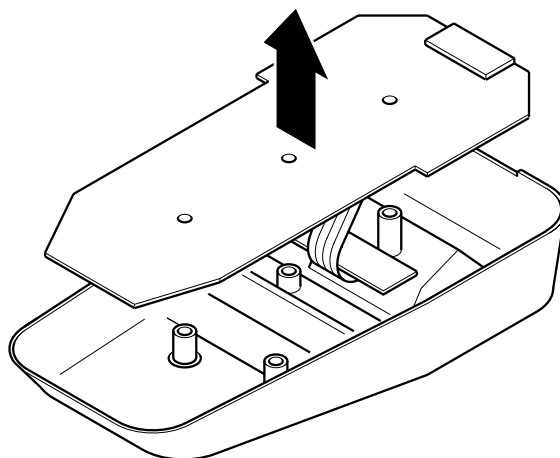


Figure 16: Charger C removal 1

500-0521

5. Figure 17 Disconnect and remove the charger C

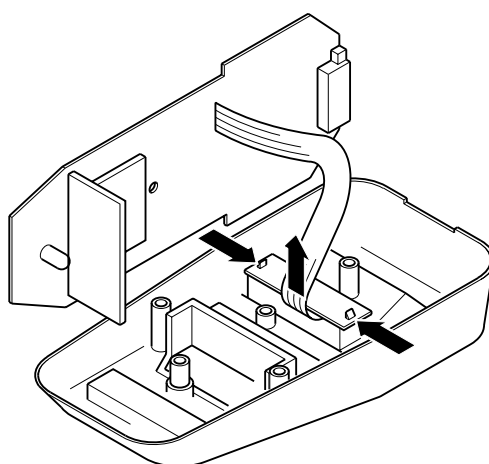


Figure 17: Charger C removal 2

500-0522

5.4 Handsfree Unit

5.4.1 Disassembly

1. Figure 18 Remove the holder from the handsfree unit 4 screws

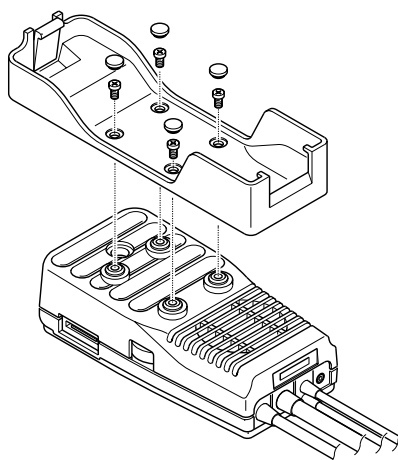


Figure 18: holder removal

500-0523

2. Figure 19 Remove the front cover from the handsfree assembly by removing the cover securing screw and disconnecting the speaker leads from the handsfree C

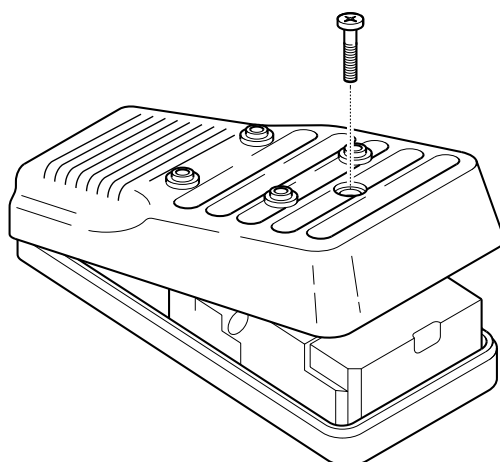


Figure 19: handsfree cover removal

500-0524

3. Figure 20 Remove the handsfree C 3 screws

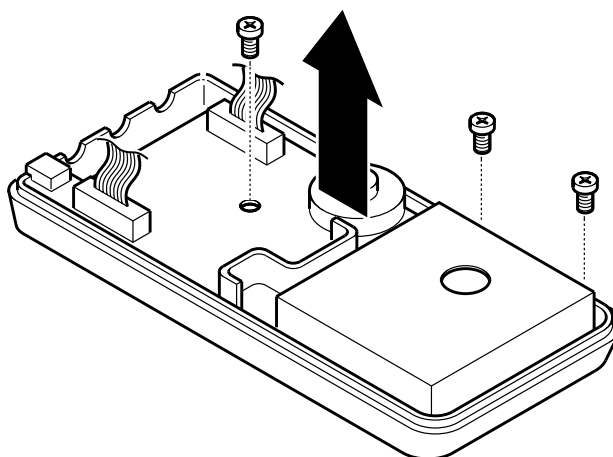


Figure 20: handsfree C removal

500-0525

5.4.2 Reassembly

- Figure 21 Reinstall the handset C into the case 3 screws

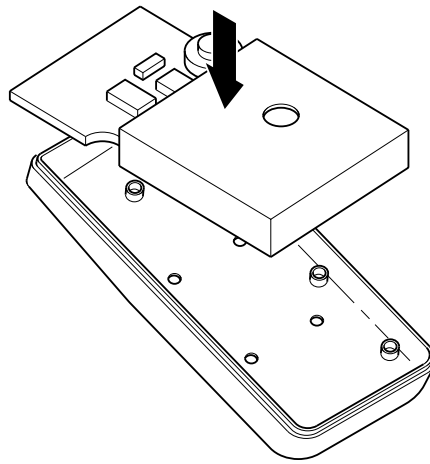


Figure 21: handset C reinstallation

500-0526

- Figure 22 Position the cables into the case following

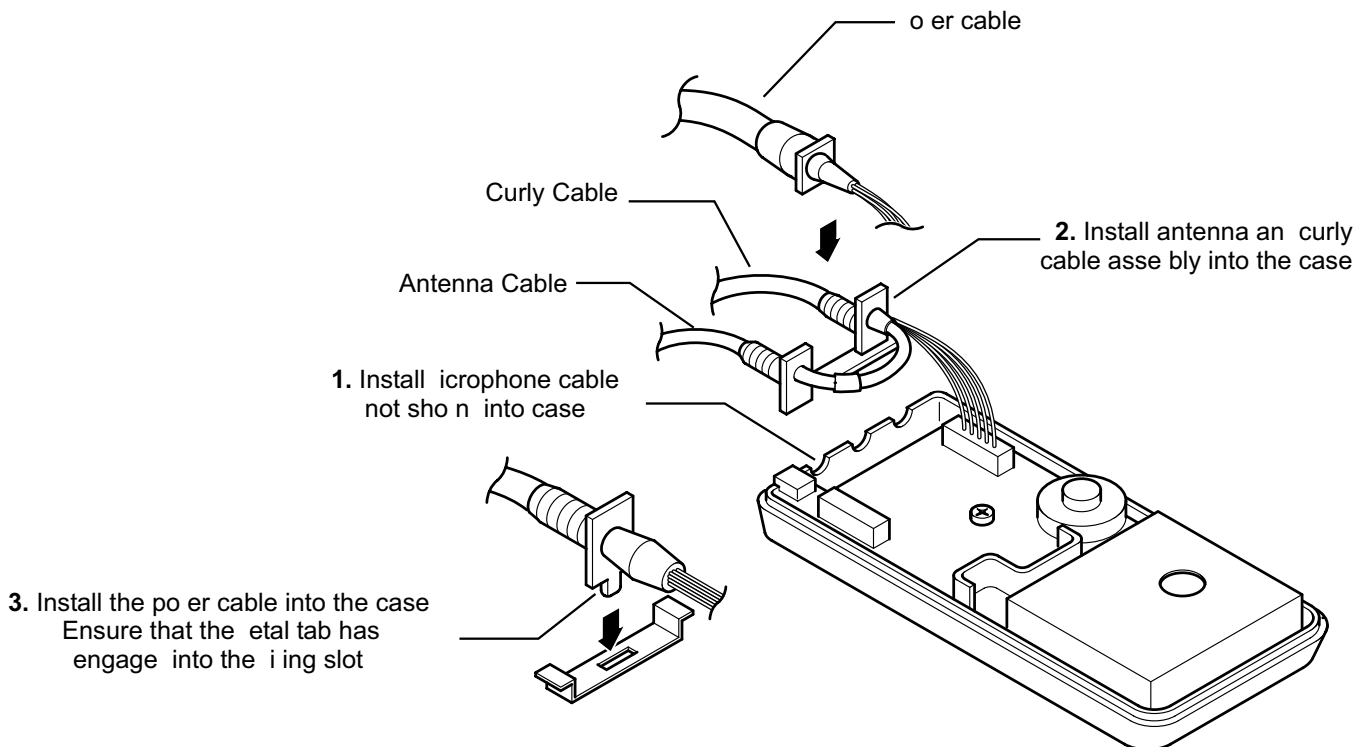


Figure 22: handset cable positioning

500-0527

4. Figure 23 Reinstall the front cover onto the handset assembly by reconnecting the speaker lead onto the handset. Then reinstall the cover securing screw.

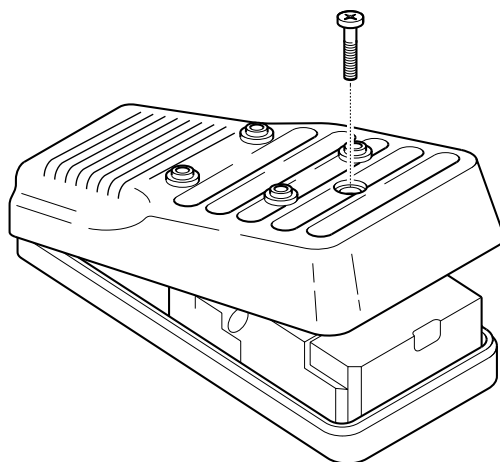


Figure 23: handset cover removal

500-0524

5. Figure 24 Reinstall the holster onto the handset unit. Use 4 screws.

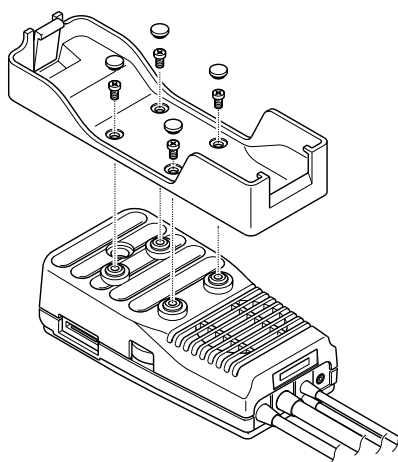


Figure 24: holster removal

500-0523

6 TECHNICAL SPECIFICATIONS

6.1 General

1	Frequency range	T R	890 - 915M 935 - 960M
2	T R Frequency separation	45M	
3	R channel bandwidth	200k	
4	Number of R channels	124	
5	Speech coding	Full rate	
6	Operating temperature	-20 C to 55 C	

6.2 Handportable Unit

6.2.1 General

Unless stated these specifications are with battery pack S2 fitted
battery life figures are dependent on network conditions

1	Type	Class 4 an hel GSM hase 2
2	i ensions	eight 141 i th 46 epth 25
3	olu e	165cc
4	eight	175g
5	isplay	Chip on glass li ui crystal Alphanu eric 12 3 characters 4 icons an 6 1 characters
6	Illu ination	Green 4 LE s or the LC 10 LE s or the keyboar s 1 LE Inco ing call Re 1 LE Charging in icator
7	Keypa	17 keys an avigation key
8	SIM	lug-in type only
9	attery	4 8
10	Stan by attery Li e R 5 ECTEL reco en ation	attery ack S upto 35 hrs attery ack S2 upto 38 hrs attery ack M upto 50 hrs attery ack L upto 90 hrs
11	Conversation attery Li e L 7 T 50 E TEL reco en ation	attery ack S 140-190 inutes attery ack S2 150-210 inutes attery ack M 195-270 inutes attery ack L 370-510 inutes

12	External DC Supply Voltage	6.7
13	Antenna Terminal Impedance	50Ω
14	Antenna S.R.	21:1
15	Output Power	21 dBm GSM class 4
16	Modulation	GMSK T0.3
17	Connection	8-ch TMA
18	Voice Coding	13 kbps RPE-LT
19	Transmission Speed	270.3 kbps
20	Diversity	Frequency hopping
21	Signal Reception	Double superheterodyne
22	Intermediate Frequency	1st 113.6 - 116.1 MHz 2nd T246 MHz R201 MHz

6.2.2 Tx Characteristics

- Frequency error 0.1 ppm ± relative to base station frequency
- Modulation phase error RMS 5°
Peak 20°
- Output R.F. Spectrum due to Modulation

Offset from Centre Frequency (kHz)	Maximum Level Relative to the Carrier (dB)
100	0.5
200	-30
250	-33
400 to 1800	-54 Integral antenna

- Output R.F. Spectrum due to Switching Transients

Offset from Centre Frequency (kHz)	Maximum Level (dBm)
400	-23
600	-26
1200	-32
1800	-36

Measurement conditions for output R.F. spectrum measurements

Frequency Span 0
 Measurement bandwidth 30 kHz
 Video bandwidth 100 kHz
 Peak hold

5. Spurious Emissions at the Antenna Connector

Frequency (MHz)	Limits (dBm)		Measurement BW (kHz)	Video BW (kHz)
	Active Mode	Idle Mode		
set to carrier in T band				
180	-36		30	100
600	-36		100	300
set to T band edge				
200	-36		30	100
500	-36		100	300
1000	-36		300	1M
2000	-36		1M	3M
3000	-36		3M	10M
frequency bands				
935 - 960			100	100
925 - 935			100	100
1805 - 1880	-79 a b		100	100
0009 - 1000	-67 a b	-57	100	100
1710 - 1785	-71 a b	-57	100	100
1805 - 1880		-57	100	100
1000 - 12750		-47	100	100

Measurement conditions

Peak to

Modulate Carrier

a Measure the average over a burst and then average again over 50 bursts

b In each of the bands 925-960 MHz and 1805-1880 MHz up to 5 spurious emissions can exist these limits in which case the limit -36 shall apply

6. Output Level Dynamic Operation

Power Control Level (defined by GSM 05.05)	Peak Power (dBm)	Tolerance for Conditions (dB)	
		Normal	Extreme
5	33	2	2.5
6	31	3	4
7	29	3	4
8	27	3	4
9	25	3	4
10	23	3	4
11	21	3	4
12	19	3	4
13	17	3	4
14	15	3	4
15	13	3	4

7. Residual Peak Power 70 dB 300kHz

6.2.3 Rx Characteristics

1. Sensitivity

The reference sensitivity performance in terms of raw erasure bit error or residual bit error rates whichever is appropriate is specified in the following table according to the propagation condition

PROPAGATION CONDITIONS					
Type of Channel	Static	TU50 noise	TU50 ideal	RA250 noise	T100 noise
TC SER	0.1	6	3	2	7
Class Ib RER	0.4	0.4	0.3	0.2	0.5
Class II RER	2	8	8	7	9

The reference sensitivity level is -102

NOTE:

- The value of can be different for each channel condition but must remain the same for RER and class Ib RER measurements for the same channel condition

2. Locking

Interferer Frequency (MHz)	Interferer Level (dBm)
set to ante carrier in band 915 - 980M 600k 800k 1.6M	-43 -33 -23
out of band frequency bands 0.1 - 915 980 - 12750	0 0

Measurement Conditions

ante carrier is 3 dB above reference sensitivity

Interferer is C

Spurious response exceptions

6 exceptions are permitted in band 915 - 980M

24 exceptions are permitted outside band 915 - 980M

3. Intermodulation Characteristics

Interferer Level (f1 & f2) dBm	Interferer Frequencies (f1 & f2)
-49	ante frequency 2.1 - 2.4 GHz and 2.1 - 2.4 GHz 800k

6.3 Handsfree Unit

This specification is applicable to the **ansree Car Kit** and **Easyfit ansree Car Kit**

Input voltage	13.8 – 20
Over voltage protection	18 – 10
Current consumption	Operation 2.0A at normal sound Idle mode 150 mA at no sound Stand by 1 A at logic power off
Ignition signal	Level L Level
Speaker output power	1.5
Speaker impedance	8Ω
Antenna mode	External antenna
Operating temperature range	-10 to 55 °C
Storage temperature range	-20 to 60 °C
Charging temperature range	-5 to 35 °C

6.4 Dual Charger

Input voltage	8 A IU
Input current	700 mA
Charging slots	Front Main unit Rear battery pack only
Charge time front slot	battery pack S 120 minutes battery pack S2 120 minutes battery pack M 150 minutes battery pack L 300 minutes
Charge time rear slot	battery pack S 4 hours battery pack S2 4 hours battery pack M 4 hours battery pack L 10 hours
Charge indicator front slot Telephone display	 Charging  On charge telephone On charge telephone
Charge indicator rear slot	Red LE Charging Green LE On charge
Charge current	210 – 10 mA
Operating temperature range	5 to 35 °C
Storage temperature range	-20 to 60 °C
Charging temperature range	5 to 35 °C

6.5 AC Adaptor

Input voltage	UK EU 230 AC 10 T 110 AC 10 C 100 AC 10
Input current	20 A a i u
Input plug type	UK Type EU Type C-4 C-7 ther Country speci ic
utput voltage	6 7 C
utput current	600 A a i u
Ripple voltage	50 peak to peak at 600 Ah
Charge ti e	attery ack S 80 inutes attery ack M 130 inutes attery ack L 240 inutes
utput connector	M 138-MA75-165-C L
perating te perature range	5 to 40 C
Storage te perature range	-20 to 60 C
Charging te perature range	5 to 35 C

6.6 DC Adaptor

This speci ication is applicable to the C A aptor an Si ple Car Kit

Input voltage	13 8 C 20 egative earth only
utput voltage	7 2 C ⁰ -10
Current consu ption	peration 500 A Stan by 34 A a no loa
Charge ti e	attery ack S 120 inutes attery ack M 150 inutes attery ack L 270 inutes
isplay	Re LE po er status
Reverse voltage protection	io e across input
Short circuit protection	Input 2A use utput 8 2 ener io e
perating te perature range	5 to 60 C
Storage te perature range	-20 to 80 C
Charging te perature range	5 to 35 C

6.7 Battery Packs

6.7.1 Battery Pack (S2)

Type	i-M 4 cells
eight	80 2g
oltage	4 8
Capacity	650 Ah
Storage te perature range	-20 to 40 C 6 onths

6.7.2 Battery Pack (S)

Type	i-M 4 cells
eight	90 2g
oltage	4 8
Capacity	600 Ah
Storage te perature range	-20 to 40 C 6 onths

6.7.3 Battery Pack (M)

Type	i-M 4 cells
eight	115 2g
oltage	4 8
Capacity	850 Ah
Storage te perature range	-20 to 40 C 6 onths

6.7.4 Battery Pack (XL)

Type	i-M 4 cells
eight	145 2g
oltage	4 8
Capacity	1600 Ah
Storage te perature range	-20 to 40 C 6 onths

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7 TEST AND MEASUREMENT

7.1 Introduction

This section provides information on testing the G450 telephone. The layout is as follows:

- 1 Section 7.2 External testing describes the equipment requirements and general set up procedure
- 2 Section 7.3 Channel box test controls provides detailed explanation of the different controls available using the test equipment and channel-box software
- 3 Section 7.4 A unit test mode describes a test mode available on the G450 handset unit
- 4 Section 7.5 Lock code describes the procedure to check or reset the lock code using the Channel box software
- 5 Section 7.6 SIM personalisation describes the procedure to personalise the telephone to a particular SIM

7.2 External Testing

The G450 unit can be connected to a compatible personal computer or electronic test equipment and fault diagnosis. This section provides a description of the equipment required to perform those tasks.

Testing an handset of the handset unit can be performed with the outer case in place or in-depth fault finding the unit should be disassembled (section 5) and the electronic card used to connect the ICs together externally as they would be found in normal use. Fault tracing can then be performed on the ICs using suitable test equipment such as spectrum analysers and oscilloscopes.

7.2.1 Jigs and Tools

Test Equipment Descriptions

1. Interface Unit part no I 001 figure 1

The I 001 provides

- a voltage regulation from 12 V input to power supply to 7 V output
- b RS 232 interface. Ensures that the Unit Under Test is supplied with the correct signalling level and format

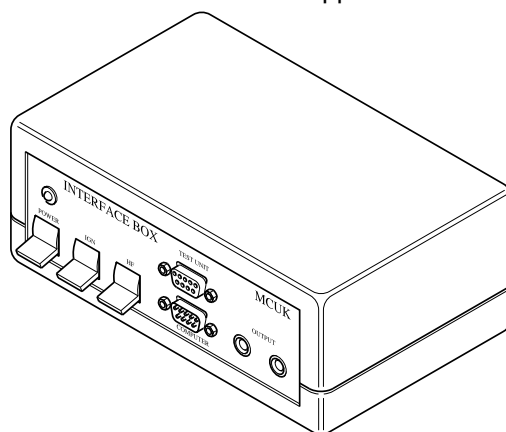


Figure 1: Interface unit I 001

500-0701

2. Personal Computer PC

The PC 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.

3. Regulator Unit part o G5I T 001 figure 2

The Regulator Unit provides

- a voltage regulation for 7 C input for I 001 to 5.6 or 4.8 C output. The 5.6 switch setting is used for C testing and the 4.8 switch setting is used for testing the complete unit
- b Connection between I 001 and the Unit Under Test

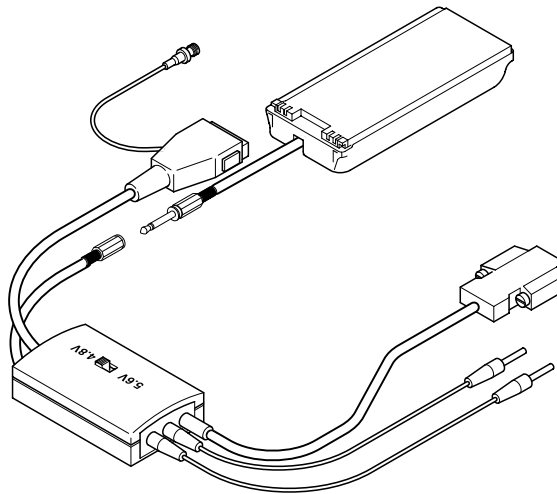


Figure 2: Regulator Unit

500-0702

4. Power Supply

provides 12 C supply to the Interface o I 001

5. Extension Cable part o G5E T C 001 figure 3

The extension Cable is provided to allow connection of the logic Cable to the R Cable when the Cables have been removed from the main unit

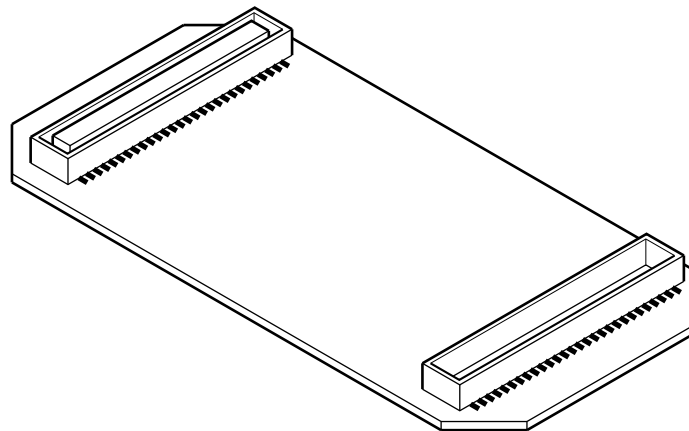


Figure 3: Extension Cable

500-0703

6. GSM Tester

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

7. Channel Software

This is the test software for the G450 unit and should be installed onto the personal computer used for testing

7.3 Complete Unit Test Setup

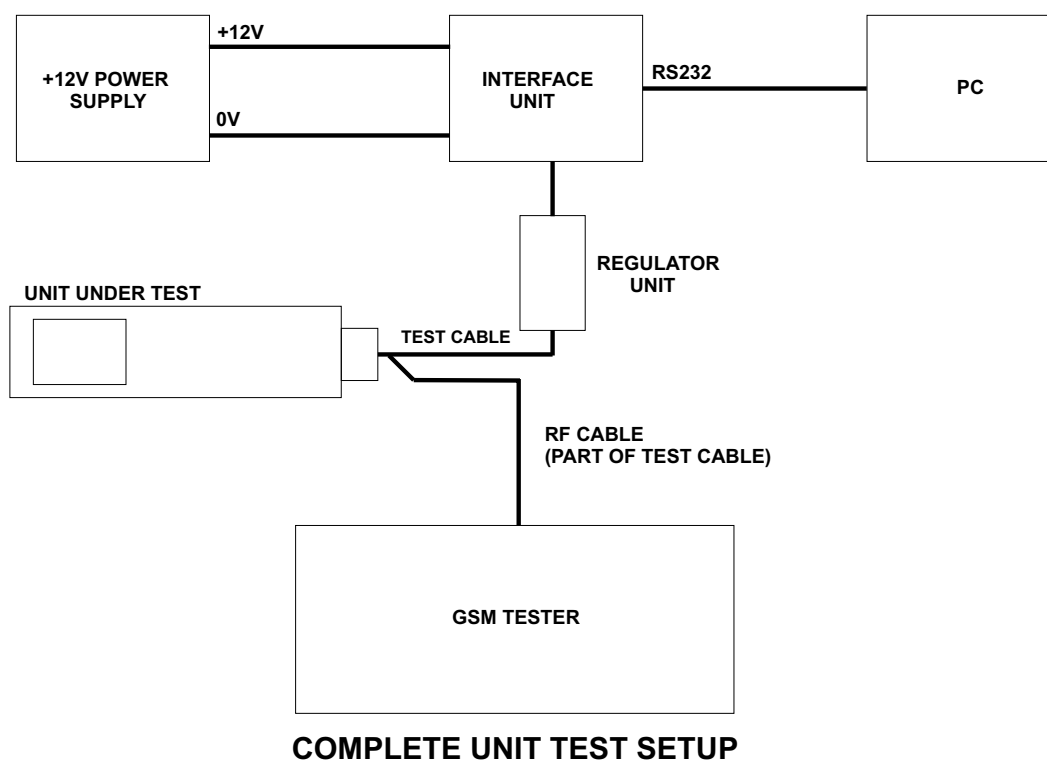
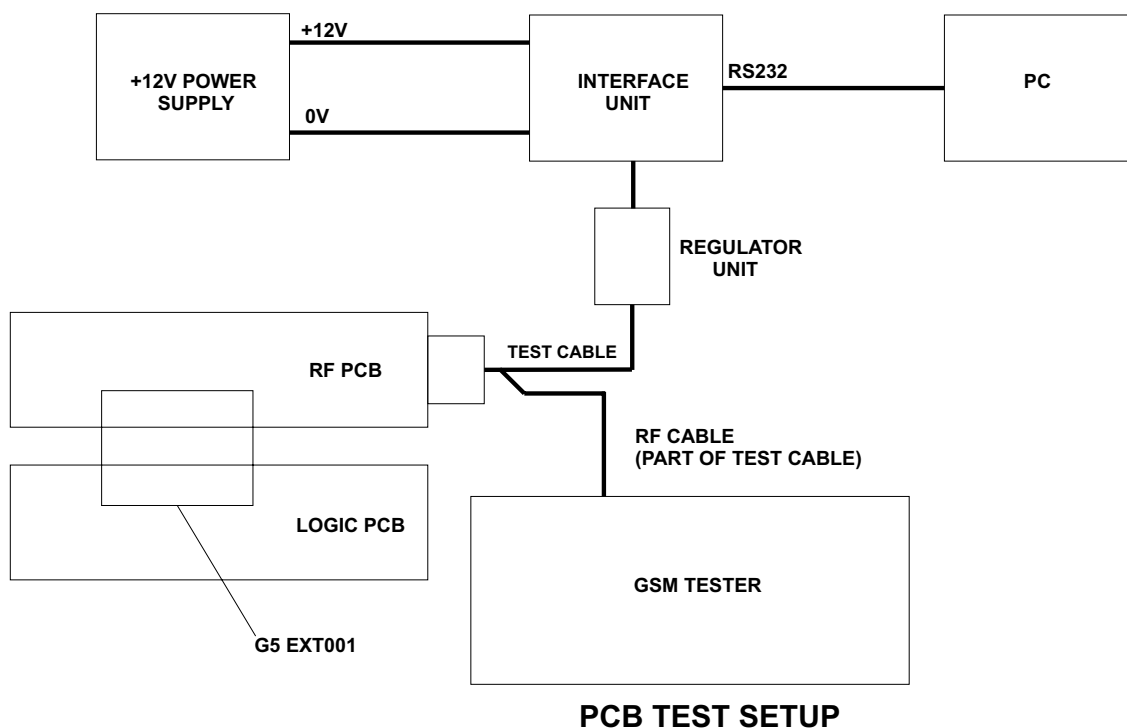


Figure 5: Complete unit test setup

500-0705

7.3.1 External Testing Setup Procedure

IMPORTANT NOTE:

To allow accurate measurement of the complete unit the test equipment must be connected as shown in figure 6. The C Test Setup must be used to enable repair to C since repair replacement is complete the assembly unit must be tested and calibrated with the rigs and tools connected as shown in figure 6.

Full Test Equipment Requirements

For testing the handset unit the following equipment is required

- 1 Interface unit
- 2 Regulator unit
- 3 12 power supply
- 4 Personal computer I/M compatible with RS232 interface
- 5 RS232 interface cable 9 pin straight through connection
- 6 GSM test station

Figure 6 shows a typical setup for testing the G450 unit. The channel board socket are supplied on floppy disk should be installed onto the drive of the personal computer.

The R cable on the regulator unit is connected to the GSM test station via a suitable adaptor. The 12 supply is connected to the rear socket of the interface unit.

Tools are available for testing the handset unit

- 1 Test Mode
The Test Mode facility allows various sections of the handset unit to be individually activated.
- 2 Normal Mode
The Normal Mode facility allows the handset unit to be powered externally for call origination/receiving operations. TE A suitable test SIM card will be required which is compatible with the GSM test station.

Power On into Test Mode

1. Figure 6 Connect the test equipment into test mode configuration

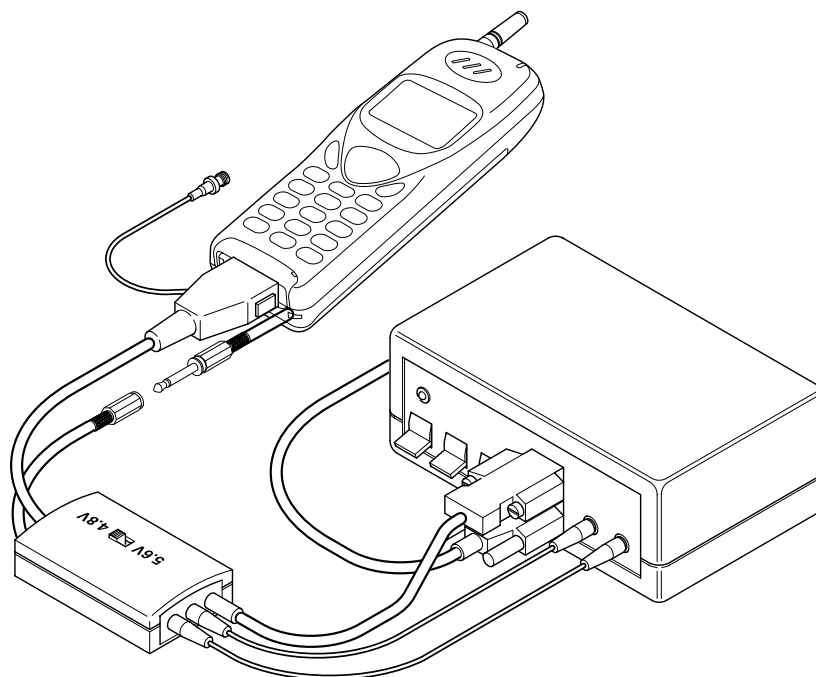


Figure 6: Interface Unit

450-0706

2. Ensure that the following settings are as follows:
 - a. Interface Unit I 001
 power position
 IG position
 position
 - b. power supply
 12 V
 - c. Channel buttons are loaded and the screen indicating as shown in figure 7



Figure 7: C Screen SCR 10

450-0707

3. Press ENTER on the C keyboard
4. Switch on the 12 V supply
5. At the C press 10
6. At the Interface Unit switch the power to
7. Steps 5 and 6 above must be carried out within 1 second or power will time-out

NOTE:

The UUT will switch on back again. The display will read STAT I. The back light will be illuminated and all LEDs will be lit.

Go to section 7.5 Channel to Test Connections for further testing information.

Power On in Normal Mode

1. Figure 8 Connect together the test equipment

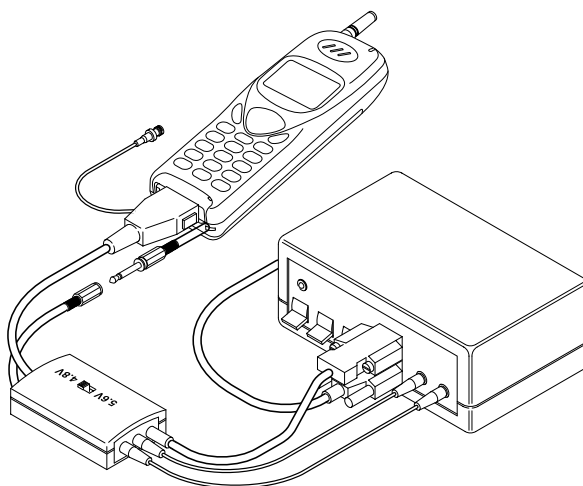


Figure 8: Interface Unit

450-0706

2. Ensure that the following settings are as follows:
- a. Interface Unit I 001
 - power position
 - IG position
 - position
 - b. power supply 12 C
 - c. C
- Channel buttons are located on the screen indicating as shown in figure 9



Figure 9: C Screen SCR 9

450-0707

- 3. In the C press ENTER
- 4. Switch on the 12 supply
- 5. At the Interface Unit switch the power to on and to
- 6. At the C press 10
- 7. At the Interface Unit switch IG

Entering Call Mode from Test Mode

The screen on the C will resemble the one shown in figure 10



Figure 10: C Screen SCR 11

500-0710

1. At the C change the S T SIM iel to rea E ress E TER
2. At the C change the TEST iel to rea TERM ress E TER

The UUT ill po er o n an up again I the UUT is connecte to a GSM test set a ter a elay o appro i ately 5 secon s the UUT ill register service

3. To return to test o e set S T SIM iel to IS an set TEST iel to Test ress E TER

7.4 Channel Box Test Commands

The ollo ing table outlines the co an s available using the channel-bo so t are

A ter the han hel unit has been s itche on section 7.3 use the up o n scroll keys on the personal co puter keyboard to select the channel-bo co an Use the le t right scroll keys to isplay the re uire inication an press the E TER key to select the isplay unction

CHANNEL BOX COMMAND	INDICATION	FUNCTION
TEST M E	TERM	Ter inates test o e
	ReST	Restarts test o e
I ITIALI E	I IT	hen RETUR is presse this ill reset the e ault channel settings
C A GE C		Sets up pre- e ine channel settings
T R M		Sets user e ine channels or trans it Receive an onitor
R I C		reverts Receive signal ro pulsing provi ing accurate test environ ent or the Receive signal Allo s RSSI easure ent to be a e
ER LE EL		Allo s a speci ie po er level to be set at the UUT
T ATA	RL 0 RL 1 RL R ACC R	Sets T Mo ulation to or al burst ATA all 0s or al burst ATA all 1s or al burst ATA all ran o Access burst ATA ran o
RSSI M		rovi es an RSSI rea ing on the User speci ie channel
SET AGC 1 SET AGC 2 SET AGC 3		Allo s changes to AGC levels on L MI LE IG channels
S L ACK	START	rovi es an au io path or use ith the GSM test station
	ST	Sets au io loop-back ro T au io to R au io ithout processing by the C EC
AT C T	M S MESI MESE MISI MISE	Sets au io paths MIC o speaker o MIC e ternal speaker internal MIC e ternal speaker e ternal MIC internal speaker internal MIC internal speaker e ternal

CHANNEL BOX COMMAND	INDICATION	FUNCTION
L U		Sets bu er volu e bet een values 0 to 3 Min to Ma
L SI E		Sets 4 si e tone volu e levels bet een 0 an -18
L MIC		Sets 8 MIC volu e levels bet een 26 an 40
L S 1		Sets speaker pre-a p volu e levels
L S 2		Sets speaker volu e levels
GET KE C E	E A LE ISA LE	isplays the value o a key presse on the keypa
C TR L UT	LE R LE C ARGE LE C ALL ALL	S itches on Inco ing LE S itches on acklight LE s S itches charge se uence on LC S itches on Charging LE S itches on han s ree o e S itches o all above S itches on all above
C ECK LC 1	1 2	rovi es 50 visual isplay o check pattern on the UUT LC rovi es 50 visual isplay o check pattern on the UUT LC
TEST S TST	E	ith E set an TEST M E TERM test co an s can be entere ro the key pa o the UUT
SET ER IS	E A LE ISA LE	Unit error co es ill be isplaye on the UUT isplay Unit error co es ill not be isplaye on the UUT isplay
S T SIM	E A LE ISA LE	ith E A LE set an TEST M E TERM the UUT is re ove ro test o e an can be place into call o e
TEST M E	TERM	ith S T SIM E A LE the UUT ill be re ove ro test o e an can be place into a call
SIM STATUS	S	Checks an isplays the SIM status
C ECK SUM	S	isplays the so t are check-su

7.5 Adjustment Mode

NOTE:

See section 7.2.1 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 ICs in the handset unit. Failure to do so may result in incorrect operation of the telephone.

The following adjustments MUST be done on AR AIRS.

There are four distinct calibration procedures to adjust R per or ance. These procedures are:

- 1 Ramping gain Section 7.5.1
- 2 RSSI Section 7.5.2
- 3 Lant values Section 7.5.3

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



Figure 11: Test so t are screen

450-0710

7.5.1 Ramping Gain

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

Target Power Level	Peak Power (dBm)	Tolerance (dB)	Initial Calibration Value	Change per dB
L5	33	2	128	29
L6	31	3	128	15
L7	29	3	128	11
L8	27	3	128	8
L9	25	3	128	7
L10	23	3	128	6
L11	21	3	128	5
L12	19	3	128	4
L13	17	3	128	3
L14	15	3	128	3
L15	13	3	128	2
L16	11	3	128	2

Target Power Level	Peak Power (dBm)	Tolerance (dB)	Initial Calibration Value	Change per dB
L17	9	3	128	2
L18	7	3	128	1
L19	5	3	128	1

Calibration of output power on each power level

To be able to calibrate the radiating gain it is first necessary to switch the unit into Test Mode section 7.3. This procedure must be followed for all power levels L5- L19 for low and high channels.

- Set the Channel controls to Channel 62 at Power Level 5 normal burst mode with random data as follows:
 - press the down arrow until CAGE C 62 is highlighted and then press ENTER
 - press the down arrow until L L19 is highlighted press the over left arrow until 5 appears in the highlighted field press ENTER
 - Figure 12 press the down arrow until TATA is highlighted press the over arrow until RL R appears in the highlighted field press ENTER

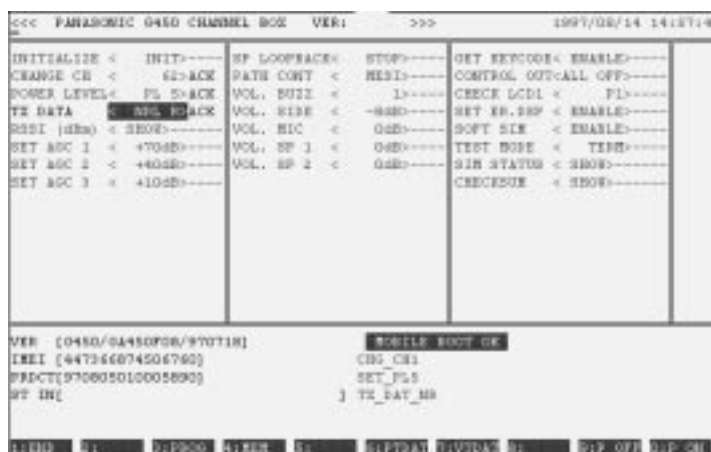


Figure 12: Test data field

450-0712

- At the GSM test unit measure the peak power
- If the measured power is in the range of the target power see previous table then proceed to step 10
- press 7 to view the TRIM or the channel. Make a note of this value
- perform the following calculation

Set Rgain L5 value recorded in step 4 change in L to meet specified value or Change per
Make a note of the answer

6. Figure 13 At the C press 6 to program the TRIM or the i channel



Figure 13: Power level selection 1

450-0713

7. Figure 14 highlight the L5 level and press ENTER



Figure 14: Power level selection 2

450-0714

8. Enter the value calculated in step 4 into the data field and then press ENTER
9. Press ESC
10. At the GSM test unit re-measure the peak power
11. Repeat steps 2-9 of this procedure for power levels L6 to L19
12. After calibrating at channel 62 the carrier power must be measured and calibrated at low and high channels or power level 5 to 19

7.5.2 RSSI

This procedure describes the calibration of RSSI on the i channel Mch Ch 62. This process must be carried out on Lo Channel, Mid Channel and High Channel. The following channel settings are used in this procedure.

- 1. Set up the test equipment as described in Section 7.3 and switch the unit into test mode as described.
- 2. Apply a carrier frequency of 68K to the UUT or Ch 62 947.468MHz at an input level of -60.
- 3. At the C highlight the CAGEC 62 iel and press ENTER.
- 4. highlight the SET AGC 2 iel and change the set value to 36 and press ENTER.
- 5. Figure 15 highlight the RSSI iel and press ENTER.

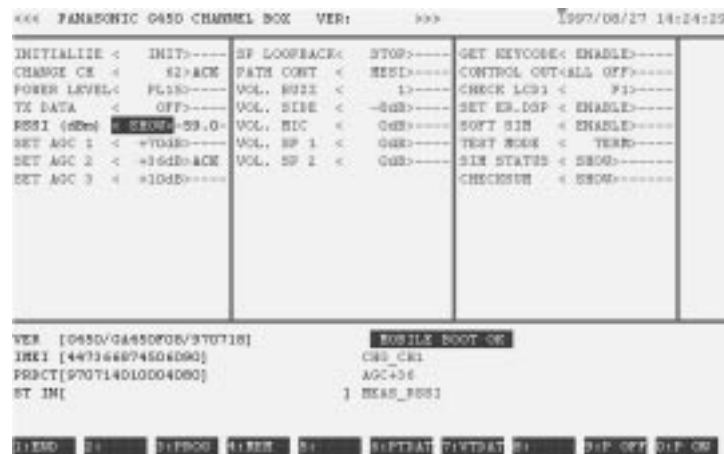


Figure 15: RSSI iel 450-0715

- 6. If the measure value is not -60.2 then take the following calculation:
 $RSSI_{\text{offset value}} - 60 = \text{MEASURE RSSI ALUE}$ or e.g. $-60 - 75 = 15$
Record the result.
- 7. Figure 16 At the C press 7 select TRIM other. Make a note of the RSSI on the measure channel reading press ESC.

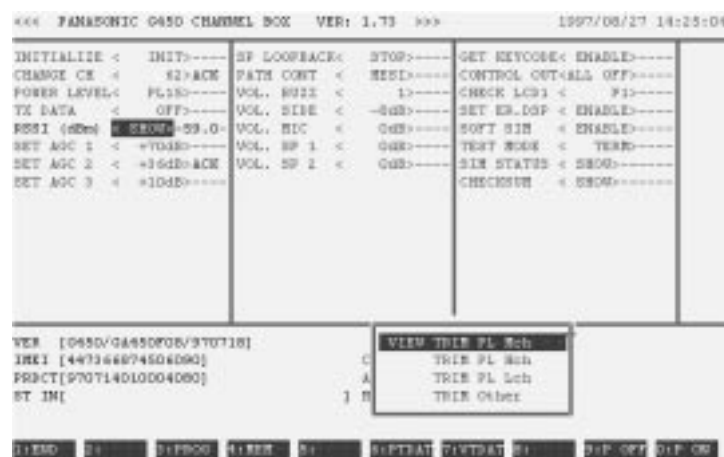


Figure 16: RSSI reading 1 450-0716

8. Figure 17 At the C press 6 and highlight program TRIM other press ENTER

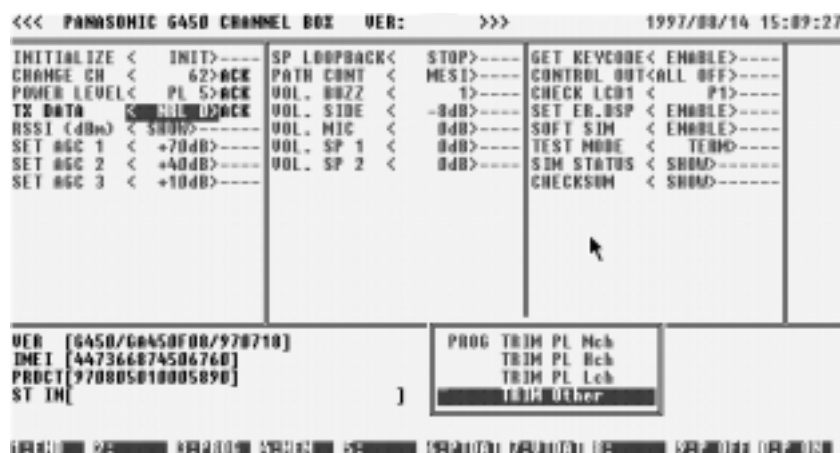


Figure 17: RSSI reading 2

450-0717

9. Make the following calculation: RSSI SET VALUE from step 8. READING TEST 6. Enter the result into the RSSI Memory for example 15.5 - 20
 11. press ENTER
 12. press ESC
 13. Measure the RSSI level again by highlighting the RSSI level and pressing ENTER
- Repeat this procedure for the calibration of both Low and High channels

7.5.3 I and Q Values

NOTE:

With the I/Q adjustment procedure 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 not an appropriate attenuator must be used

I, Q Offset

Spectrum Analyser setup
 centre frequency 902.4MHz
 Resolution 10kHz
 Span 1kHz
 sweep time 2sec

- Set the Channel controls to channel 62 at power level 5 normal burst mode with all 0s
 - press the down arrow until CHANNEL is highlighted then press ENTER
 - press the down arrow until L is highlighted press ENTER
 - figure 19 press the down arrow until TUNING is highlighted press the down arrow until RL0 appears in the highlighted field press ENTER



Figure 19: Channel setup

500-0719

- Figure 20 in the spectrum analyser measure the carrier leakage ratio. Carrier leakage ratio is measured as the ratio of peak power and the power at 68kHz below peak frequency.
 Example
 peak power 902.468MHz 33dBm
 power at 68kHz below peak power 0dBm
 carrier leakage ratio 33dB - 0dB = 33dB

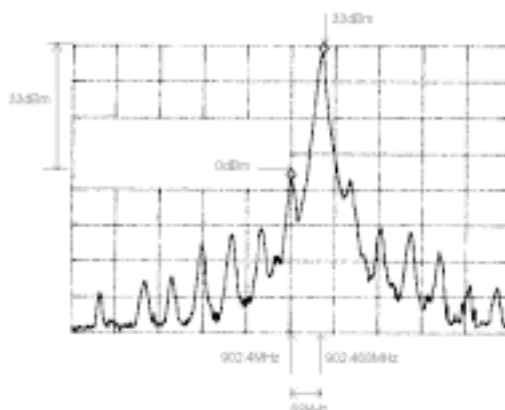


Figure 20: Carrier leakage ratio

500-0720

- If carrier leakage ratio is greater than 30 dBc then unit is OK so set calibration is complete
- If carrier leakage ratio less than 30 dBc then go to I/Q check

Ich check

1. Set Ich o set to 3
 - a At the C press 6 an select TRIM other
 - b Figure 21 Press over on arrow until IC SET appears in the iel Press E TER



Figure 21: I ata iel selection

450-0721

- c Figure 22 Enter a higher or lo er nu ber as appropriate into the ata iel an press E TER



Figure 22: I ata iel

450-0722

2. Using the spectru analyser easure the ne carrier leakage ratio
3. I the carrier leakage ratio is greater than 30 c then the unit is K o set calibration is co plete
4. I the original carrier leakage ratio see I ch ests step 2 is greater than the ne carrier leakage ratio go to I ec Calibration
5. I the original carrier leakage ratio is less than the ne carrier leakage ratio go to I Inc Calibration

I Dec Calibration

1. Set Ich o set to 127 see Ich Check step 1
2. Using the spectru analyser easure the ne carrier leakage ratio
3. I the carrier leakage ratio is greater than 30 c then unit is K o set calibration is co plete
4. I not then repeat steps 1 2 an 3 above or Ich o set values 58 55 52 49 46 43
5. I the carrier leakage ratio is still not greater than 30 c then go to ch Check

I Inc Calibration

1. Set *Ich o* set to 3 see *Ich* check step 1
2. Using the spectrum analyser measure the carrier leakage ratio
3. If the carrier leakage ratio is greater than 30 dB then the unit is OK so set calibration is complete
4. If not then repeat steps 1, 2 and 3 above or *Ich o* set values 9, 12, 15, 18, 21
5. If the carrier leakage ratio is still not greater than 30 dB then go to *ch* Check

Qch Check

1. Set *Ich o* set to 0
2. Set *ch o* set to 3
 - a. At the *C* press 6
 - b. Figure 21 Press *over* on arrow until *C SET* appears in the *iel* Press *E TER*
 - c. Figure 22 Enter 3 into the *ata* *iel* and press enter
3. Measure the new carrier leakage ratio
4. If the carrier leakage ratio is greater than 30 dB then the unit is OK so set calibration is complete
5. If the original carrier leakage ratio see *I ch* sets step 2 is greater than new carrier leakage ratio then go to *ec* Calibration
6. If the original carrier leakage ratio is less than new carrier leakage ratio then go to *Inc* Calibration

Q Dec Calibration

1. Set *ch o* set to 61 see *ch* Check step 2
2. Measure carrier leakage ratio
3. If the carrier leakage ratio is greater than 30 dB then unit is OK so set calibration is complete
4. If not then repeat steps 1, 2 and 3 above or *ch o* set values 58, 55, 52, 49, 46, 43
5. If the carrier leakage ratio is still less than 30 dB then unit is a fail

Q Inc Calibration

1. Set *ch o* set to 6 see *ch* Check step 2
2. Measure carrier leakage ratio
3. If carrier leakage ratio is greater than 30 dB then unit is OK so set calibration is complete
4. If carrier leakage ratio is less than 30 dB then repeat steps 1, 2 and 3 above or *ch o* set values 9, 12, 15, 18, 21
5. If carrier leakage ratio is less than 30 dB then unit is a fail

I, Qch Gain

IM RTA T If *ch o* set calibration should be done before this calibration

Spectrum Analyser Setup

centre frequency 902.4M

R 10k

1k

span 1M

sweep time 2sec

1. Set the *C* controls to channel 62 at power level 5 normal burst duration with all 0s
 - a. Press the *on* arrow until *C A GE C* is highlighted and then press *E TER*
 - b. Press the *on* arrow until *L* is highlighted Press *E TER*
 - c. Press the *on* arrow until *T ATA* is highlighted Press the *over* arrow until appears in the highlighted *iel* Press *E TER*

2. Figure 23 Using the spectrum analyser measure the i age leak ratio I age leak ratio is the measure ratio of peak power at the power at 135kHz below peak frequency
- Example
 peak power 902.468 Hz -33
 power at 135kHz below peak power -9
 i age leak ratio -33 - -9 = 42

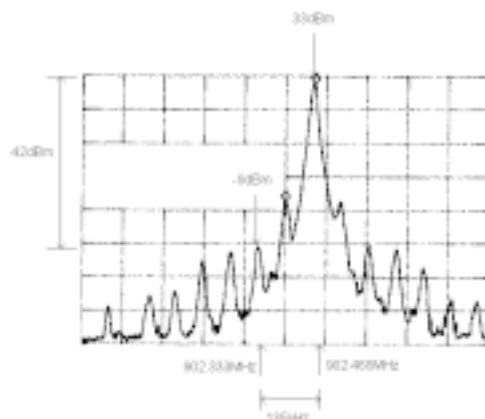


Figure 23: I age leak ratio

500-0723

3. If i age leak ratio is greater than 30 dB then unit is OK so set calibration is complete
4. If i age leak ratio is less than 30 dB then go to I ch gain calibration

IQch Gain Calibration

1. Set I ch gain to 0
 - a. In the C press 6
 - b. Figure 21 Press over left arrow until I C GAIN is highlighted Press ENTER
 - c. Figure 22 Enter 2 into the data field Press ENTER
2. Measure the i age leak ratio
3. If i age leak ratio is greater than 30 dB then unit is OK so set calibration is complete
4. If i age leak ratio is less than 30 dB then repeat steps 1 2 and 3 above with I ch gain values 1 2 3 4 5 6 and 7
5. If i age leak ratio is still less than 30 dB then go to ch gain calibration

7.5.4 Simple Receiver Test

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

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

1. At the C highlight the C A GE C iel and set the required test channel press ENTER
2. highlight the SET AGC 1 2 3 iel and enter the required gain value
3. At the GSM test unit input an R signal at the required frequency and level

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

7.5.5 Simple Transmitter Test

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

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

1. highlight the C A GE C iel and set the required test channel
2. press ENTER
3. highlight the L iel and set the required test power level
4. press ENTER
5. highlight the T ATA iel 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 (R) path.

7.6 Lock Code

NOTE:

See section 7.2.1 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

7.6.1 Check current lock code

- Figure 24 At the C press 4 and highlight IE LCK C ITI press ENTER



Figure 24: ie lock code

450-0724

- The display will show the current lock status and lock code for the UUT

7.6.2 Change current lock code

- At the C press S I T and 4 and highlight R G L CK C ITI press ENTER
- Figure 25 press ENTER to unlock the UUT The current lock code will be use

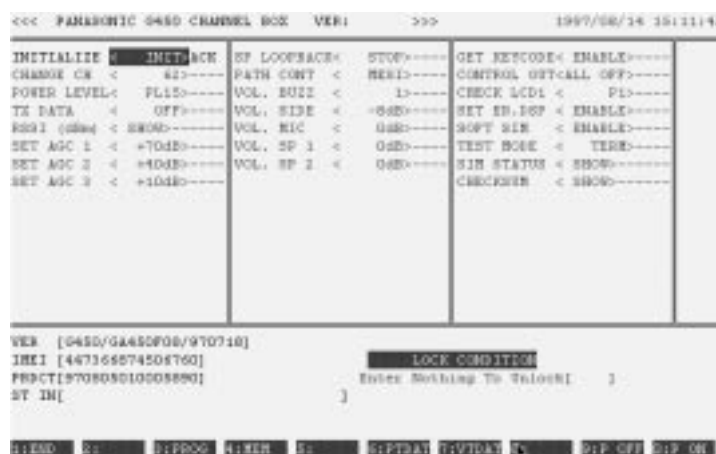


Figure 25: rogra lock code

450-0725

- Enter 0000 to reset the UUT to factory defaults The UUT will be locked using the lock code 0000

7.7 SIM Personalisation

Introduction

SIM personalisation will limit the use of G450 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 G450 contains a SIM that is from a different source it will display the message SIM ERROR when switched on. This personalisation of G450 is so effective that it is as if SIM lock or SIM latch.

Testing

To test a personalised G450 when the user has not supplied the SIM a SIM configured for test purposes e.g. test SIM or so that SIM should be used. The mobile will recognise that the SIM is for testing purposes only and operate as normal.

Personalisation Function

Personalisation is activated during manufacture and then enabled at a later stage. Enabling/disabling is available by entering special key sequences 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 by 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
7 ⁷²⁰ 4 ^{GH} 6 ^{IND}	Can only disable personalisation
5 ^{ML} 2 ^{ABC} 8 ^{TV} 2 ^{ABC} 4 ^{GH}	Can both enable and disable personalisation

Disabling Procedure

- 1 **7**⁷²⁰ **4**^{GH} **6**^{IND} or **5**^{ML} **2**^{ABC} **8**^{TV} **2**^{ABC} **4**^{GH}
- 2 to point at
SIM or SIM personalisation
network or network personalisation
Subnetwork or Subnetwork personalisation
S or Service provider personalisation or
Corporate or Company personalisation
- 3
- 4 the 16 digit Control Key
- 5
- 6 the 16 digit Control Key
- 7

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



450-0726

Enabling Procedure

- 1 **5**^{ML} **2**^{ABC} **8**^{TV} **2**^{ABC} **4**^{GH}
- 2 to point at
SIM or SIM personalisation
network or network personalisation
Subnetwork or Subnetwork personalisation
S or Service provider personalisation or
Corporate or Company personalisation
- 3
- 4 the 16 digit Control Key
- 5
- 6 the 16 digit Control Key
- 7

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



450-0727

8 CIRCUIT DIAGRAMS

8.1 Handheld Unit

8.1.1 Logic

The logic circuit diagram is split over 3 sheets. The main details of each sheet is shown



Figure 1: Logic map 450-0801

The waveforms shown below relate to the logic circuit diagram on the following pages. The waveforms shown are for reference purposes

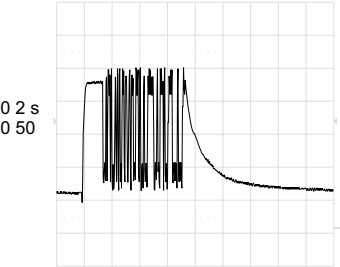


Figure 2: 1 450-0802

8.1.2 RF

The logic circuit diagram is split over 3 sheets. The main details of each sheet is shown

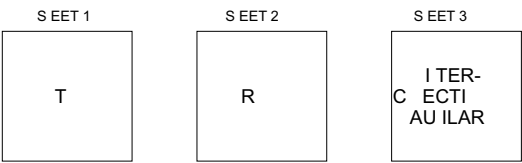


Figure 3: R Map

450-0803

The waveforms shown below relate to the logic circuit diagram on the following pages. The waveforms shown are for reference purposes.

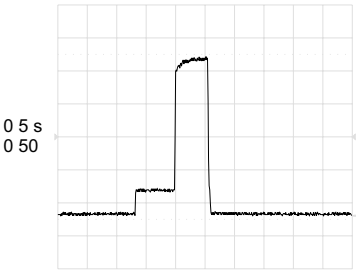


Figure 4: 2

450-0804

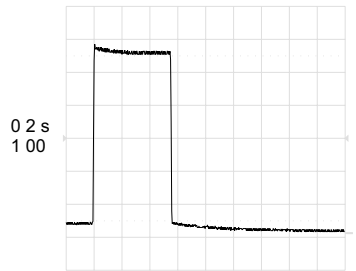


Figure 5: 3

450-0805

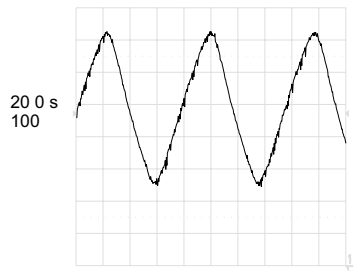


Figure 6: 4

450-0806

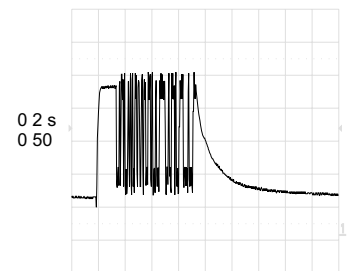
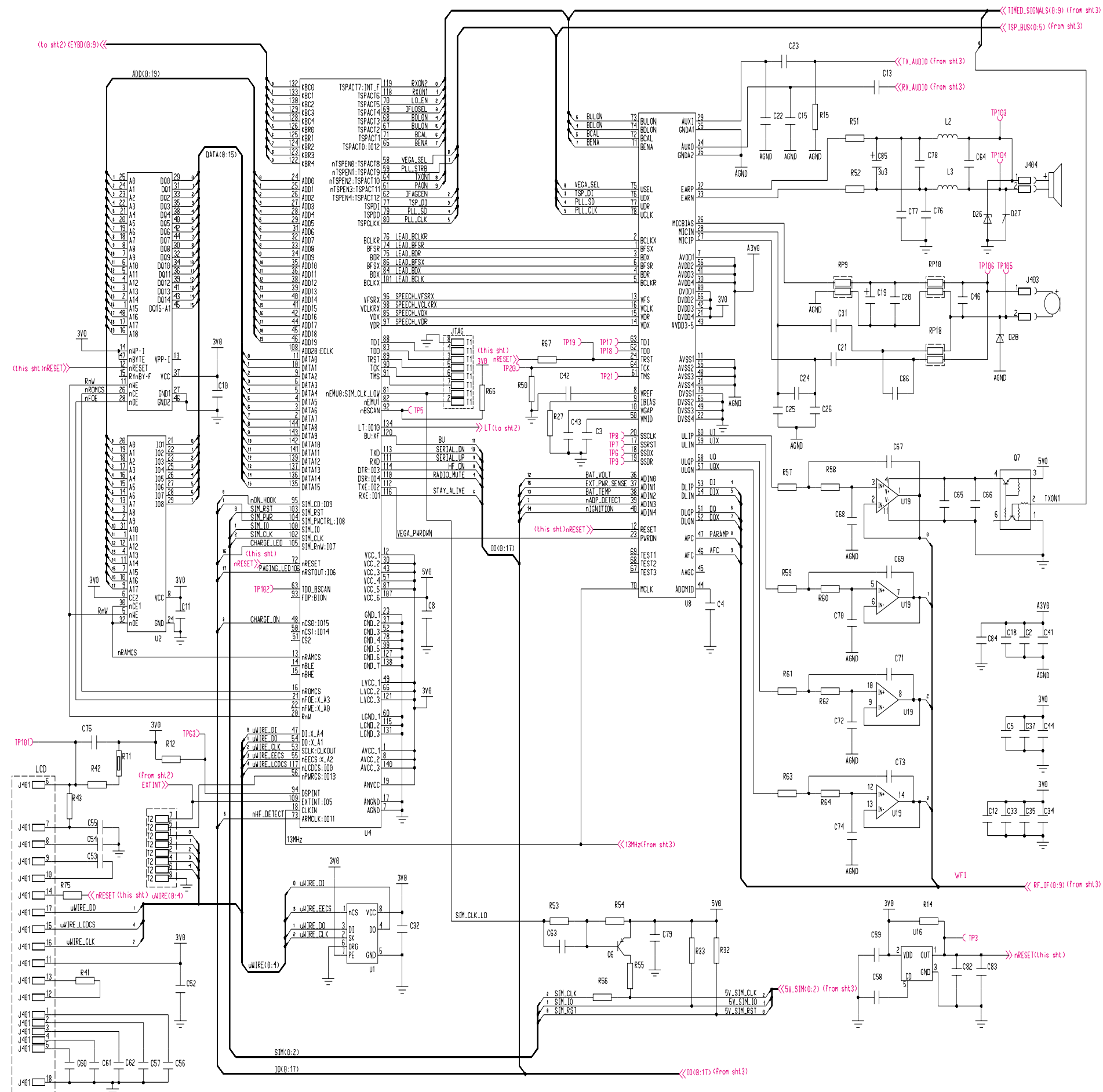


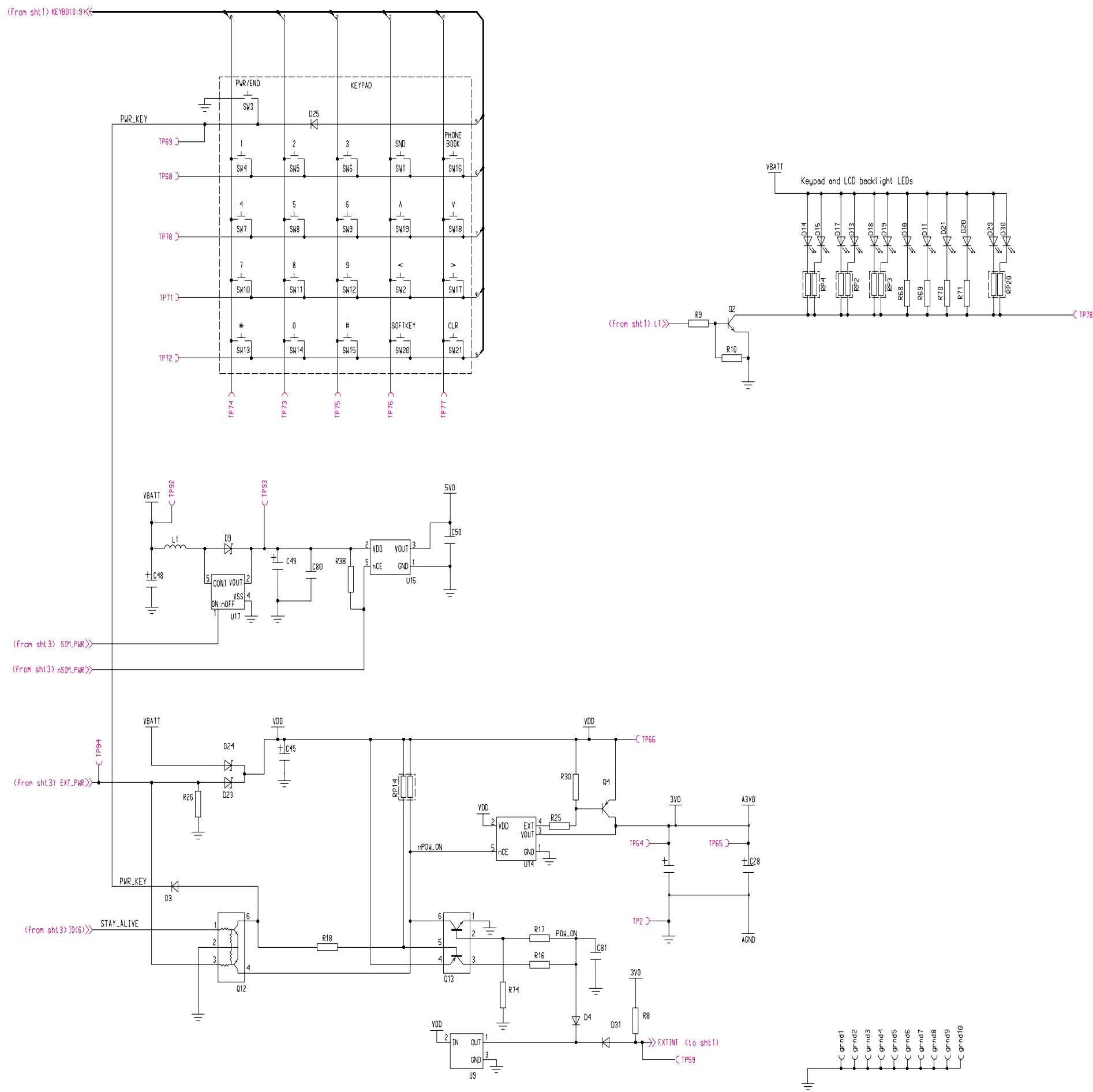
Figure 7: 5

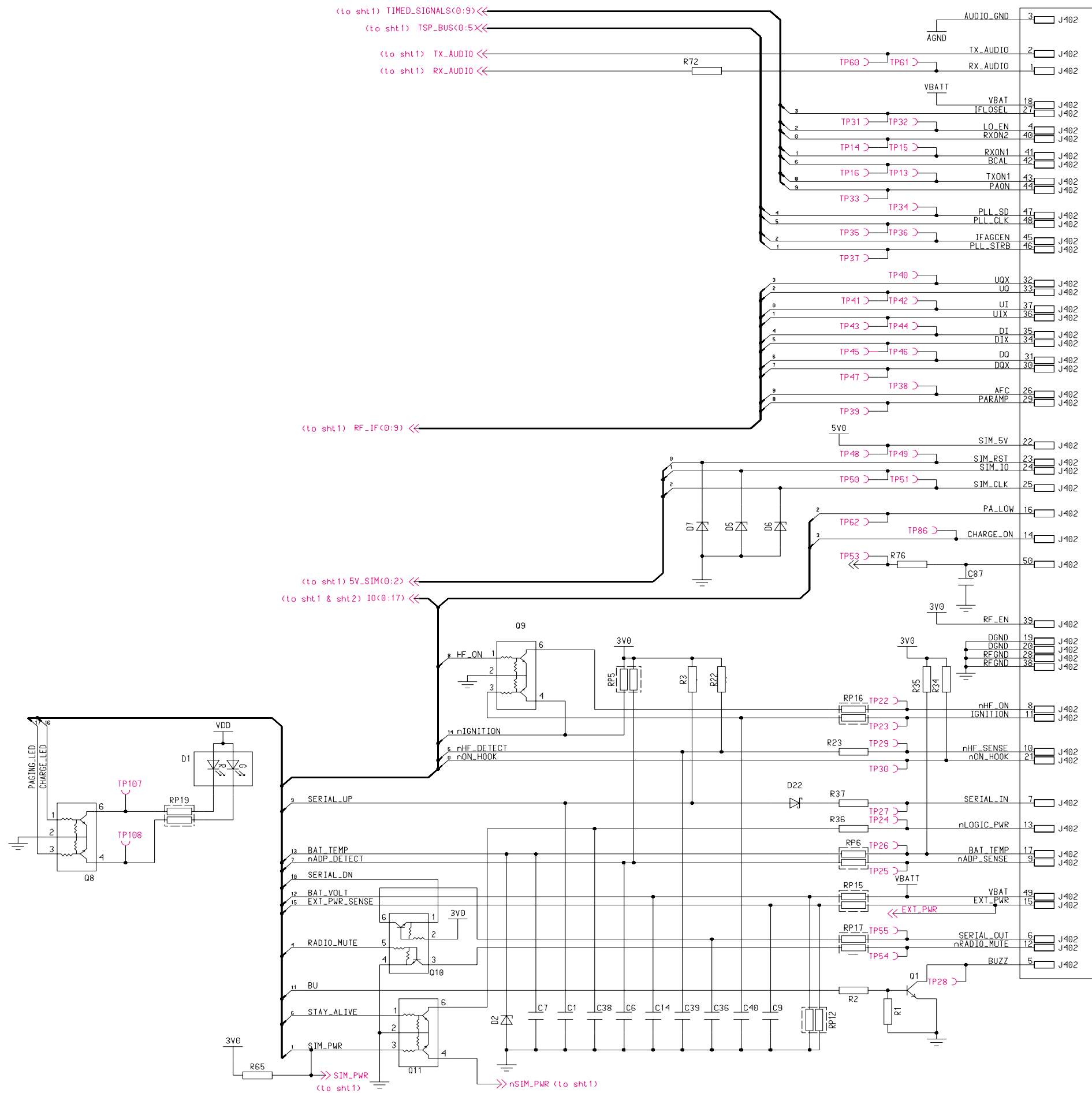
450-0807

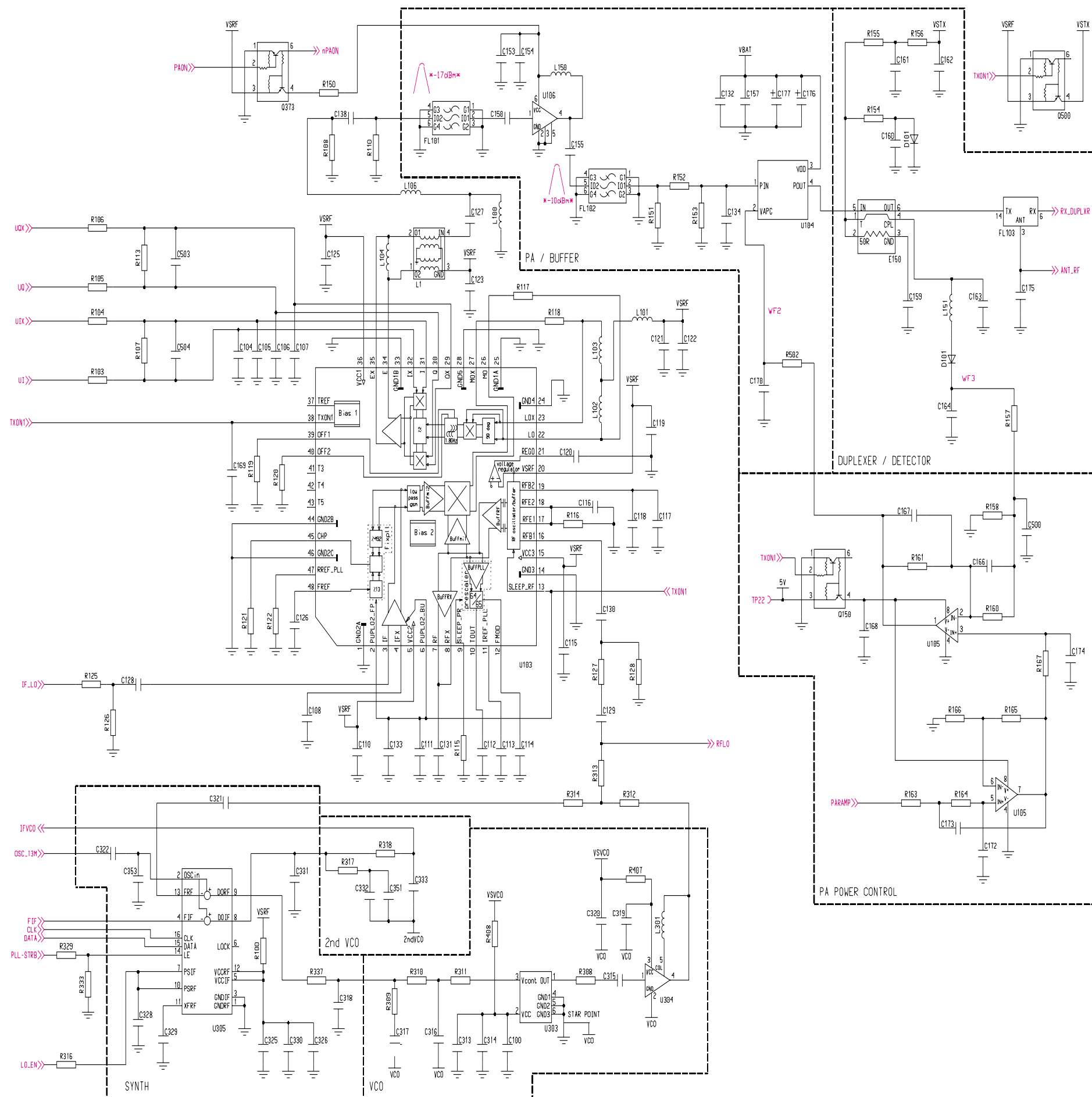
Logic Sheet 1

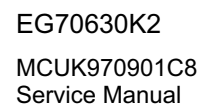


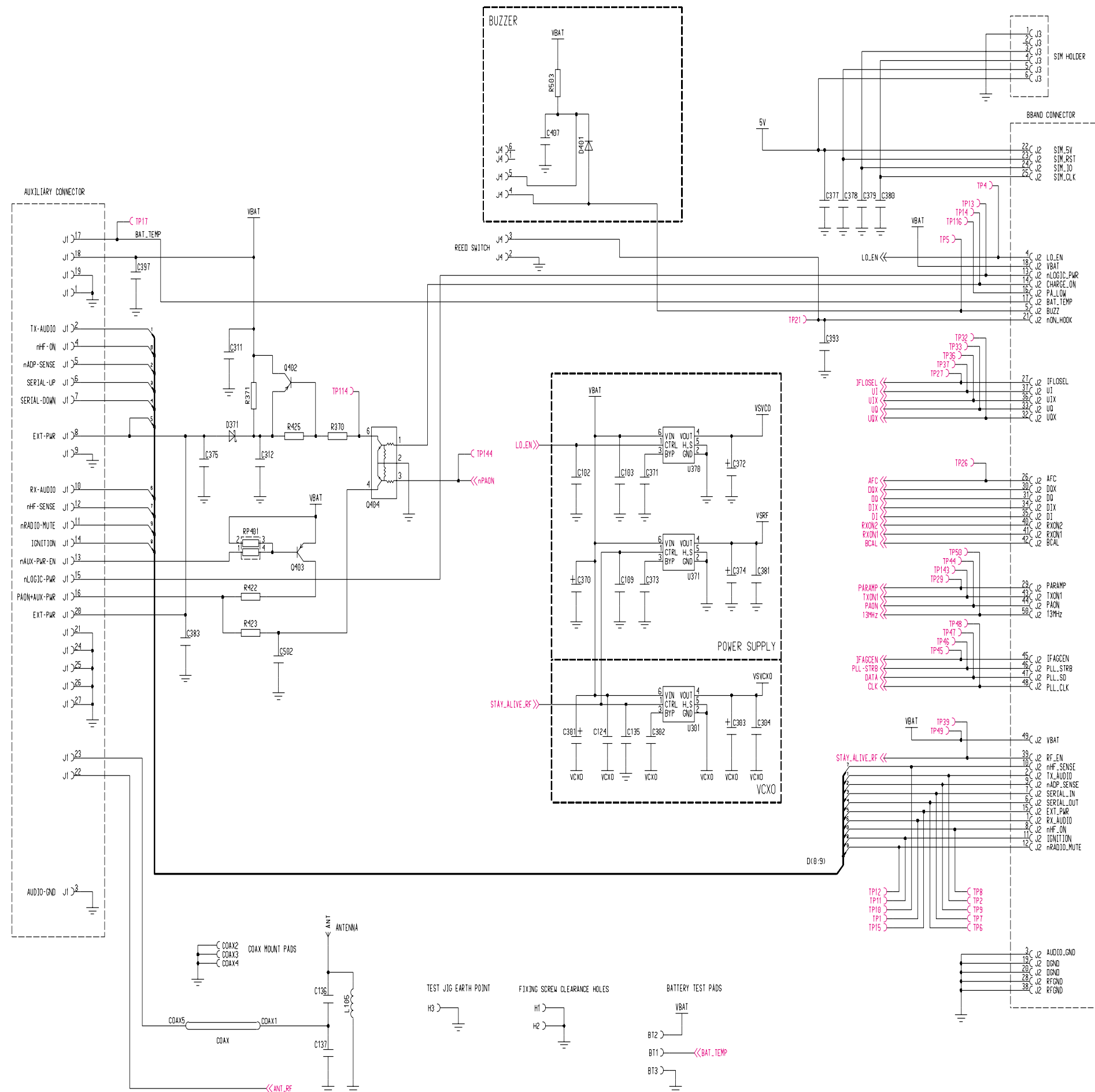
Logic Sheet 2



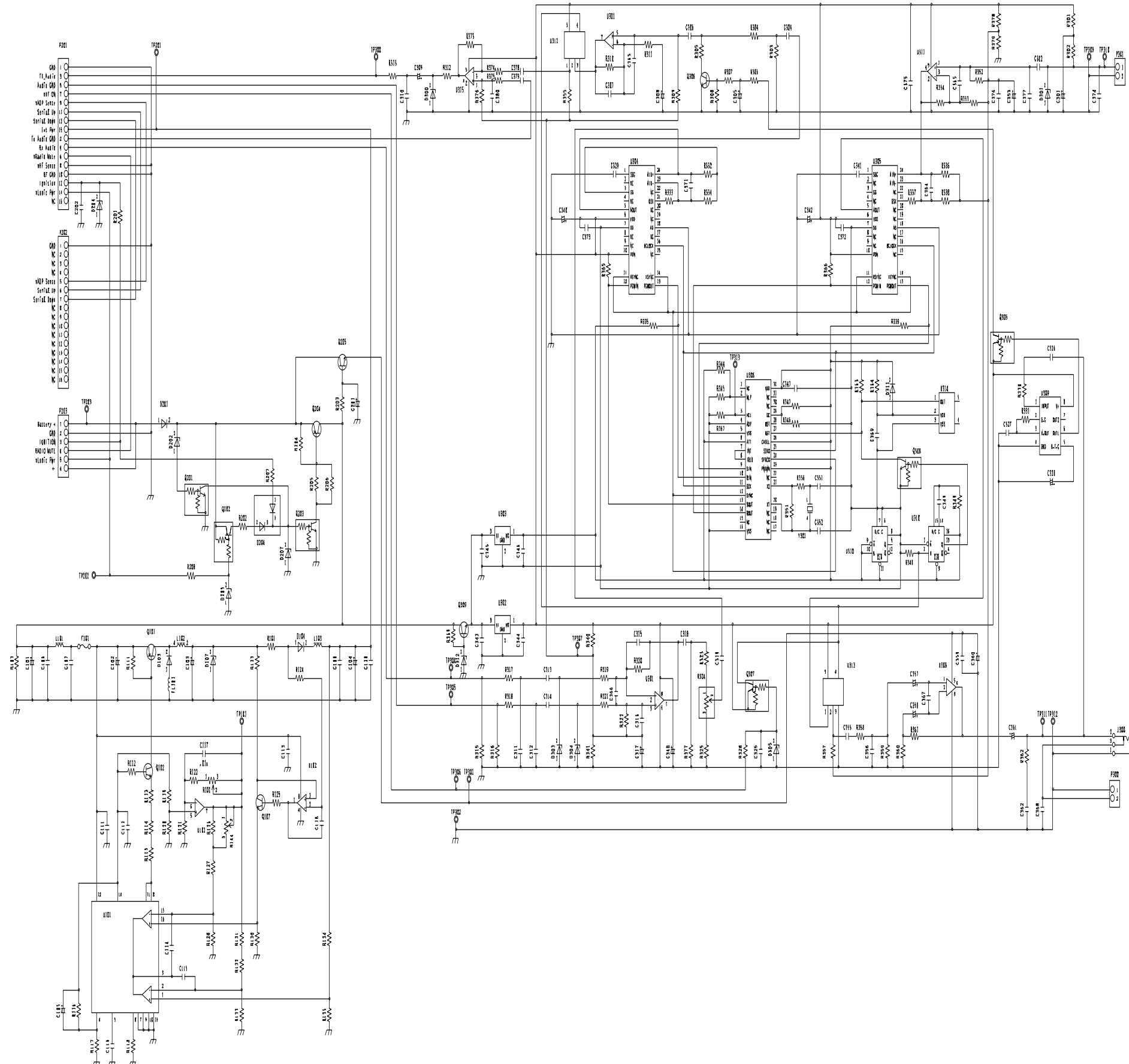








8.2 Handsfree Unit

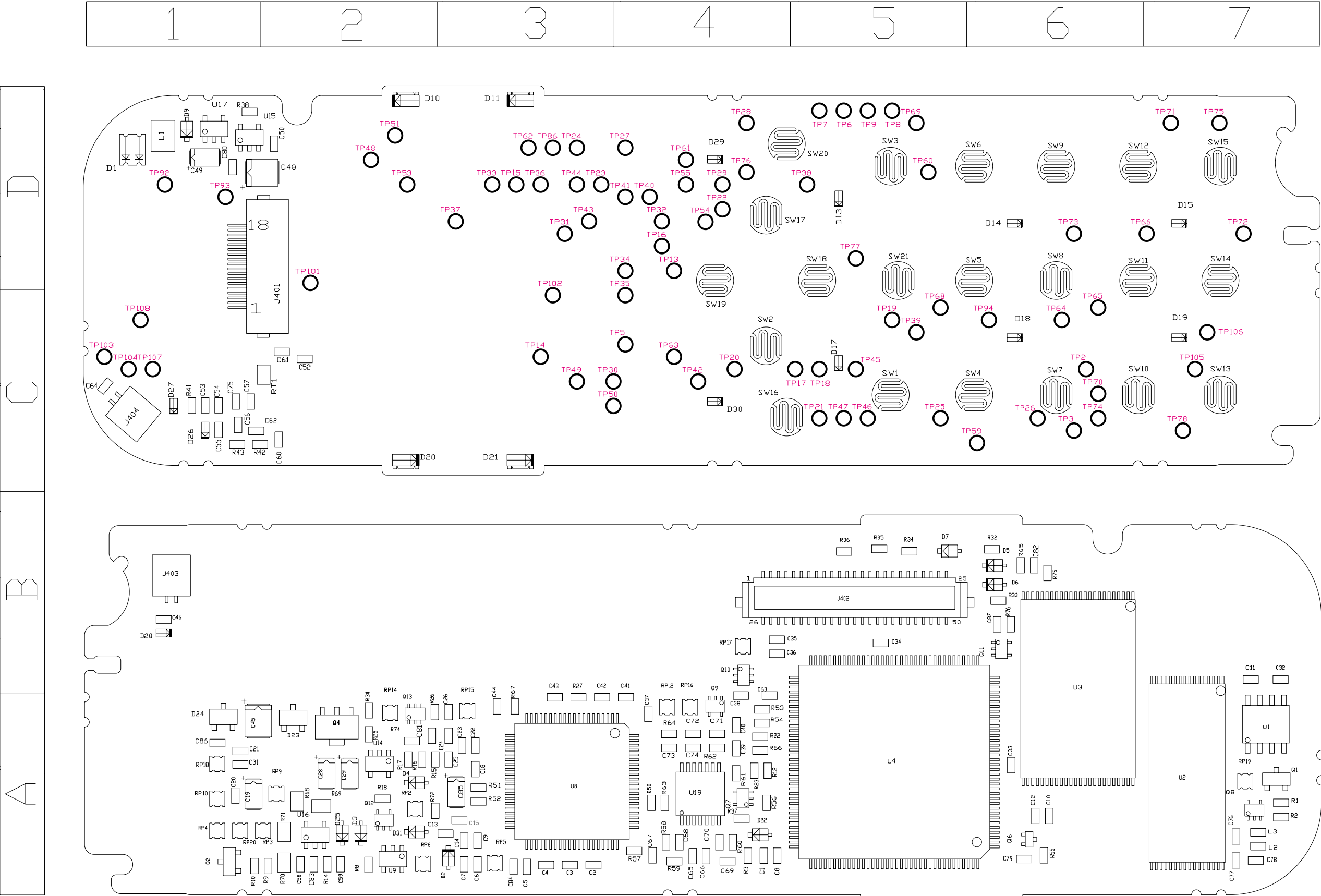


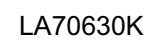
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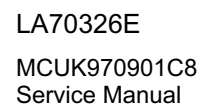
9 PCB LAYOUT DIAGRAMS

9.1 Handheld Unit

9.1.1 Logic

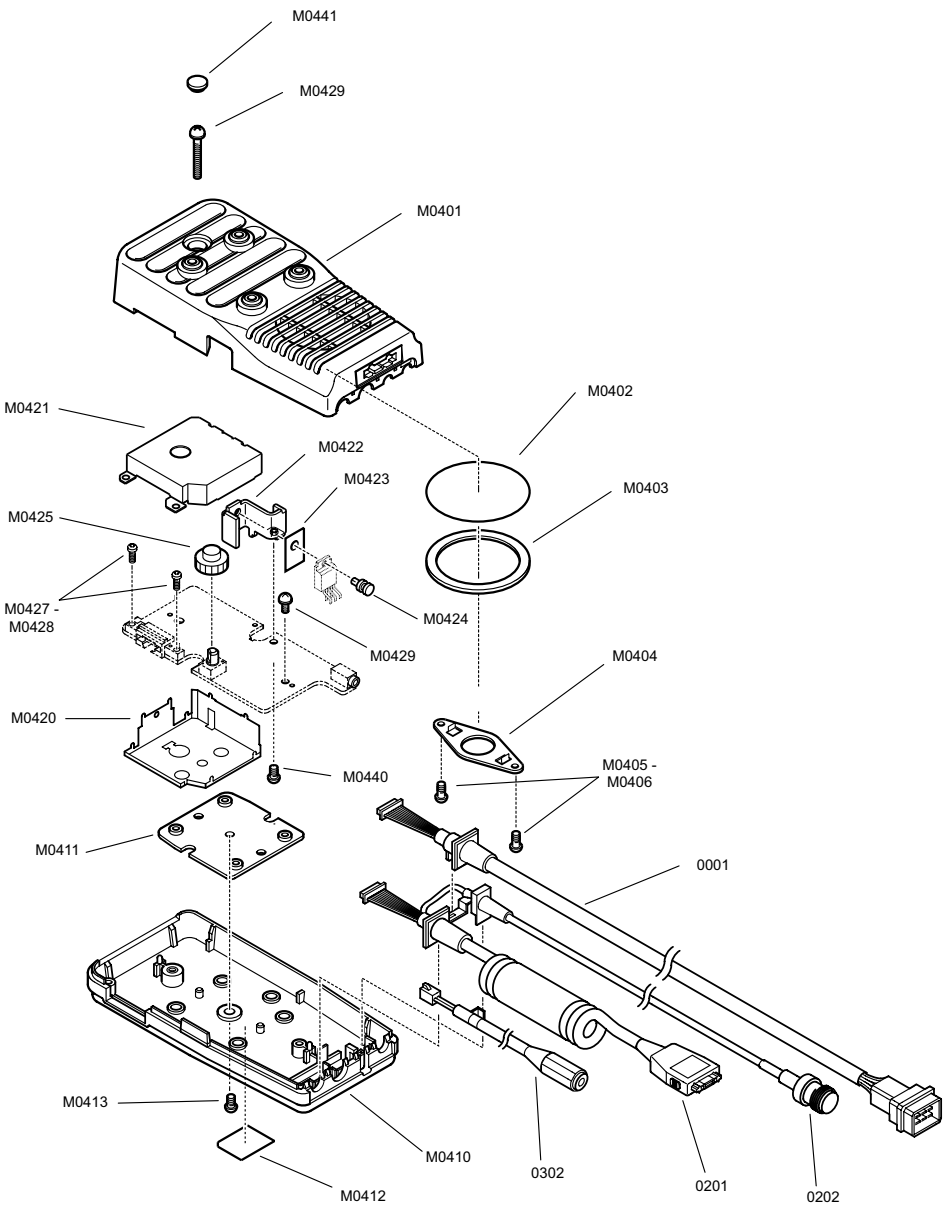






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10.2 Handsfree Unit



Ref.	Parts No	Name
M0401	5 70086A	Cover
M0402	6 10031A	Speaker net
M0403	4R8209	Speaker packing
M0404	1 70071A	Speaker bracket
M0405 M0406	T 256G	Scre 2
M0410	5M70076A	Case
M0411	1 C5819A	late
M0412	7 70119A	a e plate
M0413	S 35	Scre
M0420	1C70128A	Sheil Case 1
M0421	1C70129A	Sheil Case 2
M0422	1E70008A	Ra iator
M0423	5G10500A	Insulator
M0424	1M270900102	Cla p
M0425	5 5129A	olu e knob
M0426	3 6	Scre
M0427 M0428	T 2510G	Scre 2
M0429	T 256G	Scre
M0440	3 30	Scre
M0441	5U70008	Top cushion
0001	70005A	o er Supply Cable
0201	C70109A	Curly Cor
0202	C70110A	Interconnecting Cable
0302	G70003A	E ternal Microphone Cable

Figure 2: an s ree Unit 500-1002

10.3 Handheld Replacement Parts List

10.3.1 Logic

MODEL	E -G450	NAME	Logic	
Ref.	Part No.	Description	Grid	Remarks
	G4570630A	ASSEM LE L GIC C		
C001	GM1C102 1ET	CA ACIT R 1n 25 A4		
C002	ECU 1C104K	CA ACIT R 100n 16 A3		
C003	ECU 1C104K	CA ACIT R 100n 16 A3		
C004	ECU 1C104K	CA ACIT R 100n 16 A3		
C005	ECU 1C104K	CA ACIT R 100n 16 A3		
C006	ECU 1C104K	CA ACIT R 100n 16 A3		
C007	ECU 1C104K	CA ACIT R 100n 16 A3		
C008	ECU 1C104K	CA ACIT R 100n 16 A4		
C009	GM1 105 1AT	CA ACIT R 1 10 A3		
C010	ECU 1C104K	CA ACIT R 100n 16 A3		
C011	ECU 1C104K	CA ACIT R 100n 16 7		
C012	ECU 1C104K	CA ACIT R 100n 16 A6		
C013	GM1 105 1AT	CA ACIT R 1 10 A3		
C014	GM1 105 1AT	CA ACIT R 1 10 A3		
C015	GM1C101 1 T	CA ACIT R 100p 50 A3		
C017	GM1C101 1 T	CA ACIT R 100p 50 A3		
C018	ECU 1C104K	CA ACIT R 100n 16 A3		
C019	CS U011M156	CA ACIT R 15 6 A1		
C020	ECU 1C104K	CA ACIT R 100n 16 A1		
C021	ECU 1C104K	CA ACIT R 100n 16 A1		
C022	GM1C101 1 T	CA ACIT R 100p 50 A3		
C023	GM1 105 1AT	CA ACIT R 1 10 A3		
C024	GM1C101 1 T	CA ACIT R 100p 50 A3		
C025	GM1C101 1 T	CA ACIT R 100p 50 A3		

MODEL	E -G450	NAME	Logic	
Ref.	Part No.	Description	Grid	Remarks
C026	GM1C101 1 T	CA ACIT R 100p 50 A3		
C028	CS U011M156	CA ACIT R 15 6 A2		
C029	CS U011M156	CA ACIT R 15 6 A2		
C031	ECU 1C104K	CA ACIT R 100n 16 A1		
C032	ECU 1C104K	CA ACIT R 100n 16 7		
C033	ECU 1C104K	CA ACIT R 100n 16 A6		
C034	ECU 1C104K	CA ACIT R 100n 16 5		
C035	ECU 1C104K	CA ACIT R 100n 16 4		
C036	GM1C102 1ET	CA ACIT R 1n 25 4		
C037	ECU 1C104K	CA ACIT R 100n 16 A4		
C038	ECU 1C104K	CA ACIT R 100n 16 A4		
C039	ECU 1C104K	CA ACIT R 100n 16 A4		
C040	ECU 1C104K	CA ACIT R 100n 16 A4		
C041	ECU 1C104K	CA ACIT R 100n 16 A4		
C042	ECU 1C104K	CA ACIT R 100n 16 A3		
C043	ECU 1C104K	CA ACIT R 100n 16 A3		
C044	ECU 1C104K	CA ACIT R 100n 16 A3		
C045	CS U013M156	CA ACIT R 15 16 A1		
C046	GM1C101 1 T	CA ACIT R 100p 50 1		
C048	CS U013M156	CA ACIT R 15 16 1		
C049	CS U015M106	CA ACIT R 10 10 1		
C050	GM1 105 1AT	CA ACIT R 1 10 2		
C052	GM1 105 1AT	CA ACIT R 1 10 C2		
C053	GM1 105 1AT	CA ACIT R 1 10 C1		
C054	GM1 105 1AT	CA ACIT R 1 10 C1		
C055	GM1 105 1AT	CA ACIT R 1 10 C1		
C056	ECU 1C104K	CA ACIT R 100n 16 C1		
C057	ECU 1C104K	CA ACIT R 100n 16 C1		
C058	ECU 1C104K	CA ACIT R 100n 16 A2		

MODEL	E -G450	NAME	Logic				
Ref.	Part No.	Description	Grid	Remarks			
C059	ECU 1C104K	CA ACIT R	100n	16	A2		
C060	ECU 1C104K	CA ACIT R	100n	16	C2		
C061	ECU 1C104K	CA ACIT R	100n	16	C2		
C062	ECU 1C104K	CA ACIT R	100n	16	C1		
C063	ECU 1 470 C	CA ACIT R	47p	50	A4		
C064	GM1C101 1 T	CA ACIT R	100p	50	C1		
C065	ECU 1C104K	CA ACIT R	100n	16	A4		
C066	GM1C101 1 T	CA ACIT R	100p	50	A4		
C067	ECU 1 821 C	CA ACIT R	820p	50	A4		
C068	ECU 1 391 C	CA ACIT R	390p	50	A4		
C069	ECU 1 821 C	CA ACIT R	820p	50	A4		
C070	ECU 1 391 C	CA ACIT R	390p	50	A4		
C071	ECU 1 821 C	CA ACIT R	820p	50	A4		
C072	ECU 1 391 C	CA ACIT R	390p	50	A4		
C073	ECU 1 821 C	CA ACIT R	820p	50	A4		
C074	ECU 1 391 C	CA ACIT R	390p	50	A4		
C075	GM1 105 1AT	CA ACIT R	1	10	C1		
C076	GM1C101 1 T	CA ACIT R	100p	50	A7		
C077	GM1C101 1 T	CA ACIT R	100p	50	A7		
C078	GM1C101 1 T	CA ACIT R	100p	50	A7		
C079	ECU 1C104K	CA ACIT R	100n	16	A7		
C080	GM1C101 1 T	CA ACIT R	100p	50	1		
C081	GM1 105 1AT	CA ACIT R	1	10	A2		
C082	GM1 105 1AT	CA ACIT R	1	10	6		
C083	GM1 105 1AT	CA ACIT R	1	10	A2		
C084	ECU 1 470 C	CA ACIT R	47p	50	A3		
C085	CS U009M335	CA ACIT R	3 3	16	A3		
C086	ECU 1E223K	CA ACIT R	22n	25	A1		

MODEL	E -G450	NAME	Logic				
Ref.	Part No.	Description	Grid	Remarks			
001	CL155URG T	LE 2 C L UR	1				
002	MA8062MT	E ER I E	A3				
003	MA111T	I E	A2				
004	MA111T	I E	A2				
005	MA8062MT	E ER I E	6				
006	MA8062MT	E ER I E	6				
007	MA8062MT	E ER I E	5				
009	MA729T	I E	1				
010	L1650 G	LE GREE	2				
011	L1650 G	LE GREE	3				
013	1111C650TR	LE ELL	5				
014	1111C650TR	LE ELL	6				
015	1111C650TR	LE ELL	7				
017	1111C650TR	LE ELL	C5				
018	1111C650TR	LE ELL	C6				
019	1111C650TR	LE ELL	C7				
020	L1650 G	LE GREE	C2				
021	L1650 G	LE GREE	C3				
022	MA729T	I E	A4				
023	R 411 T146	I E	A2				
024	R 411 T146	I E	A1				
025	MA111T	I E	A2				
026	MA S0470GL	E ER I E	C1				
027	MA S0470GL	E ER I E	C1				
028	MA S0470GL	E ER I E	1				
029	1111C650TR	LE ELL	4				
030	1111C650TR	LE ELL	C4				
031	MA111T	I E	A2				

MODEL	E -G450	NAME	Logic	
Ref.	Part No.	Description	Grid	Remarks
T0102	S70016A	RECEI ER		
401	528931890	C ECT R 18 A	1	
402	A 00118	C ECT R 50 A	5	
403	SM02 SRSS	2 A S CKET	1	
404	SM02 SRSS	2 A S CKET	C1	
L001	L 3C101KT	I UCT R 100	1	
L002	LL1608 82	I UCT R 82n	A7	
L003	LL1608 82	I UCT R 82n	A7	
001	C 65CTA	TRA SIST R	A7	
002	C 65CTA	TRA SIST R	A1	
004	2S 1424T100R	TRA SIST R	A2	
006	2SA1774TLR	TRA SIST R	A6	
007	UMC2TR	TRA SIST R	A4	
008	UMG8TR	TRA SIST R	A7	
009	UMG2TR	TRA SIST R	A4	
010	UM 10T	TRA SIST R	4	
011	UMG2TR	TRA SIST R	6	
012	UMG2TR	TRA SIST R	A2	
013	UM 1 TR	TRA SIST R	A2	
R001	ER 3GE 104	RESIST R 100kΩ	A7	
R002	ER 3GE 332	RESIST R 3k3Ω	A7	
R003	ER 3GE 103	RESIST R 10kΩ	A4	
R008	ER 3GE 104	RESIST R 100kΩ	A2	
R009	ER 3GE 332	RESIST R 3k3Ω	A2	
R010	ER 3GE 104	RESIST R 100kΩ	A1	

MODEL	E -G450	NAME	Logic	
Ref.	Part No.	Description	Grid	Remarks
R012	ER 3GE 104	RESIST R 100kΩ	A4	
R014	ER 3GE 103	RESIST R 10kΩ	A2	
R015	ER 3GE 103	RESIST R 10kΩ	A2	
R016	ER 3GE 223	RESIST R 22kΩ	A2	
R017	ER 3GE 104	RESIST R 100kΩ	A2	
R018	ER 3GE 563	RESIST R 56kΩ	A2	
R022	ER 3GE 104	RESIST R 100kΩ	A4	
R023	ER 3GE 331	RESIST R 330Ω	A4	
R025	ER 3GE 102	RESIST R 1kΩ	A2	
R026	ER 3GE 222	RESIST R 2k2Ω	A2	
R027	ER 3GE 104	RESIST R 100kΩ	A3	
R030	ER 3GE 103	RESIST R 10kΩ	A2	
R032	ER 3GE 103	RESIST R 10kΩ	6	
R033	ER 3GE 103	RESIST R 10kΩ	6	
R034	ER 3GE 103	RESIST R 10kΩ	5	
R035	ER 3GE 683	RESIST R 68kΩ	5	
R036	ER 3GE 331	RESIST R 330Ω	5	
R037	ER 3GE 331	RESIST R 330Ω	A4	
R038	ER 3GE 104	RESIST R 100kΩ	1	
R041	ER 3GE 184	RESIST R 180kΩ	C1	
R042	ER 3GE 563	RESIST R 56kΩ	C1	
R043	ER 3GE 222	RESIST R 2k2Ω	C1	
R050	ER 3GE 104	RESIST R 100kΩ	A4	
R051	ER 3GE 120	RESIST R 12Ω	A3	
R052	ER 3GE 120	RESIST R 12Ω	A3	
R053	ER 3GE 332	RESIST R 3k3Ω	A4	
R054	ER 3GE 331	RESIST R 330Ω	A4	
R055	ER 3GE 221	RESIST R 220Ω		

MODEL	E -G450	NAME		Logic	
Ref.	Part No.	Description		Grid	Remarks
R056	ER 3GE 470	RESIST R	47Ω	A4	
R057	ER 3GE 102	RESIST R	1kΩ	A4	
R058	ER 3GE 182	RESIST R	1k8Ω	A4	
R059	ER 3GE 102	RESIST R	1kΩ	A4	
R060	ER 3GE 182	RESIST R	1k8Ω	A4	
R061	ER 3GE 102	RESIST R	1kΩ	A4	
R062	ER 3GE 182	RESIST R	1k8Ω	A4	
R063	ER 3GE 102	RESIST R	1kΩ	A4	
R064	ER 3GE 182	RESIST R	1k8Ω	A4	
R066	ER 3GE 104	RESIST R	100kΩ	A4	
R067	ER 3GE 223	RESIST R	22kΩ	A3	
R068	ER 6GE 181	RESIST R	180Ω	A2	
R069	ER 6GE 181	RESIST R	180Ω	A2	
R070	ER 6GE 181	RESIST R	180Ω	A2	
R071	ER 6GE 181	RESIST R	180Ω	A2	
R072	ER 3GE 331	RESIST R	330Ω	A2	
R074	ER 3GE 104	RESIST R	100kΩ	A2	
R075	ER 3GE 102	RESIST R	1kΩ	6	
R076	ER 3GE 681	RESIST R	680Ω	6	
R 002	E 4 391	RESIST R	390Ω	A2	
R 003	E 4 391	RESIST R	390Ω	A2	
R 004	E 4 391	RESIST R	390Ω	A1	
R 005	E 4 104	RESIST R	100kΩ	A3	
R 006	E 4 331	RESIST R	330Ω	A2	
R 009	E 4 331	RESIST R	330Ω	A2	
R 010	E 4 122	RESIST R	1k2Ω	A1	
R 012	E 4 273	RESIST R	27kΩ	A4	

MODEL	E -G450	NAME			Logic	
Ref.	Part No.	Description			Grid	Remarks
R 014	E 4 563	RESIST R	56kΩ		A2	
R 015	E 4 104	RESIST R	100kΩ		A3	
R 016	E 4 331	RESIST R	330Ω		A4	
R 017	E 4 331	RESIST R	330Ω			
R 018	E 4 331	RESIST R	330Ω		A1	
R 019	E 4 151	RESIST R	150Ω		A7	
R 020	E 4 391	RESIST R	390Ω		A1	
RT001	RTSM021 104	T ERMIST R			C2	
U001	G450SER001	R GRAMME EE R M			A7	
U002	UM 0135	SRAM			A7	
U003	G450 001	R GRAMME LAS MEM R		6		
U004	711801	8 Mb MICR C TR LLER			A5	
U008	TCM4400	ASE A R I TER ACE			A3	
U009	R 5 L36AATR	IC			A2	
U014	R 5RG30AATR	LTAGE REGULAT R	3		A2	
U015	R 5RT50AATR	LTAGE REGULAT R	5		1	
U016	R 5 24AATR	RESET GE ERAT R	2 4		A2	
U017	URI 0022	REGULAT R	2 4		1	
U019	UAKL0004	IC UA -AM			A4	

10.3.2 RF

MODEL	E -G450	NAME	R		
Ref.	Part No.	Description	Grid	Remarks	
	AS70011A	U ER L ER ASSEM L			
	G4570631A	ASSEM LE R C			
C100	GM2R105K1AT	CA ACIT R	1	10	A4
C101	ECU 1 470 C	CA ACIT R	47p	50	6
C102	ECU 1 470 C	CA ACIT R	47p	50	6
C103	ECU 1 470 C	CA ACIT R	47p	50	2
C109	ECU 1 470 C	CA ACIT R	47p	50	6
C110	GM1C101 1 T	CA ACIT R	100p	50	A3
C111	ECU 1 103K	CA ACIT R	10n	50	C6
C112	GM1C101 1 T	CA ACIT R	100p	50	C6
C113	GM1C101 1 T	CA ACIT R	100p	50	A2
C114	GM1C101 1 T	CA ACIT R	100p	50	A2
C115	GM1C101 1 T	CA ACIT R	100p	50	A2
C116	GM1C101 1 T	CA ACIT R	100p	50	C6
C119	GM1C101 1 T	CA ACIT R	100p	50	A2
C120	GM1C101 1 T	CA ACIT R	100p	50	A2
C121	ECU 1 390 C	CA ACIT R	39p	50	A2
C122	ECU 1 103K	CA ACIT R	10n	50	A2
C123	ECU 1 103K	CA ACIT R	10n	50	A2
C124	ECU 1 470 C	CA ACIT R	47p	50	2
C125	GM1C101 1 T	CA ACIT R	100p	50	A3
C126	ECU 1 103K	CA ACIT R	10n	50	A3
C127	GM1C101 1 T	CA ACIT R	100p	50	A3
C128	GM1C101 1 T	CA ACIT R	100p	50	A3
C129	GM1C101 1 T	CA ACIT R	100p	50	A3
C130	GM1C101 1 T	CA ACIT R	100p	50	A3
C133	GM1C101 1 T	CA ACIT R	100p	50	A3

MODEL	E -G450	NAME	R		
Ref.	Part No.	Description	Grid	Remarks	
C150	GM1C101 1 T	CA ACIT R	100p	50	A4
C153	GM1C101 1 T	CA ACIT R	100p	50	A4
C154	ECU 1 103K	CA ACIT R	10n	50	A5
C155	GM1C101 1 T	CA ACIT R	100p	50	A4
C157	GM1C101 1 T	CA ACIT R	100p	50	5
C159	GM1C101 1 T	CA ACIT R	100p	50	5
C160	GM1C101 1 T	CA ACIT R	100p	50	5
C161	ECU 1 221 C	CA ACIT R	220p	50	2
C162	ECU 1C333K	CA ACIT R	33n	16	2
C163	ECU 1 040CC	CA ACIT R	4p	50	5
C164	GM1C101 1 T	CA ACIT R	100p	50	5
C166	ECU 1 271 C	CA ACIT R	270p	50	7
C167	ECU 1 331 C	CA ACIT R	330p	50	7
C168	ECU 1 103K	CA ACIT R	10n	50	7
C169	GM1C101 1 T	CA ACIT R	100p	50	A3
C172	GM1C161 1 T	CA ACIT R	160p	50	7
C173	GM1C161 1 T	CA ACIT R	160p	50	7
C174	ECU 1 331 C	CA ACIT R	330p	50	6
C175	ECU 1 010CC	CA ACIT R	1p	50	C1
C176	CS U012M106	CA ACIT R	10	16	A5
C177	CS U012M106	CA ACIT R	10	16	A5
C200	ECU 1 020CC	CA ACIT R	2p	50	A6
C201	ECU 1 040CC	CA ACIT R	4p	50	A6
C202	ECU 1 040CC	CA ACIT R	4p	50	A7
C203	GM1C101 1 T	CA ACIT R	100p	50	A6
C204	ECU 1 102K	CA ACIT R	1n	50	A6
C205	GM1C101 1 T	CA ACIT R	100p	50	A6
C206	ECU 1 103K	CA ACIT R	10n	50	A7
C207	GM1C101 1 T	CA ACIT R	100p	50	A6

MODEL	E -G450	NAME	R			
Ref.	Part No.	Description	Grid	Remarks		
C208	ECU 1 030CC	CA ACIT R 3p 50 A7				
C210	GM1C101 1 T	CA ACIT R 100p 50 C2				
C211	ECU 1 102K	CA ACIT R 1n 50 C2				
C212	ECU 1 103K	CA ACIT R 10n 50 A6				
C213	ECU 1 102K	CA ACIT R 1n 50 A6				
C214	ECU 1 040CC	CA ACIT R 4p 50 A5				
C215	ECU 1 020CC	CA ACIT R 2p 50 A5				
C216	GM1C101 1 T	CA ACIT R 100p 50 C2				
C217	ECU 1 103K	CA ACIT R 10n 50 C2				
C218	ECU 1 103K	CA ACIT R 10n 50 A6				
C219	ECU 1 102K	CA ACIT R 1n 50 A4				
C220	ECU 1 030CC	CA ACIT R 3p 50 A4				
C221	ECU 1 100 C	CA ACIT R 10p 50 C2				
C222	GM1C101 1 T	CA ACIT R 100p 50 C2				
C224	GM1C101 1 T	CA ACIT R 100p 50 C2				
C225	GM1C101 1 T	CA ACIT R 100p 50 A6				
C226	GM1C101 1 T	CA ACIT R 100p 50 A6				
C227	ECU 1 050 C	CA ACIT R 5p 50 A6				
C228	ECU 1 050 C	CA ACIT R 5p 50 A6				
C229	ECU 1E223K	CA ACIT R 22n 25 C2				
C230	ECU 1E223K	CA ACIT R 22n 25 C2				
C231	ECU 1 030CC	CA ACIT R 3p 50 A6				
C232	GM1C101 1 T	CA ACIT R 100p 50 A6				
C233	ECU 1 103K	CA ACIT R 10n 50 A6				
C234	GM1C101 1 T	CA ACIT R 100p 50 A5				
C237	GM1C101 1 T	CA ACIT R 100p 50 A6				
C238	GM1C101 1 T	CA ACIT R 100p 50 A6				
C239	GM1C101 1 T	CA ACIT R 100p 50 A5				
C240	ECU 1 030CC	CA ACIT R 3p 50 A5				

MODEL	E -G450	NAME	R			
Ref.	Part No.	Description	Grid	Remarks		
C250	ECU 1 070 C	CA ACIT R 7p 50 A6				
C251	ECU 1 070 C	CA ACIT R 7p 50 A5				
C252	ECU 1 070 C	CA ACIT R 7p 50 A5				
C253	ECU 1 070 C	CA ACIT R 7p 50 A5				
C254	ECU 1 331 C	CA ACIT R 330p 50 A6				
C255	ECU 1 331 C	CA ACIT R 330p 50 A5				
C301	CS U009M475	CA ACIT R 4 7 16 2				
C302	ECU 1 103K	CA ACIT R 10n 50 6				
C303	CS U011M156	CA ACIT R 15 6 2				
C304	GM1C101 1 T	CA ACIT R 100p 50 2				
C305	ECU 1 040CC	CA ACIT R 4p 50 1				
C306	ECU 1 102K	CA ACIT R 1n 50 2				
C307	ECU 1 103K	CA ACIT R 10n 50 2				
C308	ECU 1 103K	CA ACIT R 10n 50 1				
C309	ECU 1 103K	CA ACIT R 10n 50 2				
C310	ECU 1 561 C	CA ACIT R 560p 50 2				
C311	GM1C101 1 T	CA ACIT R 100p 50 C7				
C312	GM1C101 1 T	CA ACIT R 100p 50 C7				
C313	GM1C101 1 T	CA ACIT R 100p 50 A4				
C314	ECU 1 103K	CA ACIT R 10n 50 A4				
C315	GM1C101 1 T	CA ACIT R 100p 50 A4				
C316	ECU 1 271 C	CA ACIT R 270p 50 A4				
C317	ECU 1C473K	CA ACIT R 47n 16 A4				
C318	ECU 1 472K	CA ACIT R 4 7n 50 3				
C319	ECU 1C104K	CA ACIT R 100n 16 A4				
C320	GM1C101 1 T	CA ACIT R 100p 50 A4				
C321	GM1C101 1 T	CA ACIT R 100p 50 4				
C322	ECU 1 220 C	CA ACIT R 22p 50 A3				
C323	GM1C101 1 T	CA ACIT R 100p 50 A3				

MODEL	E -G450	NAME					R	
Ref.	Part No.	Description					Grid	Remarks
C325	GM1C101 1 T	CA ACIT R	100p	50	A3			
C326	GM1C101 1 T	CA ACIT R	100p	50	3			
C327	GM1C101 1 T	CA ACIT R	100p	50	2			
C328	ECU 1 102K	CA ACIT R	1n	50	A4			
C329	GM1C101 1 T	CA ACIT R	100p	50	3			
C330	CCSM028 106	CA ACIT R	10	10	A4			
C331	ECU 1C333K	CA ACIT R	33n	16	A3			
C332	ECU 1C104K	CA ACIT R	100n	16	A2			
C333	GM1C101 1 T	CA ACIT R	100p	50	A2			
C334	ECU 1 100 C	CA ACIT R	10p	50	A2			
C335	ECU 1 100 C	CA ACIT R	10p	50	A2			
C336	GM1C101 1 T	CA ACIT R	100p	50	A2			
C337	ECU 1 102K	CA ACIT R	1n	50	A2			
C339	ECU 1 100 C	CA ACIT R	10p	50	A2			
C340	ECU 1 080 C	CA ACIT R	8p	50	A2			
C341	ECU 1 030CC	CA ACIT R	3p	50	A2			
C342	ECU 1 103K	CA ACIT R	10n	50	2			
C343	TA A685M006R	CA ACIT R	6 8u	6 3	2			
C344	GM1C101 1 T	CA ACIT R	100p	50	A2			
C345	ECU 1 102K	CA ACIT R	1n	50	2			
C346	GM1C101 1 T	CA ACIT R	100p	50	A2			
C347	ECU 1C104K	CA ACIT R	100n	16	A2			
C348	GM1C101 1 T	CA ACIT R	100p	50v	A2			
C349	ECU 1 100 C	CA ACIT R	10p	50	2			
C351	ECU 1C333K	CA ACIT R	33n	16	A2			
C353	ECU 1 050 C	CA ACIT R	5p	50	A3			
C370	CS U009M475	CA ACIT R	4 7	16	2			
C371	ECU 1 103K	CA ACIT R	10n	50	2			
C372	CS U011M106	CA ACIT R	10u	6 3	2			

MODEL	E -G450	NAME					R	
Ref.	Part No.	Description					Grid	Remarks
C373	ECU 1 103K	CA ACIT R	10n	50	2			
C374	CS U011M106	CA ACIT R	10u	6 3	2			
C375	GM1C101 1 T	CA ACIT R	100p	50	2			
C377	GM1 105 1AT	CA ACIT R	1	10	3			
C378	ECU 1 102K	CA ACIT R	1n	50	3			
C379	GM1C820 1 T	CA ACIT R	82p	50	3			
C381	GM1C101 1 T	CA ACIT R	100p	50	2			
C383	ECU 1 470 C	CA ACIT R	47p	50	1			
C393	GM1C101 1 T	CA ACIT R	100p	50	7			
C397	GM1C101 1 T	CA ACIT R	100p	50	1			
C403	ECU 1 010CC	CA ACIT R	1p	50	2			
C406	GM1C101 1 T	CA ACIT R	100p	50	2			
C407	ECU 1C104K	CA ACIT R	100n	16	3			
C408	GM1CR82C1 T	CA ACIT R	0 82p	50	2			
C500	GM1C120 1 T	CA ACIT R	12p	50	5			
C502	GM1C101 1 T	CA ACIT R	100p	50	7			
C503	ECU 1 221 C	CA ACIT R	220p	50	A1			
C504	ECU 1 221 C	CA ACIT R	220p	50	A1			
101	SMS2805L31	I E			5			
301	MA376T	I E			A2			
302	MA77T	I E			A2			
371	MA738T	I E			C7			
401	MA111T	I E			3			
E150	E 1556	IRECTI AL C U LER			5			
L101	E C 902MMT 4	SA ILTER			A4			
L102	E C 902MMT 4	SA ILTER			A4			

MODEL	E -G450	NAME	R	
Ref.	Part No.	Description	Grid	Remarks
L103	LSM00023	U L E ER	6	
L201	E C 947MM 6	SA ILTER	A6	
L202	E C 201M 1	SA ILTER	A5	
0002	A 00106	C ECT R 50 A	3	
0003	S70004A	SIM L ER	5	
0004	522050690	C ECT R 6 A	7	
001	A70024C	I C ECT R	A7	
L0001	E 1616	ALU SM 5 I	A3	
L100	EL RE4 7 2	I UCT R 4n7	A2	
L101	EL RE39 2	I UCT R 39n	A2	
L102	EL RE6 8 2	I UCT R 6n8	A2	
L103	EL RE6 8 2	I UCT R 6n8	A2	
L104	EL RE12 2	I UCT R 12n	A3	
L150	EL RE47 2	I UCT R 47n	A5	
L151	EL RE15 2	I UCT R 15n	5	
L155	EL RE3 3 2	I UCT R 3n3	A4	
L201	EL RE5 6 2	I UCT R 5n6	A7	
L202	EL RE5 6 2	I UCT R 5n6	A6	
L203	EL RE18 2	I UCT R 18n	A6	
L209	EL RE68 G 3	I UCT R 68n	A6	
L210	EL RE68 G 3	I UCT R 68n	A6	
L211	EL RE3 3 2	I UCT R 3n3	A4	
L213	LL2012 82	I UCT R 82n	A5	
L217	LK2125R15KT	I UCT R 150n	A6	
L218	LL2012 R12K	I UCT R 120n	A6	
L219	LL2012 R10	I UCT R 100n	A6	
L301	EL RE8 2 2	I UCT R 8n2	A4	

MODEL	E -G450	NAME	R	
Ref.	Part No.	Description	Grid	Remarks
L302	EL RE4 7 2	I UCT R 4n7	A2	
L303	EL RE5 6 2	I UCT R 5n6	A2	
L304	EL RE56 3	I UCT R 56n	A2	
L305	EL RE47 2	I UCT R 47n	A3	
L403	EL RE22 2	I UCT R 22n	A6	
150	UMC2TR	TRA SIST R	7	
301	2SC4617TLR	TRA SIST R	2	
304	2SC4226T1 01	TRA SIST R	A2	
305	TC144EETL	TRA SIST R	A2	
373	UMC5TR	TRA SIST R	2	
402	2S 1424T100R	TRA SIST R	C7	
403	C 67A	TRA SIST R	C7	
404	UMG2TR	TRA SIST R	7	
500	UMC2TR	TRA SIST R	A3	
R100	ER 3GE 100	RESIST R 10Ω	A4	
R103	ER 3GE 103	RESIST R 10kΩ	A1	
R104	ER 3GE 103	RESIST R 10kΩ	A1	
R105	ER 3GE 103	RESIST R 10kΩ	A1	
R106	ER 3GE 103	RESIST R 10kΩ	A1	
R107	ER 3GE 272	RESIST R 2k7Ω	A1	
R113	ER 3GE 272	RESIST R 2k7Ω	A1	
R115	ER 3GE 222	RESIST R 2k2Ω	C6	
R116	ER 3GE 151	RESIST R 150ΩΩ	C6	
R117	ER 3GE 0R00	RESIST R 0ΩΩ	A2	
R118	ER 3GE 0R00	RESIST R 0Ω	A2	
R119	ER 3GE 0R00	RESIST R 0Ω	A3	

MODEL	E -G450	NAME	R	
Ref.	Part No.	Description	Grid	Remarks
R120	ER 3GE 331	RESIST R 330Ω	A3	
R121	ER 3GE 222	RESIST R 2k2Ω	A3	
R122	ER 3GE 222	RESIST R 2k2Ω	A3	
R125	ER 3GE 560	RESIST R 56Ω	A3	
R126	ER 3GE 121	RESIST R 120Ω	A3	
R127	ER 3GE 0R00	RESIST R 0Ω	A3	
R128	ER 3GE 471	RESIST R 470Ω	A3	
R150	ER 3GE 120	RESIST R 12Ω	A4	
R151	ER 3GE 221	RESIST R 220Ω	4	
R152	ER 3GE 220	RESIST R 22Ω	A4	
R153	ER 3GE 221	RESIST R 220Ω	4	
R154	ER 3GE 221	RESIST R 220Ω	5	
R155	ER 3GE 122	RESIST R 1k2Ω	2	
R156	ER 3GE 392	RESIST R 3k9Ω	2	
R157	ER 3GE 562	RESIST R 5k6Ω	5	
R158	ER 3GE 392	RESIST R 3k9Ω	5	
R160	ER 3GE 332	RESIST R 3k3Ω	7	
R161	ER 3GE 153	RESIST R 15kΩ	7	
R163	ER 3GE 103	RESIST R 10kΩ	7	
R164	ER 3GE 103	RESIST R 10kΩ	7	
R165	ER 3GE 103	RESIST R 10kΩ	7	
R166	ER 3GE 183	RESIST R 18kΩ	7	
R167	ER 3GE 102	RESIST R 1kΩ	7	
R202	ER 3GE 121	RESIST R 120Ω	A6	
R203	ER 3GE 470	RESIST R 47Ω	A5	
R204	ER 3GE 102	RESIST R 1kΩ	A5	
R205	ER 3GE 102	RESIST R 1kΩ	A6	
R250	ER 3GE 152	RESIST R 1k5Ω	A5	

MODEL	E -G450	NAME	R	
Ref.	Part No.	Description	Grid	Remarks
R251	ER 3GE 683	RESIST R 68kΩ	A6	
R252	ER 3GE 683	RESIST R 68kΩ	A5	
R253	ER 3GE 242	RESIST R 2k4Ω	A5	
R254	ER 3GE 152	RESIST R 1k5Ω	A5	
R255	ER 3GE 242	RESIST R 2k4Ω	A5	
R256	ER 3GE 683	RESIST R 68kΩ	A5	
R257	ER 3GE 683	RESIST R 68kΩ	A5	
R258	ER 3GE 242	RESIST R 2k4Ω	A5	
R259	ER 3GE 152	RESIST R 1k5Ω	A5	
R260	ER 3GE 303	RESIST R 30kΩ	A5	
R261	ER 3GE 303	RESIST R 30kΩ	A5	
R262	ER 3GE 303	RESIST R 30kΩ	A5	
R263	ER 3GE 303	RESIST R 30kΩ	A6	
R264	ER 3GE 242	RESIST R 2k4Ω	A6	
R265	ER 3GE 152	RESIST R 1k5Ω	A6	
R301	ER 3GE 102	RESIST R 1kΩ	2	
R302	ER 3GE 152	RESIST R 1k5Ω	2	
R303	ER 3GE 153	RESIST R 15kΩ	2	
R304	ER 3GE 682	RESIST R 6k8Ω	2	
R305	ER 3GE 561	RESIST R 560Ω	2	
R308	ER 3GE 150	RESIST R 15Ω	A4	
R309	ER 3GE 821	RESIST R 820Ω	A4	
R310	ER 3GE 123	RESIST R 12kΩ	A4	
R311	ER 3GE 472	RESIST R 4k7Ω	A4	
R312	ER 3GE 150	RESIST R 15Ω	A4	
R313	ER 3GE 150	RESIST R 15Ω	A4	
R314	ER 3GE 150	RESIST R 15Ω	3	
R316	ER 3GE 103	RESIST R 10kΩ	A4	

MODEL	E -G450	NAME	R	
Ref.	Part No.	Description	Grid	Remarks
R317	ER 3GE 151	RESIST R 150Ω	A2	
R318	ER 3GE 822	RESIST R 8k2Ω	A2	
R319	ER 3GE 472	RESIST R 4k7Ω	A2	
R320	ER 3GE 392	RESIST R 3k9Ω	A2	
R321	ER 3GE 562	RESIST R 5k6Ω	A2	
R322	ER 3GE 392	RESIST R 3k9Ω	A2	
R323	ER 3GE 121	RESIST R 120Ω	A2	
R324	ER 3GE 101	RESIST R 100Ω	2	
R326	ER 3GE 0R00	RESIST R 0Ω	A2	
R327	ER 3GE 270	RESIST R 27Ω	A3	
R328	ER 3GE 181	RESIST R 180Ω	A3	
R329	ER 3GE 0R00	RESIST R 0Ω	3	
R330	ER 3GE 102	RESIST R 1kΩ	3	
R331	ER 3GE 102	RESIST R 1kΩ	A3	
R332	ER 3GE 102	RESIST R 1kΩ	3	
R333	ER 3GE 104	RESIST R 100kΩ	3	
R334	ER 3GE 104	RESIST R 100kΩ	3	
R335	ER 3GE 104	RESIST R 100kΩ	3	
R337	ER 3GE 0R00	RESIST R 0Ω	3	
R338	ER 3GE 393	RESIST R 39kΩ	A2	
R339	ER 3GE 392	RESIST R 3k9Ω	A2	
R370	ER 6GE 471	RESIST R 470Ω	C7	
R371	ER 3GE 471	RESIST R 470Ω	C7	
R407	ER 3GE 0R00	RESIST R 0Ω	A4	
R408	ER 3GE 330	RESIST R 33Ω	A4	
R413	ER 3GE 682	RESIST R 6k8Ω	A5	
R414	ER 3GE 682	RESIST R 6k8Ω	A5	
R415	ER 3GE 682	RESIST R 6k8Ω	A5	

MODEL	E -G450	NAME	R	
Ref.	Part No.	Description	Grid	Remarks
R416	ER 3GE 682	RESIST R 6k8Ω	A6	
R417	ER 3GE 684	RESIST R 680kΩ	A5	
R418	ER 3GE 684	RESIST R 680kΩ	A5	
R419	ER 3GE 684	RESIST R 680kΩ	A5	
R420	ER 3GE 684	RESIST R 680kΩ	A6	
R421	ER 3GE 0R00	RESIST R 0Ω	A2	
R422	ER 3GE 270	RESIST R 27Ω	7	
R423	ER 3GE 103	RESIST R 10kΩ	7	
R425	ER 3GE 104	RESIST R 100kΩ	C7	
R502	ER 3GE 0R00	RESIST R 0Ω	A4	
R503	ER 3GE 0R00	RESIST R 0Ω	3	
R 401	E 4 103	RESIST R 10kΩ	C7	
U103	M 2240	IC	A2	
U104	0145MT	A M ULE	4	
U105	MC33072	- AM S	7	
U106	U C2771TE3	TRA SIST R	A4	
U201	U G 0002	IC	A6	
U301	TK11236 MCL	REGULAT R 3 6	2	
U302	E 3222A	TC C	1	
U303	E 1 3S72	C	A4	
U304	UAL 0008	AM	A4	
U305	U I0005	IC	A3	
U306	UAL 0008	AM	A2	
U370	TK11236 MCL	REGULAT R 3 6	2	
U371	TK11236 MCL	REGULAT R 3 6	2	

10.3.3 Mechanical

MODEL	E -G450	NAME	Mechanical	
Ref.	Part No.	Description	Grid	Remarks
	9R4500K	RE UR KIT - LACK		
	9R4500M	RE UR KIT - METALLIC LUE		
A0101	AA70050A	LC M ULE		
E0151	A 70073A	I E A TE A		
M0101	G450C AS01K	C ER ASS - LACK		
M0101	G450C AS01M	C ER ASS - METALLIC LUE		
M0102	5 70086 A	LC A EL		
M0105	5 70115AA	KE S EET		
M0106	5 70018A	MIC US I G		
M0109	5S70074A	LC ACKLIG T		
M0110	5 70058	C ASSIS		
M0111	5K70070A	A TE A TU E		
M0112	4G70003A	A TE A L ER		
M0113	5M70149A	CASE		
M0115	1 70188A	A TE A TERM I AL		
M0123	G5M S002	ATE T LA EL		
M116	3 70027A	SCRE		
M117	3 70027A	SCRE		
M124	3 70027A	SCRE		
M125	3 70027A	SCRE		
MK0107	M70011A	MICR E ASS		
R	70057	C-A CA LE		

MODEL	E -G450	NAME	Mechanical	
Ref.	Part No.	Description	Grid	Remarks
M K001	6C72546A	UTER CART		
M K002	6 70571A	UL CUS I		
M K003	6 70572A	CAR AR CUS I		

10.4 Handsfree Replacement Parts List

10.4.1 Handsfree Unit

MODEL	E - 501 E - 450	NAME	an s ree Unit	
Ref	Part No.	Description	Grid	Remarks
C0101	ECA1 330	CA ACIT R 1 F 50		
C0102	EEU A1 121E	CA ACIT R 1 F 50		
C0103	ECA1C 121	CA ACIT R 120n 16		
C0104	ECA1C 121	CA ACIT R 120n 16		
C0105	ECEA0 KG330	CA ACIT R 1 F 6 3		
C0106	GM2 103K1 T	CA ACIT R 10n 50		
C0107	GM2 103K1 T	CA ACIT R 10n 50		
C0108	GM2 103K1 T	CA ACIT R 10n 50		
C0111	GM2 104 1 T	CA ACIT R 100n 50		
C0112	GM2 104 1 T	CA ACIT R 100n 50		
C0113	GM2 104 1 T	CA ACIT R 100n 50		
C0114	GM2 104K1ET	CA ACIT R 0 1 25		
C0115	GM2 104K1ET	CA ACIT R 0 1 25		
C0116	GM2 102K1 T	CA ACIT R 1n 50		
C0117	GM2 103K1 T	CA ACIT R 10n 50		
C0118	GM2 103K1 T	CA ACIT R 10n 50		
C0120	GM2 104 1 T	CA ACIT R 100n 50		
C0201	ECEA1EGE331	CA ACIT R 330 25		
C0202	GM1 103K1 T	CA ACIT R 10n 50		

MODEL	E - 501 E - 450	NAME	an s ree Unit	
Ref	Part No.	Description	Grid	Remarks
C0301	ECE 1CG100GR	CA ACIT R 10 16		
C0302	ECU 1 472K	CA ACIT R 0 47 50		
C0304	GM1 104K1CT	CA ACIT R 0 1 25		
C0305	ECE 1 G010GR	CA ACIT R 1 50		
C0306	GM1 222K1 T	CA ACIT R 2 2n 50		
C0307	GM1 821K1 T	CA ACIT R 820p 50		
C0308	ECE 1CG100GR	CA ACIT R 10 16		
C0309	ECE 1 G010GR	CA ACIT R 1 50		
C0310	GM1C101 1 T	CA ACIT R 100p 50		
C0311	GM1C101 1 T	CA ACIT R 100p 50		
C0312	GM1C101 1 T	CA ACIT R 100p 50		
C0313	GM1 103K1 T	CA ACIT R 0 01 50		
C0314	GM1 103K1 T	CA ACIT R 0 01 50		
C0315	GM1 332K1 T	CA ACIT R 3 3n 50		
C0316	GM1 332K1 T	CA ACIT R 3 3n 50		
C0317	ECE 1CG100GR	CA ACIT R 10 16		
C0318	GM1 104K1CT	CA ACIT R 0 1 25		
C0319	GM2 474K1CT	CA ACIT R 0 47 25		
C0325	GM1C101 1 T	CA ACIT R 100p 50		
C0326	GM1 104K1CT	CA ACIT R 0 1 25		
C0327	GM1 102K1 T	CA ACIT R 1n 50		
C0328	ECE 1 GR33GR	CA ACIT R 0 33 50		
C0329	GM1 104K1CT	CA ACIT R 0 1 25		
C0340	ECE 1CG100GR	CA ACIT R 10 16		
C0341	GM1 104K1CT	CA ACIT R 0 1 25		
C0342	ECE 1CG100GR	CA ACIT R 10 16		
C0343	GM1 104K1CT	CA ACIT R 0 1 25		
C0344	GM1 104K1CT	CA ACIT R 0 1 25		

MODEL	E - 501 E - 450	NAME	an s ree Unit	
Ref	Part No.	Description	Grid	Remarks
C0345	GM1 104K1CT	CA ACIT R 0 1 25		
C0346	GM1 104K1CT	CA ACIT R 0 1 25		
C0347	GM1 104K1CT	CA ACIT R 0 1 25		
C0348	ECE 1CG100GR	CA ACIT R 10 16		
C0349	GM1 102K1 T	CA ACIT R 1n 50		
C0351	GM1C100 1 T	CA ACIT R 10p 50		
C0352	GM1C100 1 T	CA ACIT R 10p 50		
C0353	ECE 1CG100GR	CA ACIT R 10 16		
C0355	GM1 104K1CT	CA ACIT R 0 1 25		
C0356	GM1 183K1CT	CA ACIT R 0 01 16		
C0357	ECE 1 G010GR	CA ACIT R 1 50		
C0358	ECE 0 G220GR	CA ACIT R 22 6 3		
C0359	GM2 104 1 T	CA ACIT R 100n 50		
C0360	ECEA1EGE221	CA ACIT R 220 25		
C0361	ECEA1EGE221	CA ACIT R 220 25		
C0362	GM1 104K1CT	CA ACIT R 0 1 25		
C0363	GM1C220 1 T	CA ACIT R 22p 50		
C0364	GM1C220 1 T	CA ACIT R 22p 50		
C0365	GM1C220 1 T	CA ACIT R 22p 50		
C0366	GM1C220 1 T	CA ACIT R 22p 50		
C0367	GM1C220 1 T	CA ACIT R 22p 50		
C0368	GM1C220 1 T	CA ACIT R 22p 50		
C0369	GM2 474K1CT	CA ACIT R 0 47 25		
C0371	GM1C220 1 T	CA ACIT R 22p 50		
C0372	GM2 474K1CT	CA ACIT R 0 47 25		
C0373	GM2 474K1CT	CA ACIT R 0 47 25		
C0374	GM1C101 1 T	CA ACIT R 100p 50		
C0375	GM1C101 1 T	CA ACIT R 100p 50		

MODEL	E - 501 E - 450	NAME	an s ree Unit	
Ref	Part No.	Description	Grid	Remarks
C0376	GM1C220 1 T	CA ACIT R 22p 50		
C0377	GM1C101 1 T	CA ACIT R 100p 50		
C0378	GM1 104K1CT	CA ACIT R 0 1 16		
C0379	GM1 104K1CT	CA ACIT R 0 1 16		
C0380	GM1C101 1 T	CA ACIT R 100p 50		
0103	S 64	I E		
0104	S 64	I E		
0107	MA7100ATR	I E		
0201	RM3L 014102	I E		
0202	MA8160MT	E ER I E		
0204	MA8120T	I E		
0205	MA8330T	I E		
0206	MA132ΩKT	I E		
0207	MA8330T	I E		
0300	MA8120T	I E		
0301	MA8120T	I E		
0303	MA8120T	I E		
0304	MA8120T	I E		
0305	MA8120T	I E		
0311	MA732T	I E		
0312	MA8120T	I E		
0101	U25	USE 2 5A		
L0101	L02R 1R62	CTAL US R		
0300	S 1080110	ILTER		

MODEL	E - 501 E - 450	NAME	an s ree Unit	
Ref	Part No.	Description	Grid	Remarks
L0101	RC 664470K	I UCT R 47 12M		
L0102	RCR110 221L	I UCT R 220 3 1M		
L0103	RC 664470K	I UCT R 47 12M		
LS0301	S45U0208	S EAKER		
0201	L 2016 T1 1	LUG 16 A 3A		
0202	A70028A	C ECT R		
0203	116 2 SA	C ECT R 6 A		
0300	A S00218	C ECT R		
0301	533980290	C ECT R		
0101	2S 1142RS	TRA SIST R		
0102	2S 1835ST	TRA SIST R		
0107	2S 601A ST	TRA SIST R		
0201	TC144EUT	TRA SIST R		
0202	TA144EUT	TRA SIST R		
0203	TC114EUT	TRA SIST R		
0204	2S 931 R	TRA SIST R		
0205	2S 1755 T	TRA SIST R		
0305	TA144EUT	TRA SIST R		
0306	2S 602AT	TRA SIST R		
0307	TA144EUT	TRA SIST R		
0308	TC144EUT	TRA SIST R		
0309	2S 874A ST	TRA SIST R		
R0101	ER 1SGR68U	RESIST R 0 68Ω		
R0102	E M7LS 00 53	RESIST R 5kΩ		
R0103	ER 3GE 334	RESIST R 330kΩ		

MODEL	E - 501 E - 450	NAME	an s ree Unit	
Ref	Part No.	Description	Grid	Remarks
R0111	ER 3GE 102	RESIST R 1kΩ		
R0112	ER 3GE 102	RESIST R 1kΩ		
R0113	ER 6GE 390	RESIST R 30Ω		
R0114	ER 6GE 390	RESIST R 30Ω		
R0115	ER 6GE 390	RESIST R 30Ω		
R0116	ER 3GE 473	RESIST R 47kΩ		
R0117	ER 3GE 102	RESIST R 1kΩ		
R0118	ER 3GE 223	RESIST R 22kΩ		
R0119	RR1220 103	RESIST R 10kΩ		
R0120	RR1220 103	RESIST R 10kΩ		
R0121	RR1220 123	RESIST R 12kΩ		
R0122	RR1220 103	RESIST R 10kΩ		
R0123	RR1220 103	RESIST R 10kΩ		
R0124	ER 3GE 472	RESIST R 4 7kΩ		
R0125	ER 3GE 334	RESIST R 330kΩ		
R0127	RR1220 243	RESIST R 24kΩ		
R0128	RR1220 242	RESIST R 2k4Ω		
R0130	RR1220 103	RESIST R 10kΩ		
R0131	RR1220 183	RESIST R 18kΩ		
R0132	RR1220 122	RESIST R 10kΩ		
R0133	RR1220 683	RESIST R 68kΩ		
R0134	RR1220 153	RESIST R 15kΩ		
R0135	RR1220 153	RESIST R 15kΩ		
R0144	E M7LS 00 14	RESIST R 10KΩ		
R0201	ER 3GE 104	RESIST R 100kΩ		
R0202	ER 3GE 103	RESIST R 10kΩ		
R0203	ER 3GE 221	RESIST R 220Ω		

MODEL	E - 501 E - 450	NAME	an s ree Unit	
Ref	Part No.	Description	Grid	Remarks
R0204	ER 3GE 471	RESIST R 470Ω		
R0205	ER 12 102	RESIST R 1kΩ		
R0206	ER 12 102	RESIST R 1kΩ		
R0207	ER 3GE 103	RESIST R 10kΩ		
R0208	ER 3GE 222	RESIST R 2 2kΩ		
R0301	ER 3GE 392	RESIST R 3 9kΩ		
R0302	ER 3GE 681	RESIST R 680Ω		
R0303	ER 3GE 104	RESIST R 100kΩ		
R0304	ER 3GE 223	RESIST R 22kΩ		
R0305	ER 3GE 472	RESIST R 4 7kΩ		
R0306	ER 3GE 472	RESIST R 4 7kΩ		
R0307	ER 3GE 472	RESIST R 4 7kΩ		
R0308	ER 3GE 103	RESIST R 10kΩ		
R0309	ER 3GE 104	RESIST R 100kΩ		
R0310	ER 3GE 104	RESIST R 100kΩ		
R0311	ER 3GE 103	RESIST R 10kΩ		
R0312	ER 3GE 471	RESIST R 470Ω		
R0313	ER 3GE 101	RESIST R 100Ω		
R0315	ER 3GE 104	RESIST R 100kΩ		
R0316	ER 3GE 104	RESIST R 100kΩ		
R0317	ER 3GE 101	RESIST R 100Ω		
R0318	ER 3GE 101	RESIST R 100Ω		
R0319	ER 3GE 103	RESIST R 10kΩ		
R0320	ER 3GE 103	RESIST R 10kΩ		
R0321	ER 3GE 103	RESIST R 10kΩ		
R0322	ER 3GE 103	RESIST R 10kΩ		
R0323	ER 3GE 102	RESIST R 1kΩ		

MODEL	E - 501 E - 450	NAME	an s ree Unit	
Ref	Part No.	Description	Grid	Remarks
R0324	E U 2A 15 54	RESIST R 50kΩ		
R0325	ER 3GE 682	RESIST R 6 8kΩ		
R0328	ER 3GE 101	RESIST R 100Ω		
R0330	ER 3GE 824	RESIST R 820kΩ		
R0331	ER 3GE 153	RESIST R 15kΩ		
R0332	ER 3GE 563	RESIST R 56kΩ		
R0333	ER 3GE 104	RESIST R 100kΩ		
R0334	ER 3GE 104	RESIST R 100kΩ		
R0335	ER 3GE 222	RESIST R 2 2kΩ		
R0336	ER 3GE 563	RESIST R 56kΩ		
R0337	ER 3GE 683	RESIST R 68kΩ		
R0338	ER 3GE 333	RESIST R 33kΩ		
R0339	ER 3GE 222	RESIST R 2 2kΩ		
R0340	ER 3GE 103	RESIST R 10kΩ		
R0341	ER 3GE 103	RESIST R 10kΩ		
R0345	ER 3GE 0R00	RESIST R 0Ω		
R0346	ER 3GE 0R00	RESIST R 0Ω		
R0348	ER 3GE 473	RESIST R 47kΩ		
R0349	ER 3GE 472	RESIST R 4 7kΩ		
R0351	ER 3GE 105	RESIST R 1MΩ		
R0352	ER 3GE 104	RESIST R 100kΩ		
R0353	ER 3GE 682	RESIST R 6 8kΩ		
R0354	ER 3GE 104	RESIST R 100kΩ		
R0355	ER 3GE 104	RESIST R 100kΩ		
R0356	ER 3GE 0R00	RESIST R 0Ω		
R0357	ER 3GE 104	RESIST R 100kΩ		
R0358	ER 3GE 223	RESIST R 22kΩ		

MODEL	E - 501 E - 450	NAME	an s ree Unit	
Ref	Part No.	Description	Grid	Remarks
R0359	ER 3GE 682	RESIST R 6 8kΩ		
R0360	ER 6GE 100	RESIST R 10Ω		
R0361	ER 6GE 471	RESIST R 470Ω		
R0362	ER 6GE 2R2	RESIST R 2 2Ω		
R0363	ER 3GE 473	RESIST R 47kΩ		
R0364	ER 3GE 223	RESIST R 22kΩ		
R0365	ER 3GE 103	RESIST R 10kΩ		
R0366	ER 3GE 103	RESIST R 10kΩ		
R0367	ER 3GE 472	RESIST R 4 7kΩ		
R0369	ER 3GE 102	RESIST R 1kΩ		
R0373	ER 3GE 473	RESIST R 47kΩ		
R0374	ER 3GE 473	RESIST R 47kΩ		
R0375	ER 3GE 473	RESIST R 47kΩ		
R0376	ER 3GE 473	RESIST R 47kΩ		
R0377	ER 3GE 562	RESIST R 5 6kΩ		
R0378	ER 3GE 103	RESIST R 10kΩ		
R0379	ER 3GE 103	RESIST R 10kΩ		
U0101	U C494GSE2	IC		
U0102	M3404AMT1	IC		
U0301	M3404AMT1	IC		
U0302	UR 0002	REGULAT R		
U0303	UR 0002	REGULAT R		
U0304	ULCS0003	IC		
U0305	ULCS0003	IC		
U0306	ULCS0004	IC		
U0308	T A2003	IC		
U0309	M2072MTE1	IC		

MODEL	E - 501 E - 450	NAME	an s ree Unit	
Ref	Part No.	Description	Grid	Remarks
U0310	U 74 C123G	IC		
U0311	M2107 TE1	IC		
U0312	SC14S66 EL	A AL GUE S ITC		
U0313	SC14S66 EL	A AL GUE S ITC		
U0314	R 5 L45AATL	REGULAT R		
U0315	M2107 TE1	IC		
0001	70005A	ER SU L CA LE		
0201	C70109A	CURL C R		
0202	C70110A	I TERC ECTI G CA LE		
0301	C70152A	\$ EAKER CA LE		
0302	G70003A	E TER AL MIC CA LE		
0301	CM30918M	CR STAL		

10.4.2 Mechanical

MODEL	E - 501 E - 450	NAME	Mechanical	
Ref.	Part No.	Description	Grid	Remarks
M0401	5 70086A	A S REE C ER		
M0402	6 10031A	S EAKER ET		
M0403	4R8209	S EAKER ACKI G		
M0404	1 70071A	S EAKER RACKET		
M0405	T 256G	SCRE		
M0406	T 256G	SCRE		
M0410	5M70076A	A S REE CASE		
M0411	1 C5819A	LATE		
M0412	7 70119A	A S REE AME LATE		

MODEL	E - 501 E - 450	NAME	Mechanical	
Ref.	Part No.	Description	Grid	Remarks
M0413	S 35	SCRE		
M0420	1C70128A	S IEL CASE 1		
M0421	1C70129A	S IEL CASE 2		
M0422	1E70008A	RA IAT R		
M0423	5G10500A	I SULAT R		
M0424	1M270900102	CLAM		
M0425	5 5129A	LUME K		
M0426	3 6	SCRE		
M0427	T 2510G	SCRE		
M0428	T 2510G	SCRE		
M0429	T 256G	SCRE		
M0440	3 30	SCRE		
M0441	5U70008	T C ER		

10.4.3 Holder

MODEL	E -KA500	NAME	ol er	
Ref.	Part No.	Description	Grid	Remarks
M0501	5M70115A	L ER CASE		
M0502	M6 6 12	MAG ET		
M0503	4 70016A	K S RI G		
M0504	5 70066A	K		
M0505	T 256G	SCRE		
M0506	T 256G	SCRE		
M0507	T 256G	SCRE		
M0508	5U70049	L ER CUS I 1		
M0509	7 70164A	L ER AME LATE		
M0510	7 70120A	L ER CAUTI LA EL		

10.4.4 Microphone

MODEL	E M1177	NAME	Microphone	
Ref.	Part No.	Description	Grid	Remarks
M0101	4G31674	MIC L ER		
M0102	4G32105	MIC L ER		
M0103	4R13358	MIC CUS I		
M0104	7C10096A	MIC AME LATE		
M0105	7C10096A	MIC AME LATE		
M0107	T 2510A	SCRE		
MK0101	M4108	MICR E		

10.4.5 Adjustable Angle Bracket 1

MODEL	E 0001	NAME	A adjustable Angle racket	
Ref.	Part No.	Description	Grid	Remarks
M0701	3G24152	RACKET		
M0702	G4 8	SCRE		
M0703	A4 K	S RI G AS ER		
M0704	G4 K	AS ER		
M0705	G4 8	SCRE		
M0706	A4 K	S RI G AS ER		
M0707	G4 K	AS ER		
M0708	3G24157	RACKET		
M0709	S 410 K	SCRE		
M0710	S 410 K	SCRE		
M0711	S 410 K	SCRE		
M0712	S 410 K	SCRE		
M0713	T 425R K	SCRE		
M0714	T 425R K	SCRE		
M0715	T 425R K	SCRE		

MODEL	E 0001	NAME	A adjustable Angle racket	
Ref.	Part No.	Description	Grid	Remarks
M0716	T 425R K	SCRE		

10.4.6 Adjustable Angle Bracket 2

MODEL	E 0002	NAME	A adjustable Angle racket	
Ref.	Part No.	Description	Grid	Remarks
M0701	3G24152	RACKET		
M0702	G4 8	SCRE		
M0703	A4 K	S RI G AS ER		
M0704	G4 K	AS ER		
M0705	G4 8	SCRE		
M0706	A4 K	S RI G AS ER		
M0707	G4 K	AS ER		
M0708	3G24157	RACKET		
M0709	S 410 K	SCRE		
M0710	S 410 K	SCRE		
M0711	S 410 K	SCRE		
M0712	S 410 K	SCRE		
M0713	T 425R K	SCRE		
M0714	T 425R K	SCRE		
M0715	T 425R K	SCRE		
M0716	T 425R K	SCRE		
M0718	G4A K	UT		
M0719	G4A K	UT		
M0720	G4A K	UT		
M0721	G4A K	UT		

10.5 Printed Material

part numbers or identification are shown on page 2-7 2 General Information
2.11 Identification

10.6 Dual Charger

The Dual Charger is not a serviceable item

10.7 DC Adaptor

The DC Adaptor is not a serviceable item

10.8 PC Card

MODEL	E - A500	NAME	C Car	
Ref.	Part No.	Description	Grid	Remarks
		INTERACE CAR		