MITSUBISHI ELECTRIC

LEVEL 2 SERVICE

Trium

FA9M0475

COSMO (DUAL BAND)

REVISIONS	VERSIONS					
		A : Création D.JUET	04/00	Rédigé par *Written by*	Verifié par *Checked by*	Approuvé par *Approuved by*
		B : Ajout Assy-Desassy 3c	08/00			
		C : Passage à IPL2000	10/00	X. GLASSON	BT LEGORGEU	G. LEBASTARD

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Version C
Date: 10/00

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1. GENERAL DESCRIPTION

Cosmo is designed for use with E-GSM/DCS network. This phone operates and complies with the ETSI GSM Phase 2 specifications.

Standard kit includes following items :

- Tranceiver (retractable antenna type)
- Battery pack (3.8 V 540 mA Li-Ion)
  Reference : FZA-0052A
- AC/DC adapter for battery rapid charging (6.5 V 400 mA)
  Reference : 2PS304/00

Dimensions
103mm x 51mm x 16mm
(including battery)
Weight
69g
Talktime (with DTX)
Up to *3 hours
Stand-by time
Up to *80 hours
Large graphic screen
Infra red computer connection
Colours
Gold velvet and bronze velvet

Speech codec :

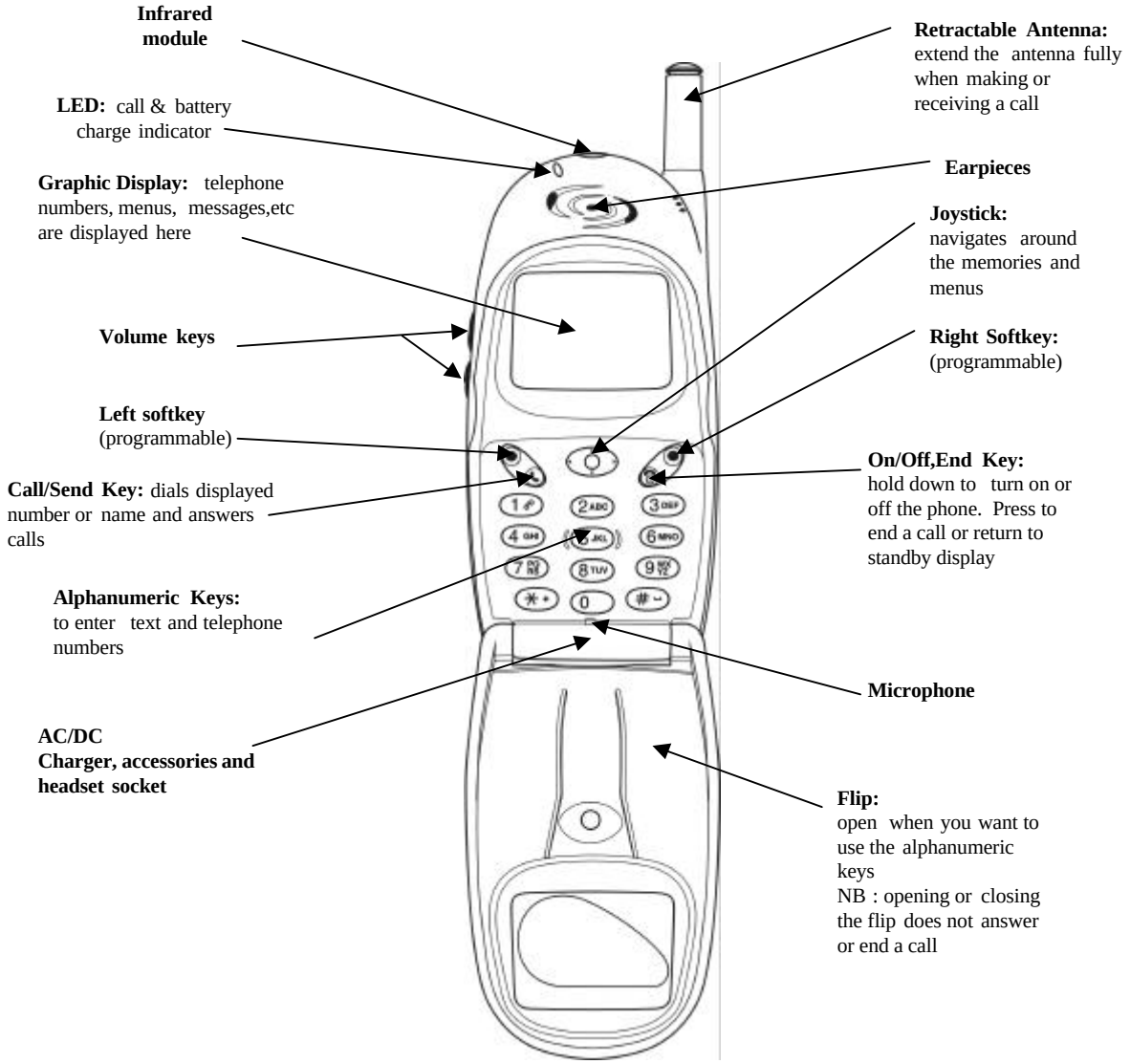
COSMO uses a speech codec which is able to switch from half rate (HR) to full rate (FR) or to enhanced full rate (EFR) according to network and the software & settings version.

Enhanced full rate (EFR) allows better voice quality at same rate as full rate.

Half rate (HR) is coding on 5.6 kbits/s (1/2 full rate) the network may put two customers on one time slot. each customer will use this timeslot every two frames.

2. MAIN FEATURES OF TRANSCEIVER

2.a Description of transceiver



For M4 family, to make test is not possible directly from mobile. This is possible only using a PC and the relevant software .

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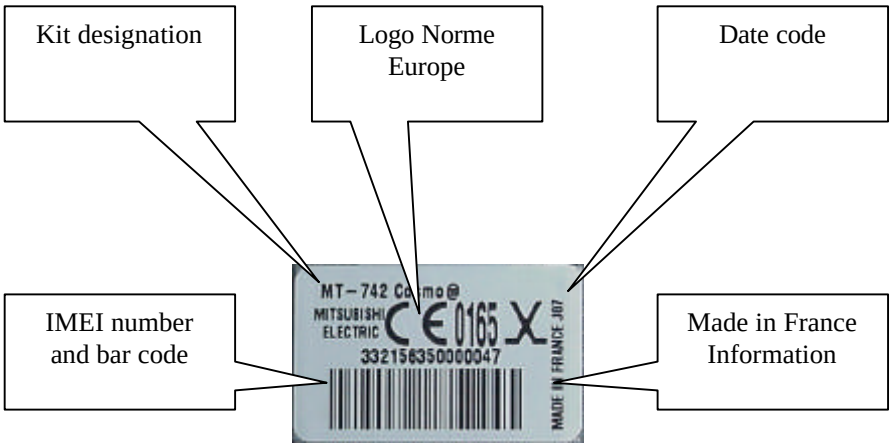
2.b IMEI label

IMEI label stands for International Mobile Equipment Identity. The IMEI label is stuck on the rear case of the terminal. It is held in the logic circuit of the main board itself. If the main board is changed then IMEI will change.



Date Code is made of 3 digits and indicates the date of shipment from factory.
For example, in J07, J stands for 2000 and 07 for July (12 for december).

Bar code indicates 15 digits 123456 45 456789 4 (for example) of the IMEI written in plain letters above the bar code:

- 123456 : The 6 first digits indicate the Type Approval Code (different according to type of mobile).
- 45 : These 2 digits are allocated to production site.
- 456789 : The 6 last digits are a sequential number (different for each mobile).
- 4 : Check digit.

2.c ART Label

The Label Art Plate identifies the type of assembly , board version of the mobile
.

XXXXXXXXXX : 10 characters for the article code of the terminal.
A : 1 character for the assembly version of M/U.
C : 1 character for the board version.
WW : 2 characters related to production site.

2.d SIM Latching

SIM Lock consists in restricting the use of the terminal to a family of SIM cards. For the SIM Lock, three sets of information are used. This information is read from data fields in the SIM card.

1°) IMSI (International Mobile Subscriber Identity), 15 Digits :

Example of IMSI : 208 01 55 12312312
208 = MCC = Mobile Country Code (ex : 208 for France)
01 = MNC = Network Country Code (ex : 01 for FT)
55 = NS = Network Subset
12312312 = serial number

2°) Group IDentifier 1 (GID1):

This data field can contain digits or letters which identify a family of SIM
Ex : XX for a type for of prepaid SIM card of Service provider Y

3°) Group IDentifier 2 (GID2) :

Same as GID1 to identify a sub family of SIM.

Then, from this information, we have 5 types of latch :

1°) Network Level :

Latch on MCC MNC of IMSI of the SIM only
(ex : only the cards 208 01 are able to operate the mobile.
Mitsubishi calls this latch NCK (NCK stands for " Network Control Keys" and is the password to lock the mobile at the network level)

2°) Network Subset Level :

Latch on MCC, MNC and digit 6 and 7 of the IMSI
Ex : latch on 208 01 55, only the SIM cards with an IMSI starting with 208 01 55 will operate the mobile.
Mitsubishi calls this latch NSCK ("Network Subset Control Key")

3°) Service provider level :

Latch on Network (value of MCC MNC) and value of GID1 data field.
Ex : latch on the value "XX" in GID1 and MCC MNC=208 01, only the SIM cards of service provider Y with XX stored in data field GID1 will operate the mobile.
Mitsubishi calls this latch SPCK (Service Provider Control Key)

4°) Corporate Provider Level :

Latch on network (value of MCC and MNC) and a value stored in GID2
Mitsubishi calls this latch CPCK (Corporate Provider Control Key)

5°) IMSI level:

Latch on the complete IMSI of one SIM card.
Only one SIM card corresponding to the correct IMSI operates the mobile. Usually, this latch is done automatic (the first SIM card inserted in the mobile is the only SIM which can be used by this mobile).

General information :

To lock /unlock a mobile, you need an 8 digit password for each level concerned, and each mobile (one set of passwords for one IMEI). These passwords are calculated with a special algorithm. You have only 10 attempts to unlock a mobile. After 10 unsuccessful attempt, the mobile is permanently blocked. To enter the unlock procedure, you need to access special menus with specific access codes.

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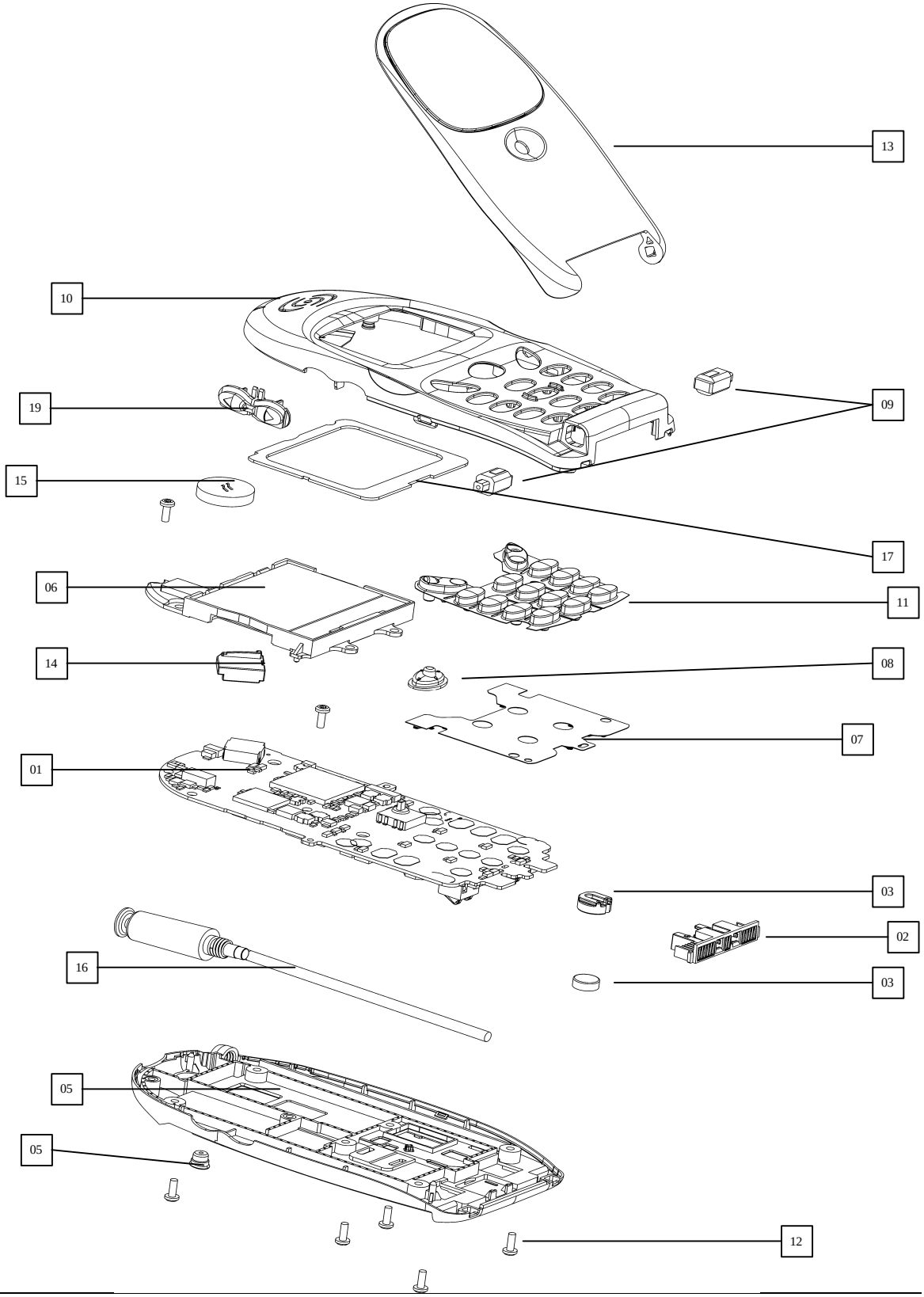
3. EXPLODED DIAGRAM AND SPARE PART LIST

3.a Exploded Diagram of COSMO



3.b Spare part list of COSMO

Position	Designation	Reference
01	PCA BOARD	FZ12120230
02	I/O CONNECTOR	FK6T000610
03	MICROPHONE GROMMET	FK1R000313
04	MICRO 3V	FK8L014211
05	REAR – SUB – ASSY CHAMPAGNE	FK1N001911
05	REAR – SUB – ASSY BRONZE	FK1N002021
05	REAR – SUB – ASSY SILVER	FS13094530
06	LCD MODULE ASSY	FK8L014113
07	METAL DOME M4 CO	FK1Y000112
08	NAVIGATOR BUTTON	FK1K000211
09	HINGES	Included into Cover
10	FRONT – SUB – ASSY CHAMPAGNE	FK1N001511
10	FRONT – SUB – ASSY BRONZE	FK1N001621
10	FRONT – SUB – ASSY SILVER	FS13094630
11	KEYPAD	FK1K000111
12	SCREWS	FK1B000210
13	FLIP CHAMPAGNE	FK8L013911
13	FLIP BRONZE	FK8L014011
13	FLIP SILVER	FS13094430
14	CUSHION BUZZER	FS2D013112
15	SPEAKER	FK1R000712
16	ANTENNA	FK8L014311
17	CUSHION L.C.D.	Included into Cover
18	CAP RF	FK1R000213
19	KEY VOL	

Connectors of COSMO

Position	Designation	Reference
J103	CONNECTOR I/O M4 CO	FK6T000610
J101 & J102	BATTERY CONNECTOR	FK6T000411
J201	GLOBAL L.C.D.CONNECTOR	Included in LCD
J301	SIM CONNECTOR	FK6T000910
J302	EARPIECE CONNECTOR	Included in Earpiece
J400	RF CONNECTOR	FK6T000510

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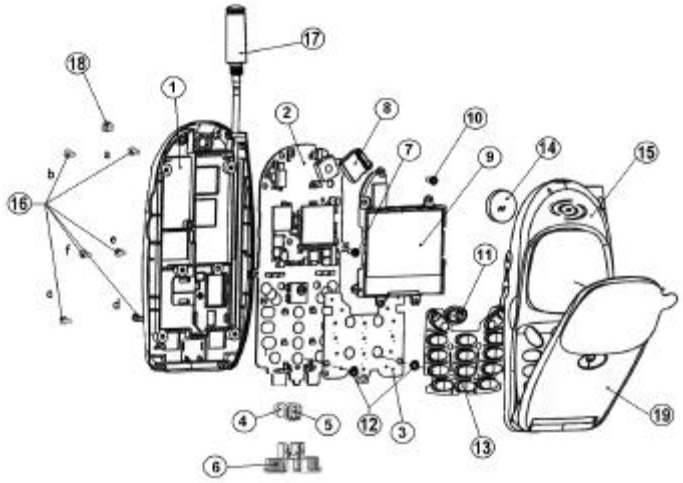
3.c Assembly and desassembly instruction

Desassembly :

Step	Planning Work	Article	Qty
1	Remove the flip	Part 19	1
2	Remove the RF cap	Part 18	1
3	Unscrew and remove the antenna	Part 17	1
4	Unscrew the mobile (from a to f)	Parts 16	6
5	Open the mobile by pressing on the cover side near the ON/OFF key	Parts 1 & 15	1
6	Remove the keypad and the receiver from the cover	Parts 13 & 14	1
7	Unscrew and remove the LCD module	Parts 9 & 10	1
8	Unscrew and remove the PCA	Parts 2 & 7	1
9	Remove the navigator button and the cushion buzzer from the PCA	Parts 8 & 11	
10	Remove the I/O connector from the PCA	Part 6	1
11	Remove the Mic Assy from the I/O connector	Part 5	1
12	Remove the Mic from the Holder Mic	Part 4	1
13	Unstick the 2 bottom spacers using a twiser	Part 12	1
14	Unstick the metaldome from the PCA using a twiser	Part 3	1



Assembly :

Step	Planning Work	Article	Qty
1	Stick the metaldome on the PCA	Parts 2 & 3	1
2	Insert the navigator button	Part 11	1
3	Insert the mic into the holder mic	Parts 4 & 5	1
4	Insert the mic assy into the I/O connector	Part 6	1
5	Insert the I/O connector on the PCA	Part 6	1
6	Insert the cushion buzzer on the buzzer on the the PCA	Part 8	1
7	Place the PCA into the case and screw (1.4 N.m)	Parts 1 & 7	1
8	Place LCD module on the PCA ans screw (1.4 N.m)	Parts 9 & 10	1
9	Stick the 2 bottoms spacers on the PCA	Parts 12	2
10	Insert the receiver into the cover	Part 14	1
11	Insert the keypad into the cover	Part 13	1
12	Blow on the LCD, then assemble the case assy on the cover assy by rock softy (key vol side to antenna side)		
13	Screw the 6 screws (order : a to f at 1.4 N.m)	Parts 16	6
14	Insert and screw the antenna	Part 17	1
15	Insert the RF cap	Part 18	1
16	Insert the flip	Part 19	1

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4. TEST AND MEASUREMENTS

4.a E-GSM / DCS measurements

4.a.1 Transmitter Power and Ramp profile

These two are interrelated, since the power ramp shape and its final peak value stored in Serial FLASH as adjustment values.

The peak power output must lie within 3 dB of specification and be flat to within 0.5 dB over the active period. The ramp profile is designed to give minimum harmonics, and hence it is important to ensure its adherence.

Power ramp profile must be checked on all frequencies (in practice channels 975, 37 and 124 for the 900 MHz band and channels 512, 698 and 885 for the 1800 MHz band). In conclusion, the ramp must fit with the mask at all frequencies and all power levels. The mask is usually stored in the radiocommunication tester. The test will also be available to cover the frequency and power range automatically.

4.a.2 Phase / Frequency / Time relationship

This is a test for the quality of the modulation including the IQ balance and the Gaussian filters. The phase of the carrier changes according to the arrival of 1s and 0s. Phase error mustbe less than 20° peak and 5° RMS.

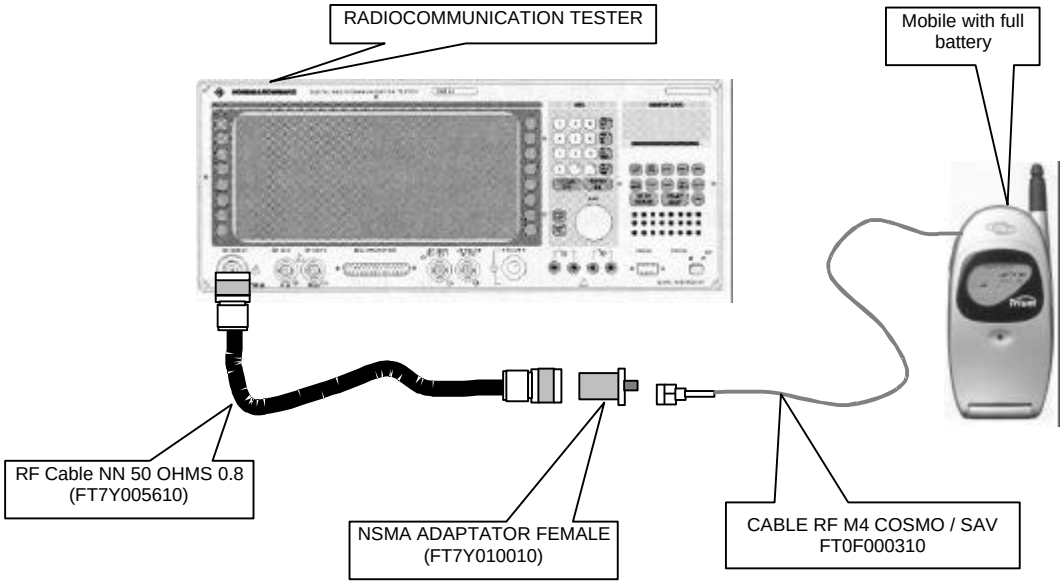
4.a.3 Receiver Bit Error Rate (RX sensitivity)

The specification is a Bit Error Rate (BER) of better than 2.44% for an input signal : -102 dBm for the E-GSM 900 band, and –100 dBm for the DCS 1800 band. There should be no error for -90 dBm to -20 dBm input signal. The maximum workable error rate is 13%.
It is important that BER and RX sensitivity are good since measures of RXLEV (from -103 to -41 dBm) and RXQUAL (from 0 to 7) are reported back to the base station on the SACCH to assist in handovers and power level control. Errors in reporting will lead to sub optimum use of channel space, or interference to others.

4.a.4 Handover between E-GSM 900 & DCS 1800 standards

The M4 dual band may handover from the E-GSM 900 band to the DCS 1800 band automatically. If the subscribed network (defined in setting) has frequencies in both bands, the M4 dual band will work either in 900 MHz or 1800 MHz band depending on the availability of frequencies.

4.b Operating instructions



1. Insert Test SIM in the mobile
2. Connect a charged battery
3. Make a call with a RADIOCOMMUNICATION TESTER and check the following parameters, or use the autotest (CMD55 or CMD55 under MTS or Wavetek 4107)

Power levels : check the transmitted power (dBm)

E-GSM 900 PCL	Power Level (dBm)	tolerance
5	33	+/-2dB
6	31	+/-3dB
7	29	+/-3dB
8	27	+/-3dB
9	25	+/-3dB
10	23	+/-3dB
11	21	+/-3dB
12	19	+/-3dB
13	17	+/-3dB
14	15	+/-3dB
15	13	+/-3dB
16	11	+/-5dB
17	9	+/-5dB
18	7	+/-5dB
19	5	+/-5dB

DCS 1800 PCL	Power level (dBm)	tolerance
0	30	+/-2dB
1	28	+/-3dB
2	26	+/-3dB
3	24	+/-3dB
4	22	+/-3dB
5	20	+/-3dB
6	18	+/-3dB
7	16	+/-3dB
8	14	+/-3dB
9	12	+/-4dB
10	10	+/-4dB
11	8	+/-4dB
12	6	+/-4dB
13	4	+/-4dB
14	2.5	+/-5dB
15	1	+/-5dB

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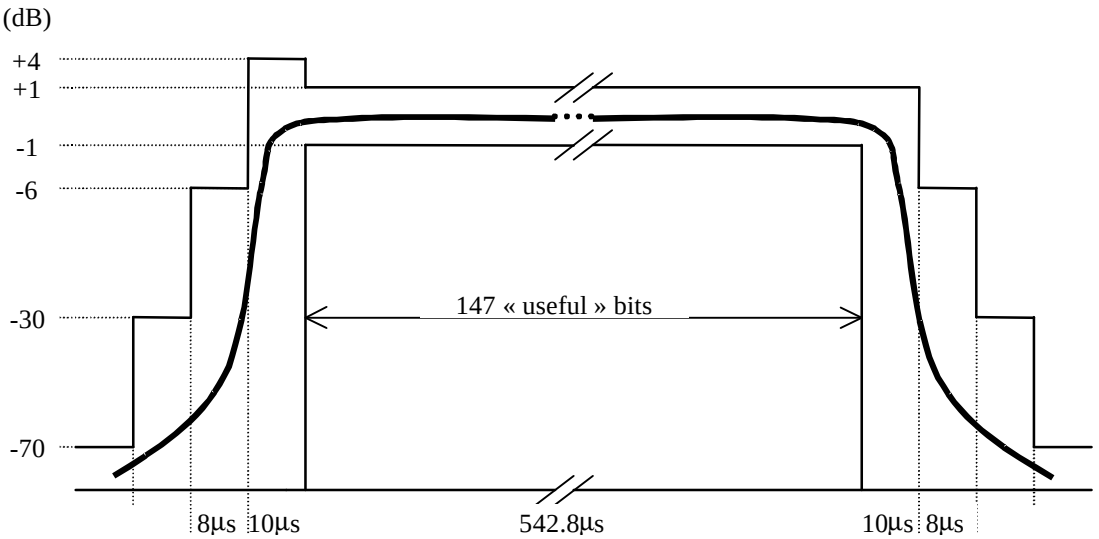
Power ramping: Check that the burst fits the mask below



RX levels : Check the values for differents signal strength

RX LEVEL	RSSI (dBm)
0	Less than -110 dBm
1	-110 to -109
2	-109 to -108
⋮	⋮
27	-84 to -83
⋮	⋮
50	-61 to -60
⋮	⋮
62	-49 to -48
63	Better than -48

Bit error : Check the value for different type

Check the Reception Bit Error Rates (RBER) and Frame Error Rates on channels 1, 62 and 124 at –102 dBm for GSM band and on channels 512, 698 and 885 for the DCS band according the following specifications :

Bit error type	Value
RBER Class Ib	< 0.41 %
RBER Class II	< 2.44 %
FER	< 0.12%

4.c Buzzer and Speaker tests

Insert a test SIM in mobile set with battery.

The volume levels of the ring tone, key tones and incoming audio can be individually adjusted in the setting menu.

- Press Menu by pressing choose Settings and validate by pressing joystick on right direction for Select
- Choose Tones by pressing on down direction and validate by pressing on right for Select
- Choose Volume by pressing on down direction and validate by pressing on right for Select
- Adjust Ring and Conversation to check buzzer and speaker

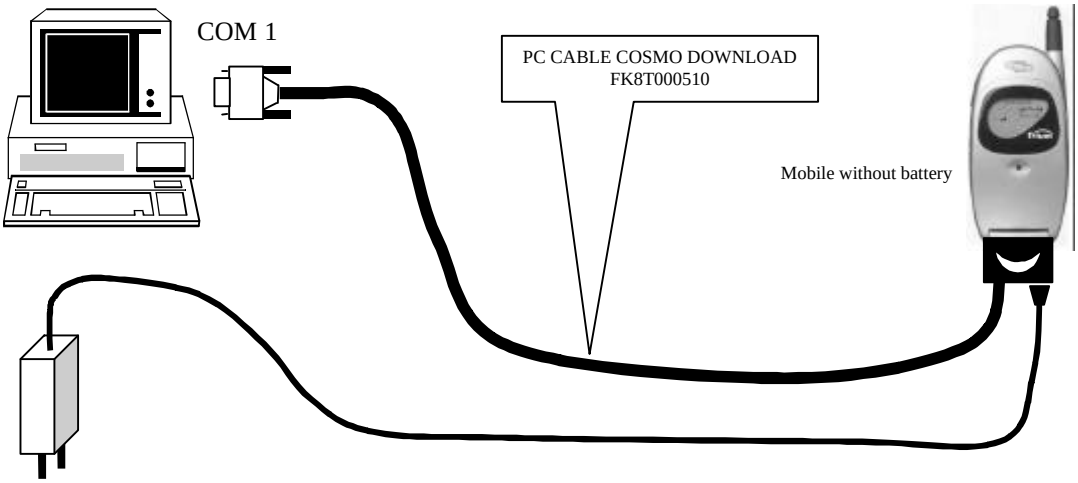
5. Service SOFTWARES

The software in the mobile consists of two files downloaded independantly.
The main part of this software is downloaded using IPL2000.
The settings file (ringing, customization…) is downloaded with MS Tools. MS tools also allows entry to test mode in order to reset user data (security code) , to print labels (imei & factory name plate), to reset the permanently blocked indicator providing you have the access rights.

5.a Software download with IPL2000

5.a.1 How to install IPL2000 software and equipment

Equipment description :



IPL2000 is available on Windows 95, 98, NT4 OS and to install it, you need theses files :

(The files can be provided under one ZIP file)

Set up procedure :

1 Launch **Setup.exe**
2 Click on Next
3 Click on Next
4 Click on Next
5 Close the **Mitsubishi Electric France** window
6 Click on Finish

IPLTrium (IPL2000) is now installed in your computer and availlable in your Start Menu

You are now ready to download the software.file.

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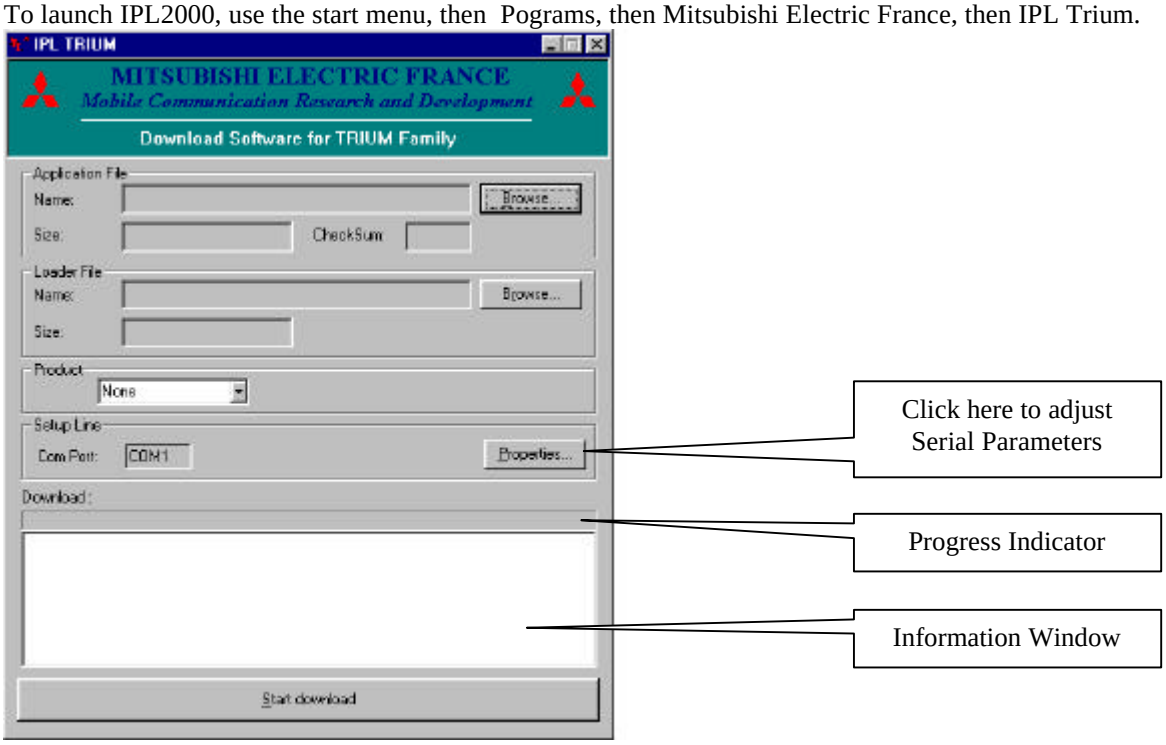
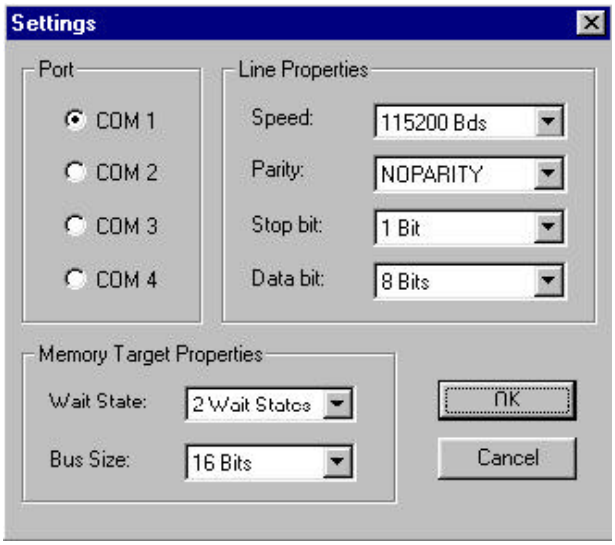
5.a.2 Software description

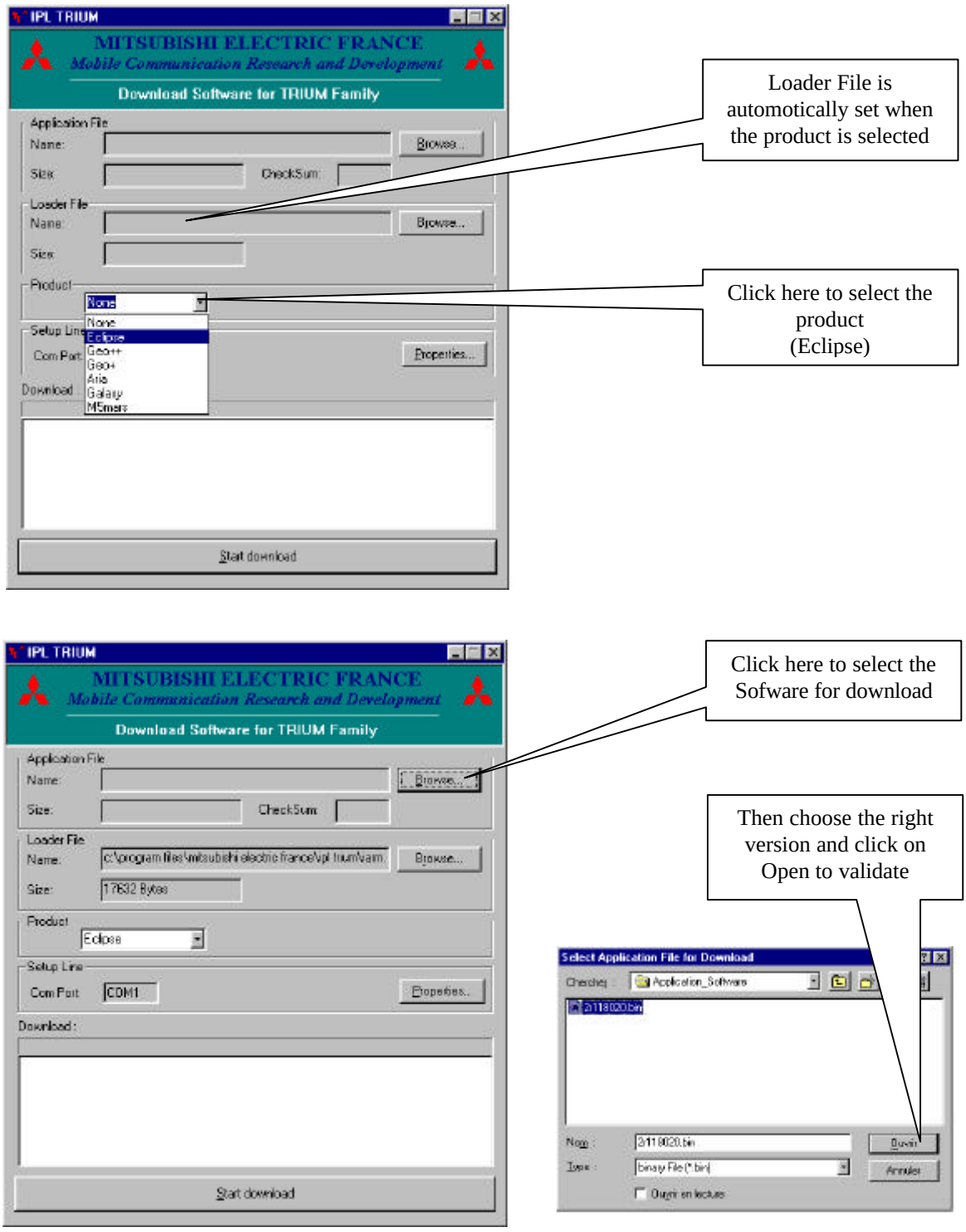
To launch IPL2000, use the start menu, then Pograms, then Mitsubishi Electric France, then IPL Trium.





Adjust the serial parameters as folowing

5.a.3 Start download



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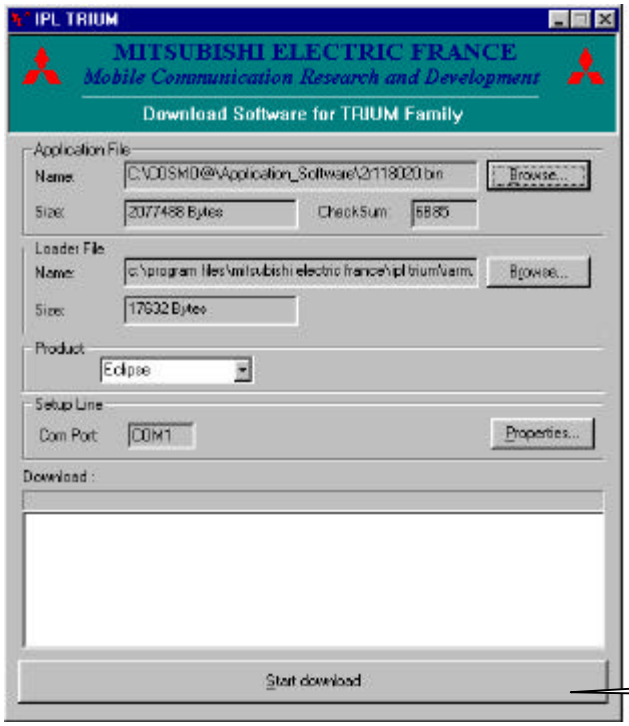
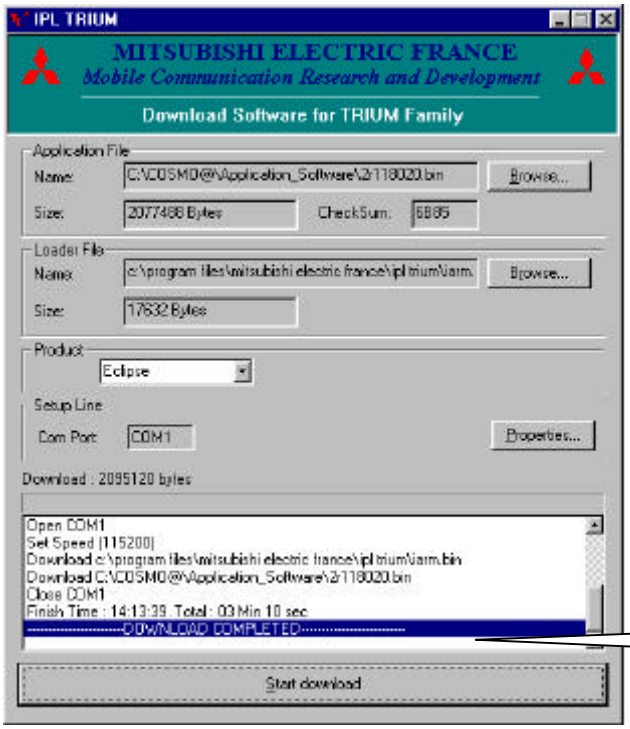


Click here to
Start download

Then you see the green top led is blinking, the download is in progress.

5.a.4 End of Download



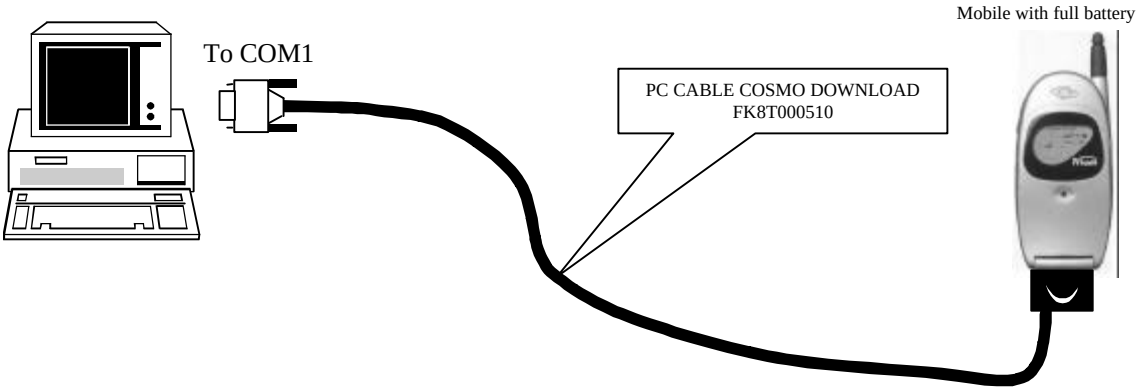
Download completed is
displayed in the
information window

To check that download is succesfully completed, look at the top led of COSMO, The green led must be ON.
If the red top led is blinking your download is failled.

5.b Settings download with MS Tools

5.b.1 How to install MS Tools software and equipment

Equipment description :



MS Tools 7.00 is available on Windows 95, 98, NT4 OS and to install it you need theses 3 files :

Setup procedure :

1 Launch Setup.exe
2 Click on Finish
3 Click on OK

MS Tools is now installed on your computer and available in your Start menu

You are now ready to download the setting file.

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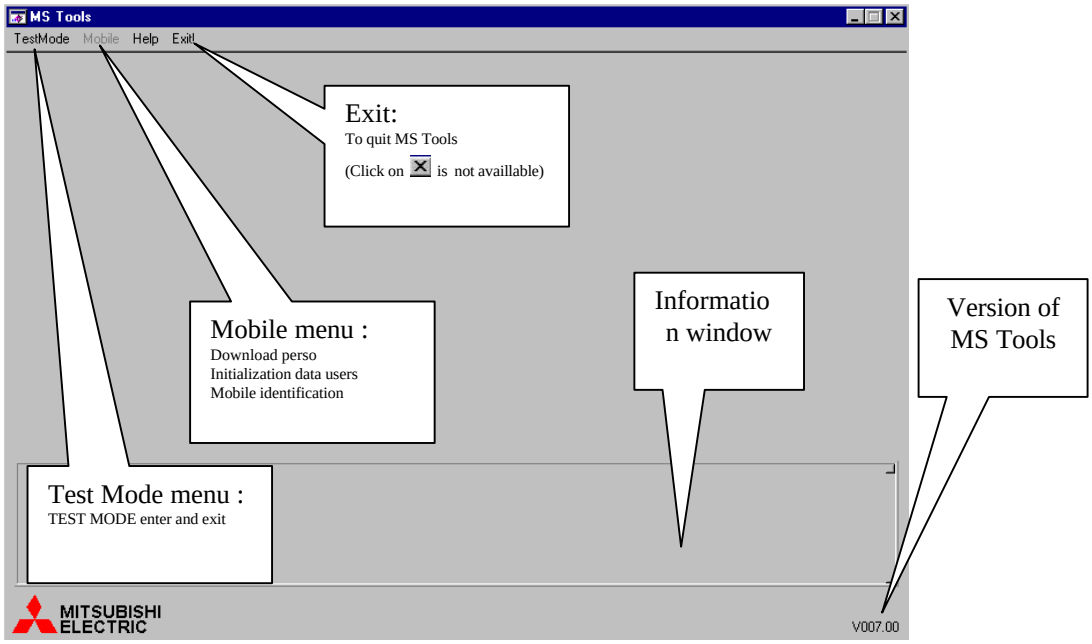
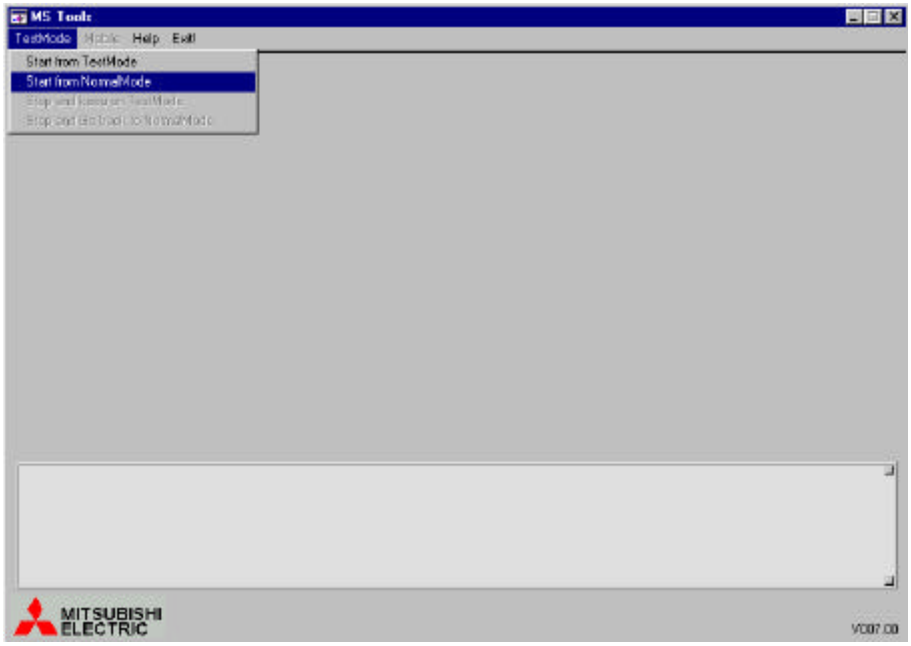
5.b.2 Software description

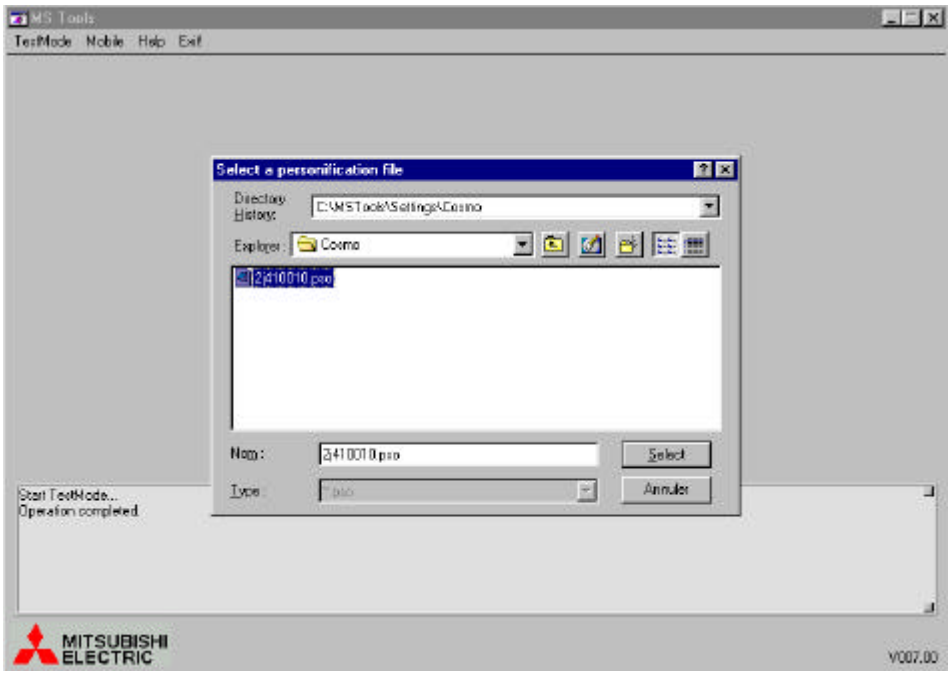


5.b.3 Start download

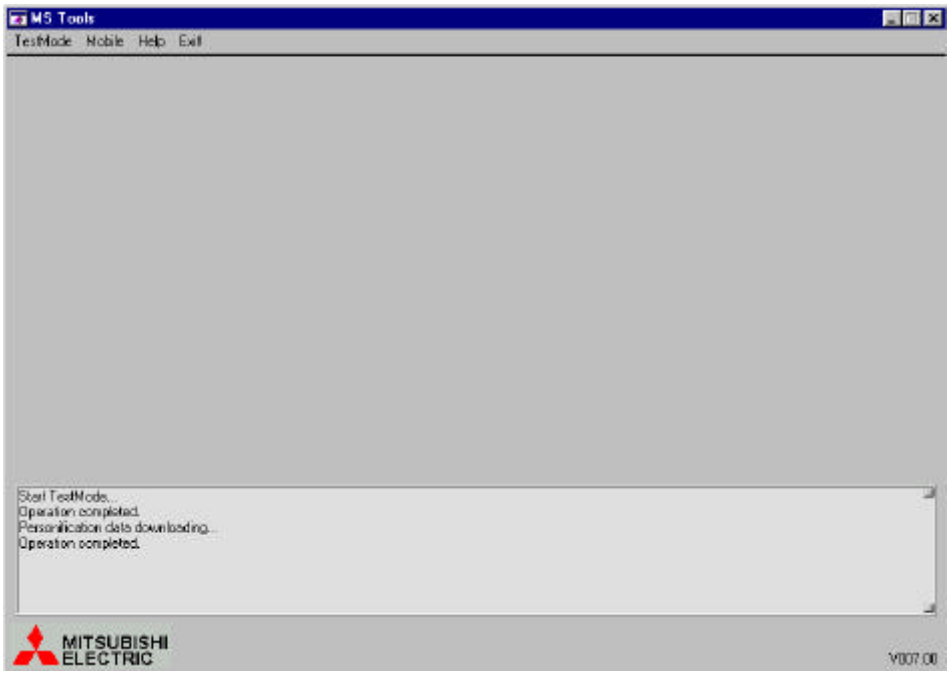
In **TestMode** menu, click on **Start from NormalMode**, then information window displays:



In **Mobile** menu, click on **Download Personification**, then, choose the right settings file and valid by select



5.b.4 End of download



In **TestMode** menu, click on **Stop and go back to normal mode** to close the test mode session.

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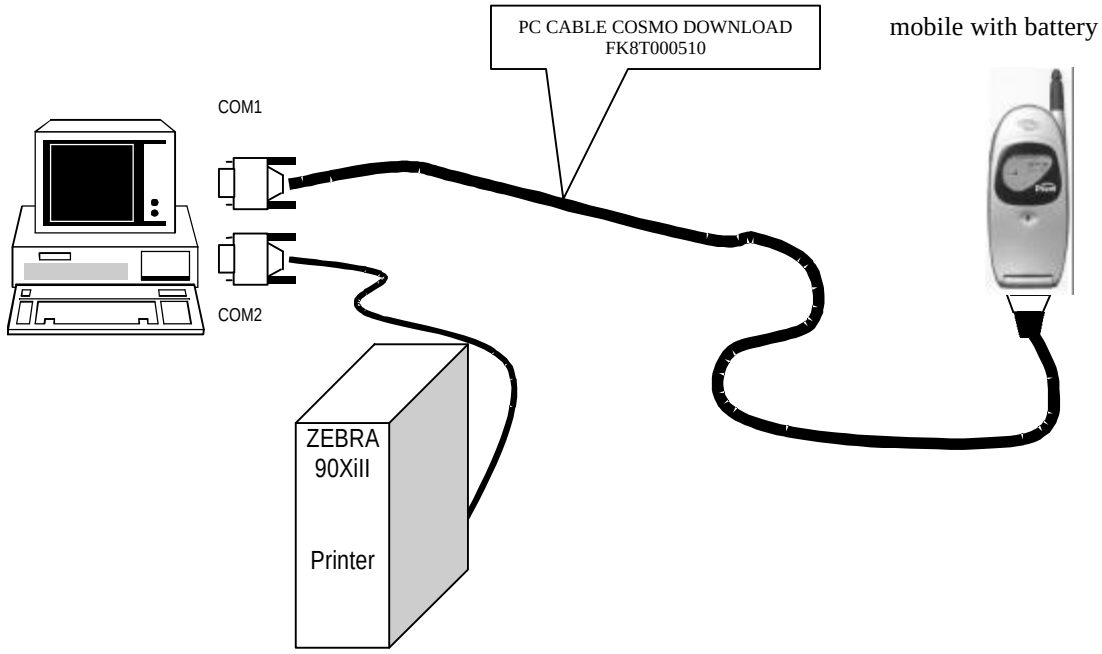
5.b.5 How to print labels using MS Tools

Equipment description:



MS Tools software version 7.00 (or higher) is required to print labels.
This software is provided by MITSUBISHI ELECTRIC France under floppy format (2 floppies)
MS Tools is available on Windows 95, 98, NT4 OS and to install it you need theses 3 files:

Setup procedure:

1 Launch **Setup.exe**
2 Click on Finish
3 Click on OK

MS Tools is now installed on your computer and available in your START menu . MS tools program does not send information directly to **ZEBRA 90Xi II printer**, it sends information to NI VISA driver and NI VISA driver sends information to ZEBRA 90Xi II printer.

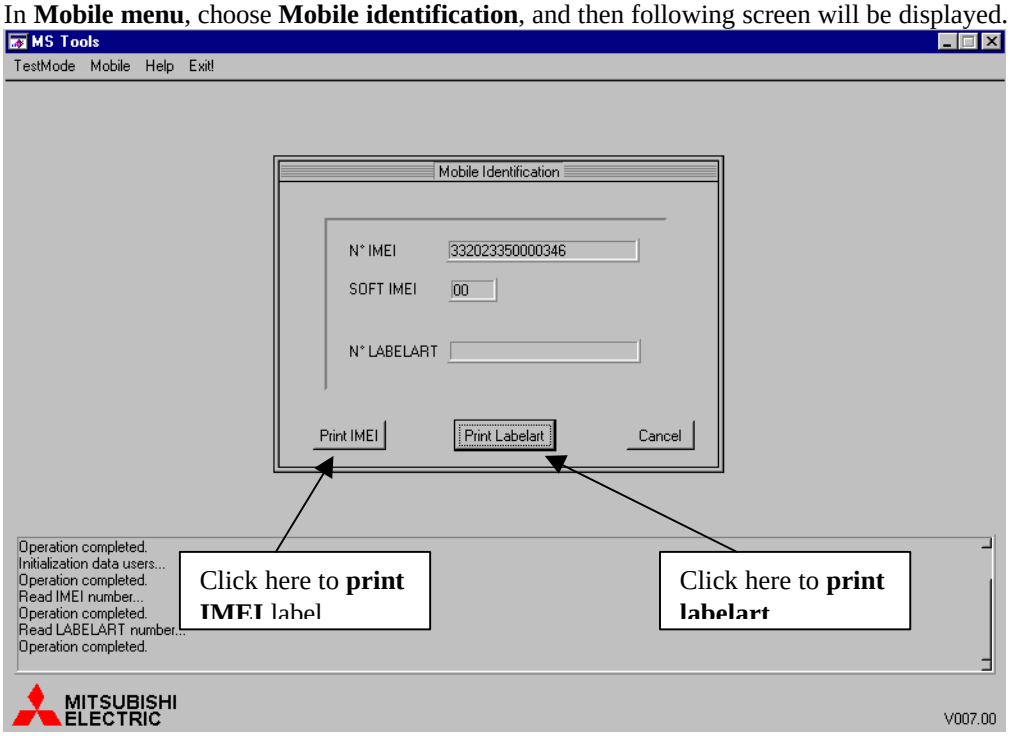
Driver required: NI VISA

NI VISA driver is required and can be provided by MITSUBISHI ELECTRIC TELECOM EUROPE.
The NI VISA driver is located on **NATIONAL INSTRUMENTS NI 488.2** CD-ROM
To install this driver on your PC, launch the **setup.EXE** which is located in the **NI-VISA** folder on the CD-ROM.

5.b.6 Print labels

In **TestMode menu**, choose **Start from NormalMode**, then **Mobile** menu became available.

In **Mobile menu**, choose **Mobile identification**, and then following screen will be displayed.



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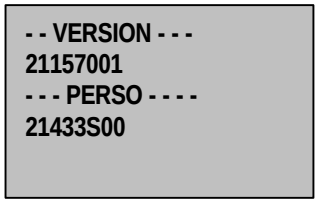
6. SOFTWARE AND SETTING VERSION

To display the software and the perso (personalisation), connect a charged battery, press the power key. Wait few seconds, then hold the * key and press 5807.
Then on the mobile, the following message is displayed,

For example:

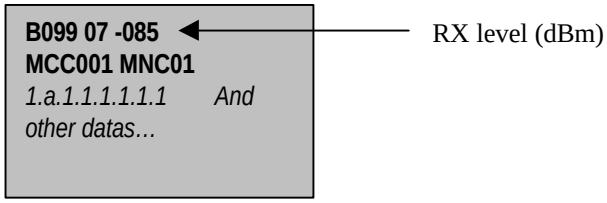


To exit from the Software and Perso monitoring mode, press any key except power key

7. OPERATOR DEBUGGING

To display the RX level (in dBm), insert the SIM card (from service provider or test SIM card using CMD in manual test), connect a charged battery and press the power key. When the mobile displays the network (real network or test network 001-01), hold the * key and press 4329
Then on the mobile, the following message is displayed,

For example :



To exit from the Operator debugging mode, use the same command: hold the * key and press 4329

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