



LEVEL 2 SERVICE

FA9M037810

Trium



ARIA (DUAL BAND)

R E V I S I O N S	V E R S I O N S	A : Création X GLASSON	10/99	Rédigé par	Verifié par	Approuvé par
		B : MAJ exploded diagram	01/00	<i>Written by</i>	<i>Checked by</i>	<i>Approved by</i>
		C : MAJ charging meas.	05/00	X. GLASSON	B. LEGORGEU	G. LEBASTARD

TABLE OF CONTENTS

1	GENERAL DESCRIPTION.....	1
2	MAIN FEATURES OF TRANSCEIVER	2
2.A	DESCRIPTION OF TRANSCEIVER	2
2.B	IMEI LABEL.....	3
2.C	ART LABEL.....	3
2.D	SIM LATCHING.....	4
3	EXPLODED DIAGRAM AND SPARE PART LIST	5
3.A	EXPLODED DIAGRAM OF ARIA	5
3.B	SPARE PART LIST OF ARIA.....	6
4	TEST AND MEASUREMENTS.....	7
4.A	CHARGING MEASUREMENTS	7
4.B	E-GSM / DCS MEASUREMENTS	8
4.b.1	<i>Transmitter Power and Ramp profile</i>	<i>8</i>
4.b.2	<i>Phase / Frequency / Time relationship.....</i>	<i>8</i>
4.b.3	<i>Receiver Bit Error Rate (RX sensitivity)</i>	<i>8</i>
4.b.4	<i>Handover between E-GSM 900 AND DCS 1800 standards</i>	<i>8</i>
4.C	OPERATING INSTRUCTIONS	9
4.D	BUZZER AND SPEAKER TESTS	10
5	SERVICE SOFTWARES	11
5.A	SOFTWARE DOWNLOAD WITH IPLTRIUM	11
5.a.1	<i>How to install IPLTrium software and equipment</i>	<i>11</i>
5.a.2	<i>Software description.....</i>	<i>12</i>
5.a.3	<i>Start download</i>	<i>13</i>
5.a.4	<i>End of Download.....</i>	<i>13</i>
5.B	SETTINGS DOWNLOAD WITH MS TOOLS	14
5.b.1	<i>How to install MS Tools software and equipment.....</i>	<i>14</i>
5.b.2	<i>Software description.....</i>	<i>15</i>
5.b.3	<i>Start download</i>	<i>15</i>
5.b.4	<i>End of download.....</i>	<i>17</i>
5.C	HOW TO PRINT LABELS USING MS TOOLS	18
5.c.1	<i>Equipment, Software and drivers required.....</i>	<i>18</i>
5.c.2	<i>Print labels.....</i>	<i>19</i>
6	SOFTWARE AND SETTING VERSION.....	20
7	OPERATOR DEBUGGING.....	20

1 General Description

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

Main features

- Weight : 85 g
- 80 hours idle time
- 1.5 hour conversation time
- Graphic LCD
- Data fax fonction included
- TEGIC fonction (word recognition)

Standart kit includes following items :

- Tranceiver (retractable antenna type)
- Battery pack (3.8V 580mA Li-ion)
Reference : FZ-2538A
- AC/DC adapter for battery rapid charging (5.5V 500mA)
Reference : FZA-0033A

Speech codec :

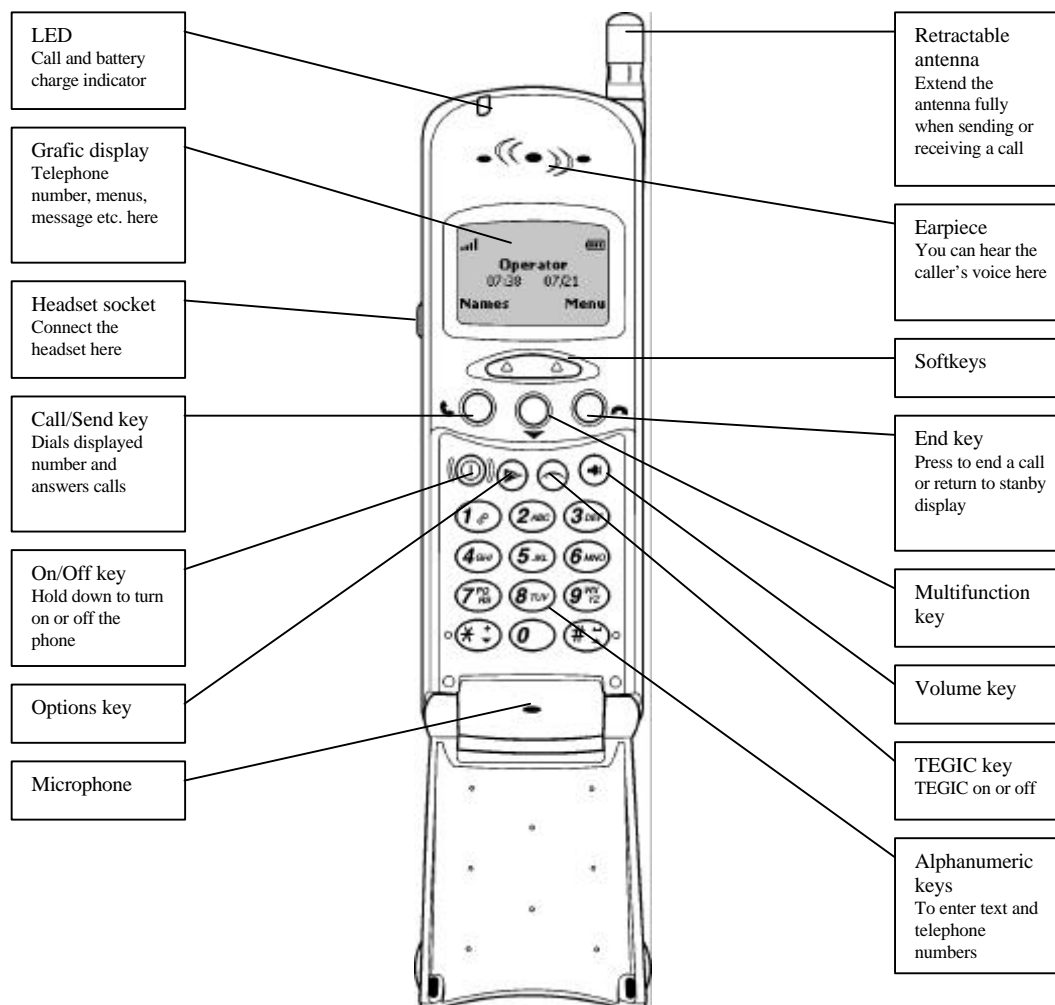
- ARIA uses a speech codec which is able to switch from half rate (HR) to full rate (FR) or to enhanced full rate (EFR) according to network and the software & settings version.
- Enhanced full rate (EFR) allows better voice quality at same rate as full rate.
- Half rate (HR) is coding on 6.5 kb/sec (1/2 than full rate) the network may put two customers on one timeslot. each customer will use this timeslot every two frames.



Actual size

2 Main Features of Transceiver

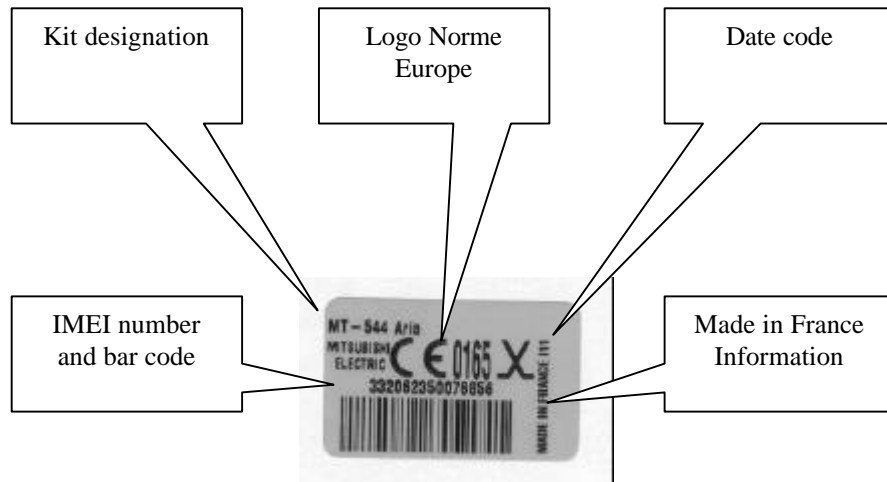
2.a Description of transceiver



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

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 circuitry 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 I11, I stands for 1999 and 11 for November (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. It is different according the type of mobile.
- 45 : These 2 digits are allocated to production site.
- 456789 : The 6 last digits are a sequential number, it is different for each mobile.
- 4 : Check digit.

2.c ART Label

The Label Art Plate identifies the type of assembly and test the mobile has been through.



XXXXXXXXXXXX : 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 principal informations are used. These informations are 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 = Indifferent 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 be able to operate the mobile.

Mitsubishi uses to call 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 uses to call 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 uses to call 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 uses to call 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 in an automatic way (the first SIM card inserted in the mobile is the only SIM which can be used by this mobile).

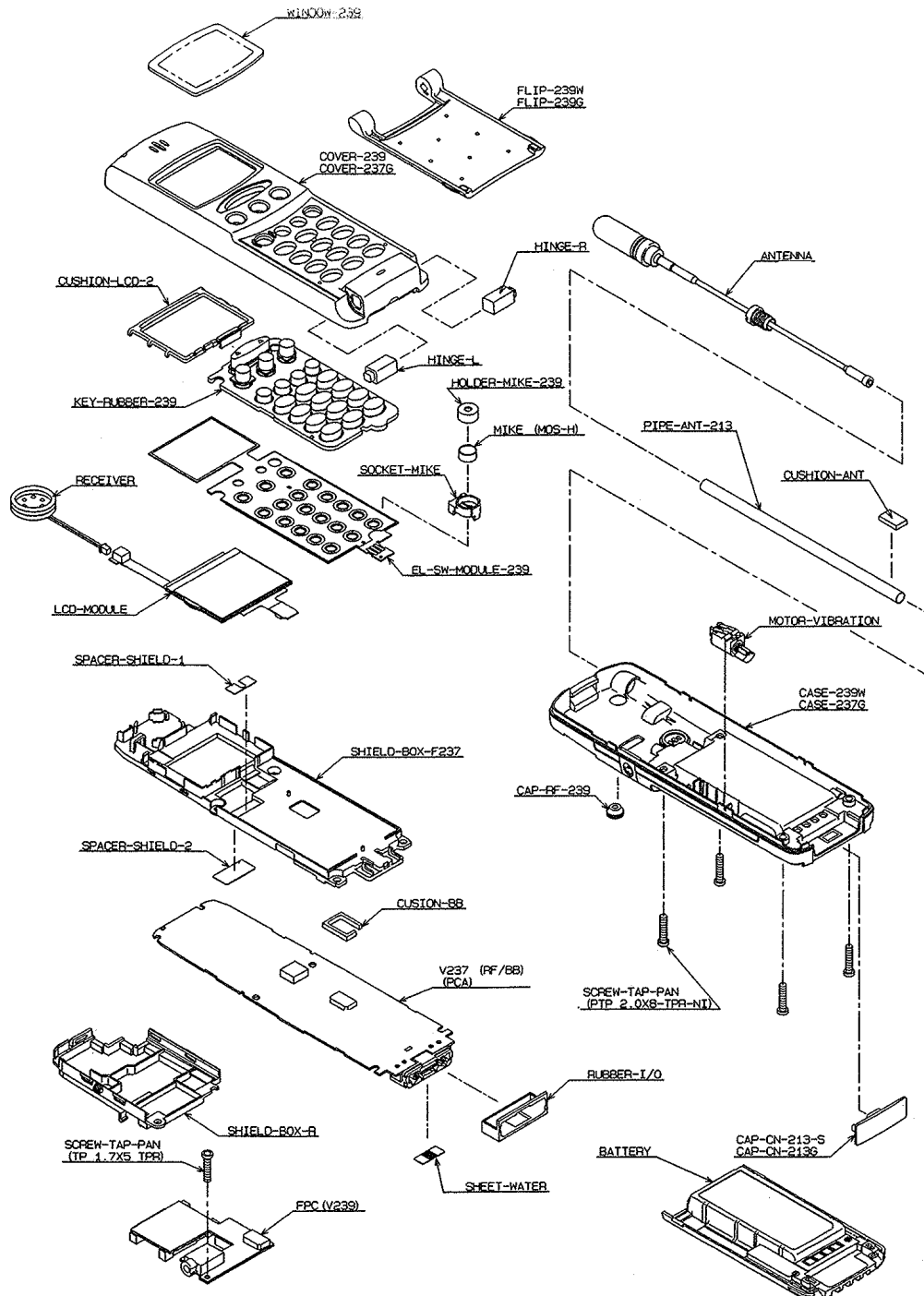
General information :

To lock /unlock a mobile, you need 8 digits 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 correctly a mobile. After 10 unsuccessful attempts, the mobile is permanently blocked.

To enter the unlock procedure, you need to access special menus with specific access codes.

3 EXPLODED DIAGRAM AND SPARE PART LIST

3.a Exploded Diagram of ARIA



3.b Spare part list of ARIA

[illegible]

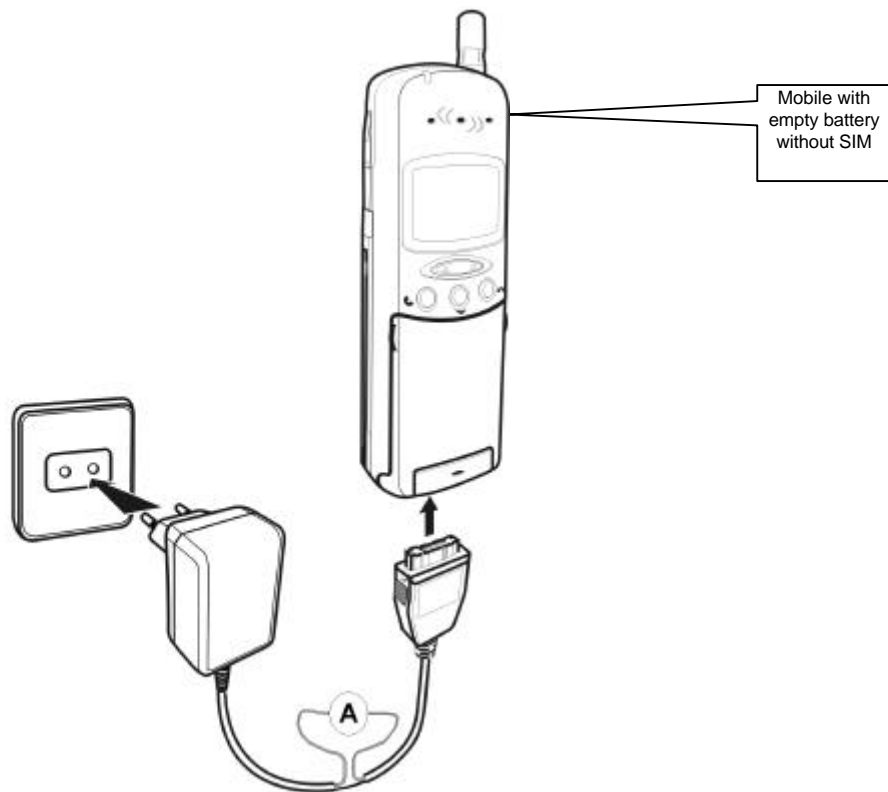
Connectors of ARIA

Position	Designation	Reference
J100	CONNECTOR I/O M4 SO	6T78676110
J101	BATTERY PROBE CONNEC	6T89736010
J200	CONNECTOR(ETP)	6T84927810
J201	CONNECTOR(ETP)	6T84927810
J300	CONNECTOR(ETP)	6T84937610
J900	CONNECTOR RF	6T25974510

4 TEST AND MEASUREMENTS

4.a Charging measurements

To check the charging, we use a modified AC/DC and an amperimeter connected as follow :



When you plug the charger into the wall socket, the charging current is displayed by amperimeter
The charging indicator scroll on the LCD and the red top led lights up.



During pre-charge, the value of the current is 84 mA (measurement without backlight)
During rapid charge, the value of the current is 610 mA (measurement without backlight)

For more details about charging, see the LEVEL 3 SERVICE MANUAL FA9M037910 at page 5.

4.b E-GSM / DCS measurements

4.b.1 Transmitter Power and Ramp profile

These two are interrelated, since the power ramp shape and its final peak value is stored in EEPROM 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 it is adhered to.

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 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.b.2 Phase / Frequency / Time relationship

This is a test of 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 must not be more than 20° peak and 5° RMS.

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

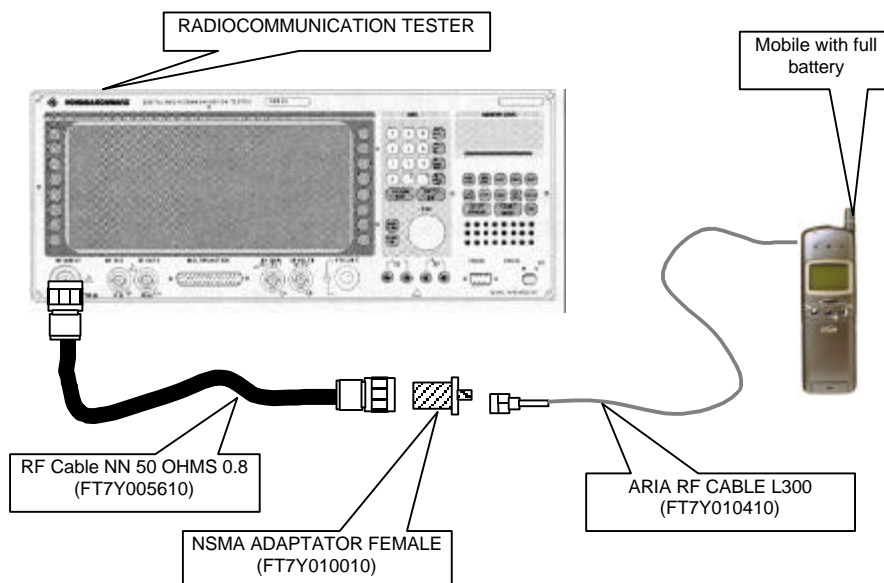
The specification is a Bit Error Rate (BER) of better than 2.44% for an input signal : -102 dBm for the E-GSM 900 band, and -100 dBm for the DCS 1800 band. There should be no error for -90 dBm to -20 dBm input signal. The maximum workable error rate is 13%.

It is important that BER and RX sensitivity is 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 uses of channel space, or interference to others.

4.b.4 Handover between E-GSM 900 AND 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 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.c Operating instructions



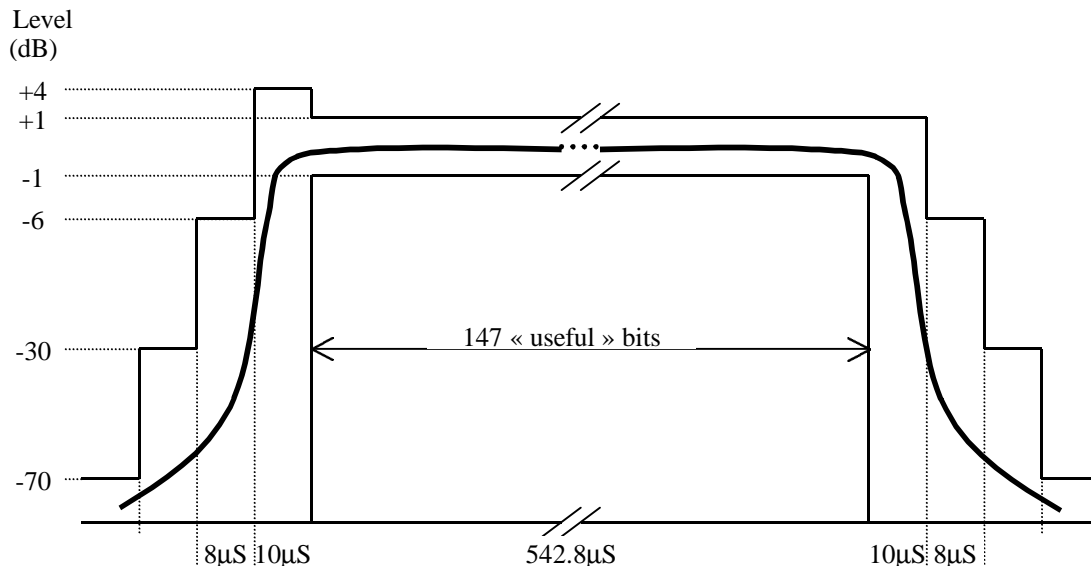
1. Insert Test SIM in the mobile
2. Connect a charged battery
3. Make a call with a RADIOCOMMUNICATION TESTER and check the following parameters, or uses the autotest (CMD55 or CMD55 under MTS or Wavetek 4107)

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	+/-5dB
15	0	+/-5dB

Power ramping: Check the burst fit the mask below



RX levels : Check the values for differents signal strenght

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 differents type








Check the Reception Bit Error Rates (RBER) and Frame Error Rates on channels 1,62 and 124 at -102dBm 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.d 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  choose **Settings** by pressing  and validate by pressing  for **Select**
- Choose **Tones** by pressing  and validate by pressing  for **Select**
- Choose **Volume** by pressing  and validate by pressing  for **Select**

And adjust Ring and Conversation to check buzzer and speaker

5 Service SOFTWARES

The software in the mobile consist of two files downloaded independantly.

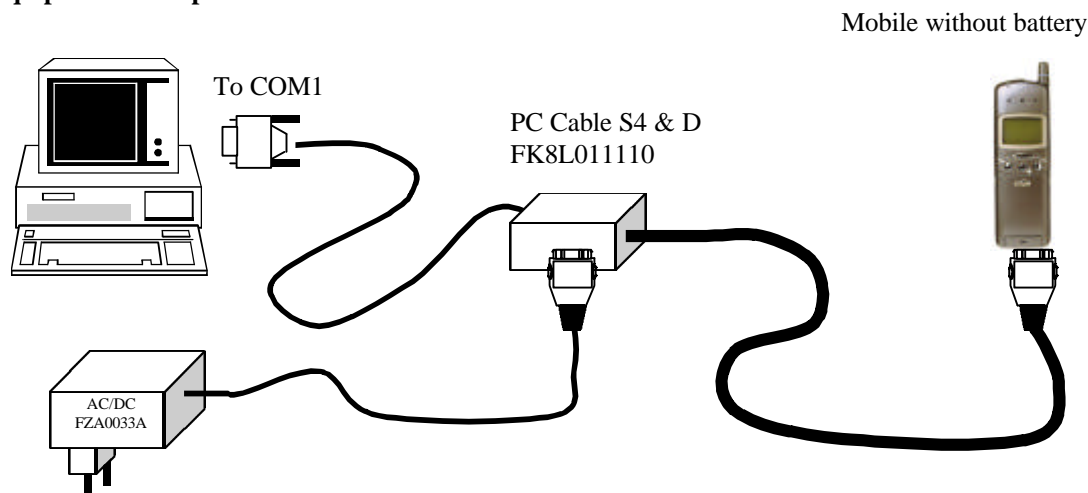
The corp of this software is downloaded using IPLTrium.

The settings file (ringing, customization...) is downloaded with MS Tools. MS tools also allows to enter test mode in order to reset ususr data (security code) , to print labels (imei & factory name plate), to reset the permantly blocked indicator providing you have the access rights.

5.a Software download with IPLTrium

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

Equipment description :



IPL trium is available on Windows 95, 98, NT4 OS and is made of differents files :



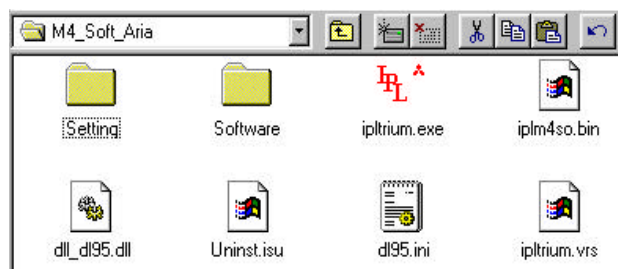
(These files can be provided under one ZIP file)

To install IPLTRIUM software, create a folder named **M4_soft_aria**



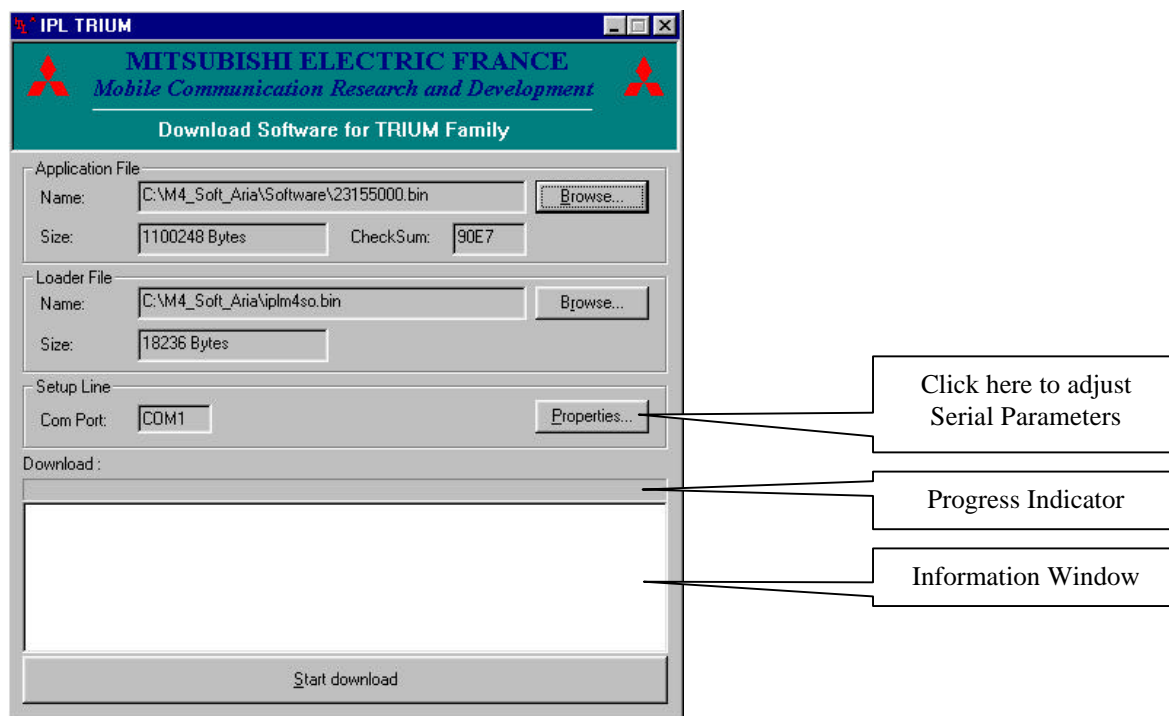
M4_Soft_Aria

And copy the files into this folder. In this folder, create two new folders named Software and Setting

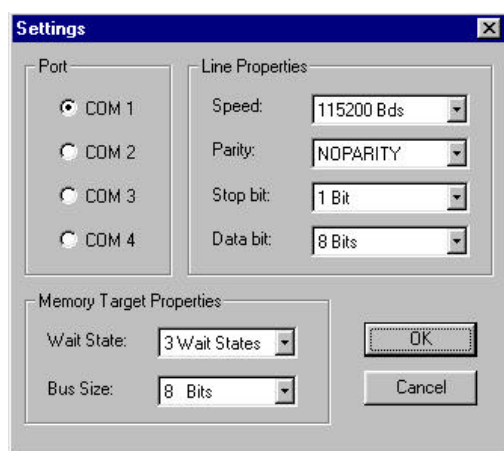


In the Software folder, copy the software file (*.BIN) available for the mobile you have to download.
You are now ready to download the software.

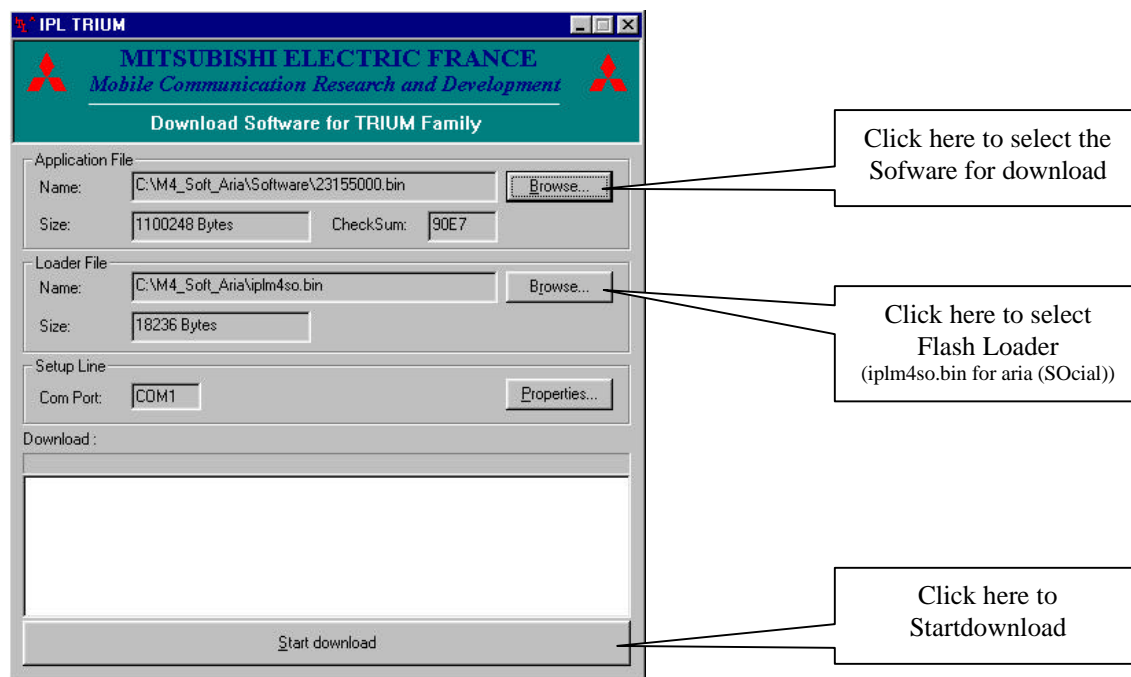
5.a.2 Software description



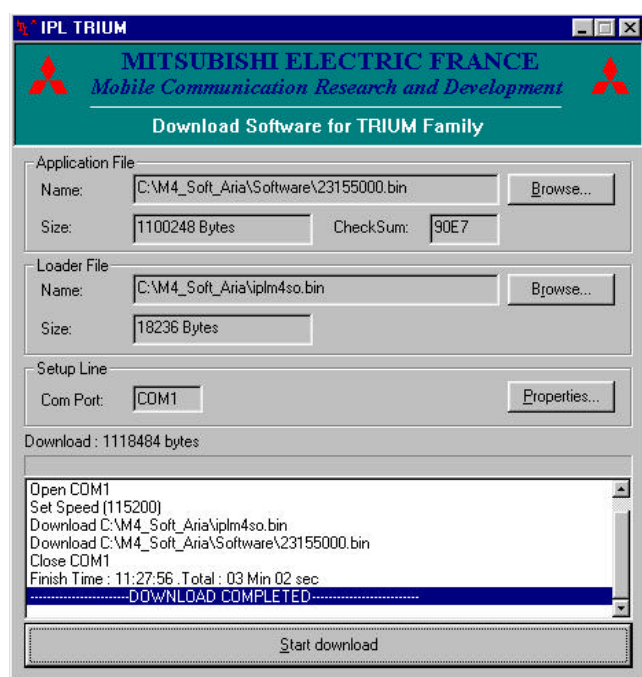
Adjust the serial parameters as following



5.a.3 Start download



5.a.4 End of Download

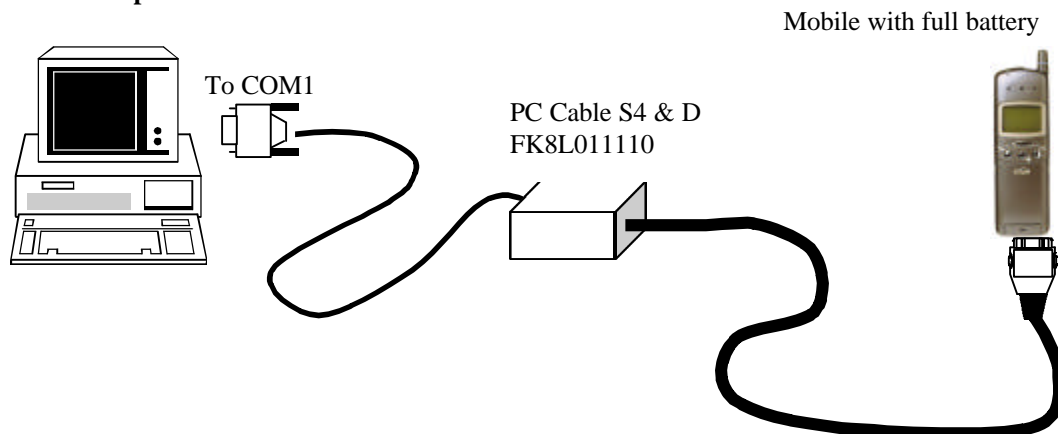


When download is completed, **press the mobile Power key** (mobile shuts down), disconnect the ARIA PC Cable, connect a full battery and press the power key (mobile switches on).

5.b Settings download with MS Tools

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

Equipment description :



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



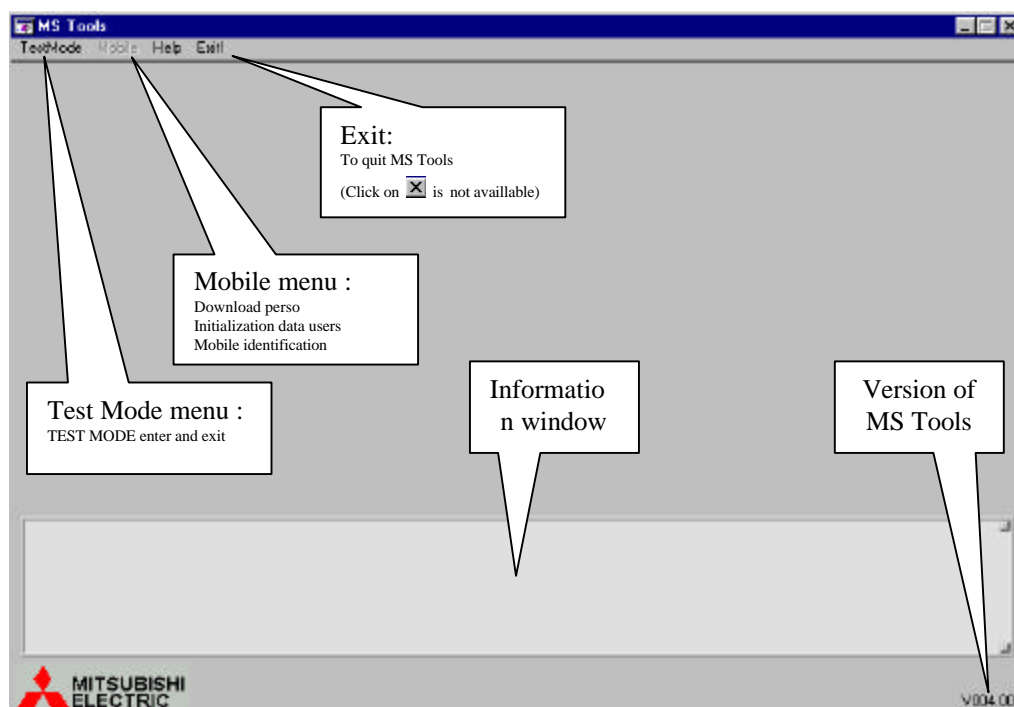
Setup procedure :

- 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

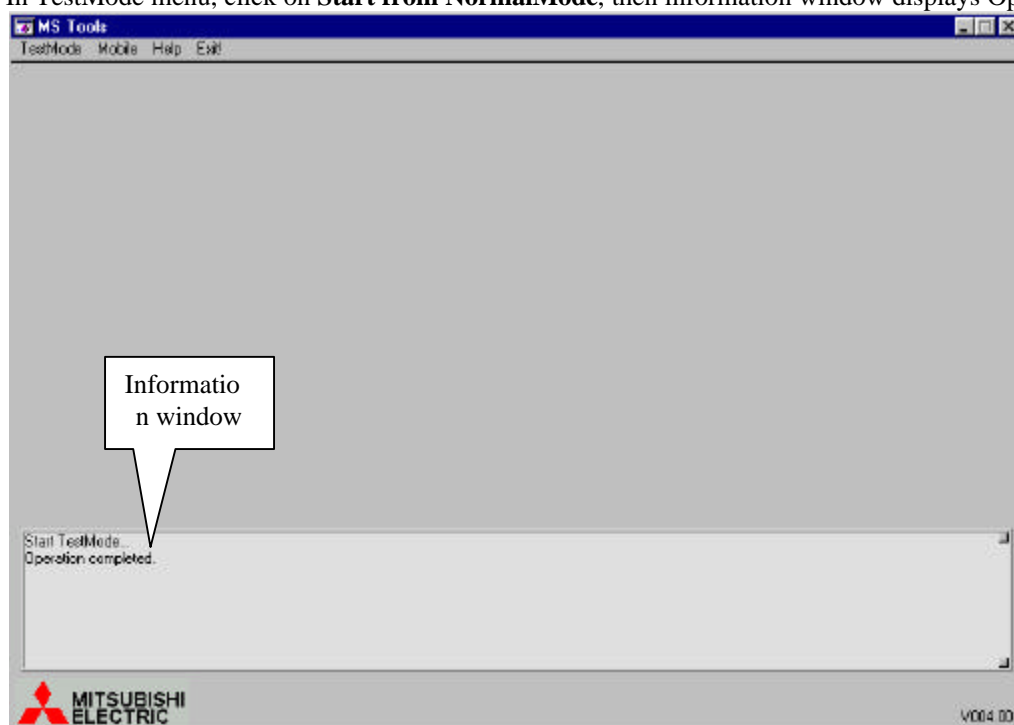
You are now ready to download the setting file.

5.b.2 Software description

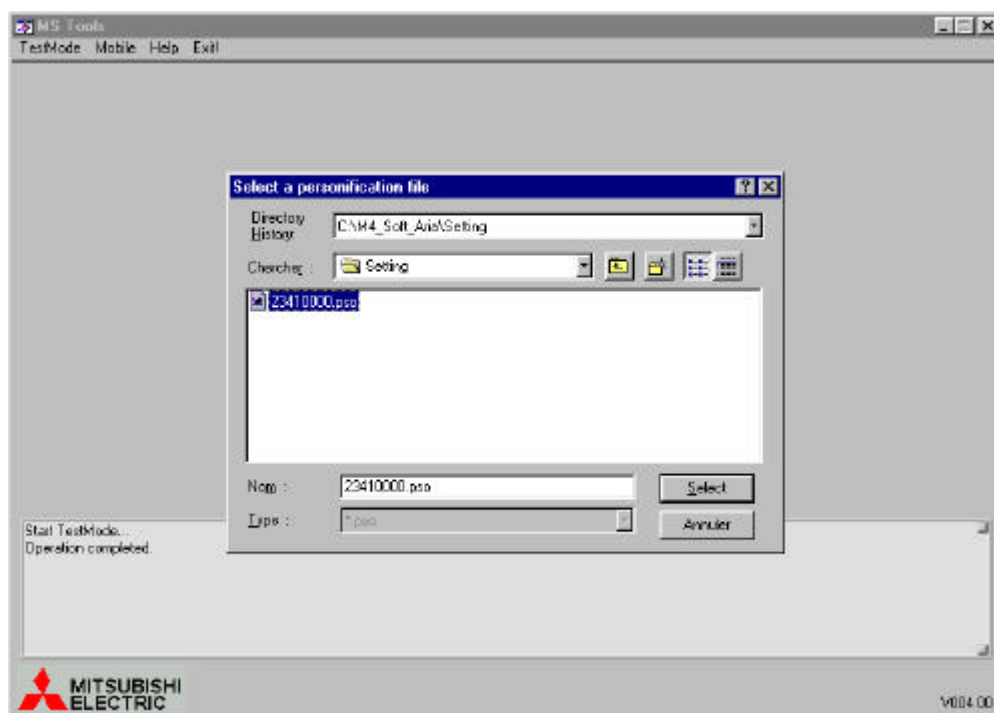


5.b.3 Start download

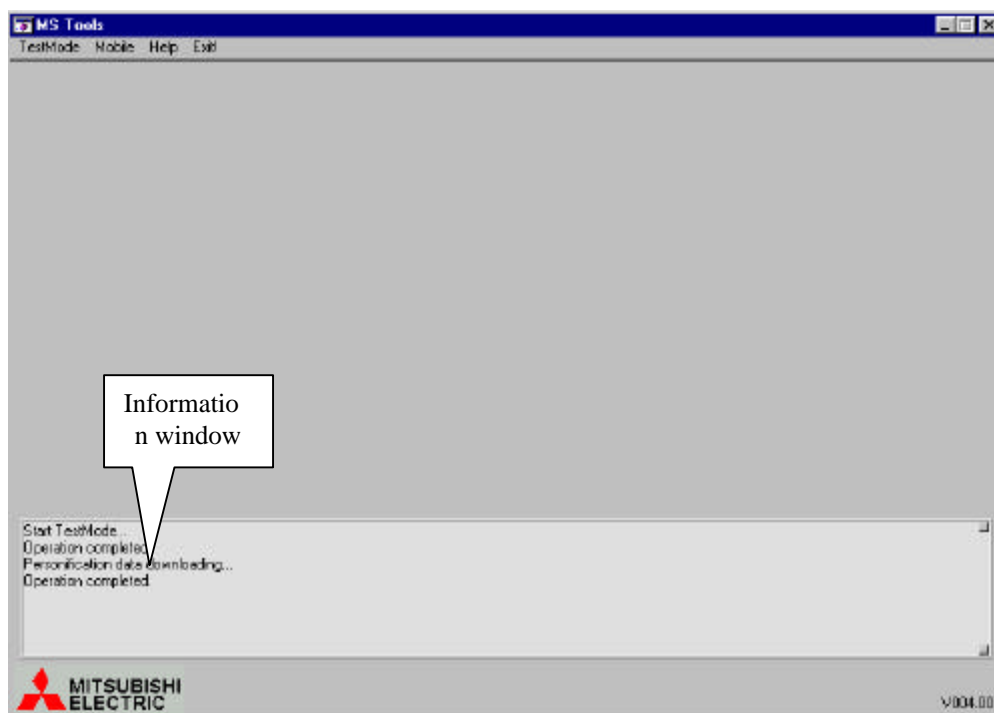
In TestMode menu, click on **Start from NormalMode**, then information window displays Operation completed



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

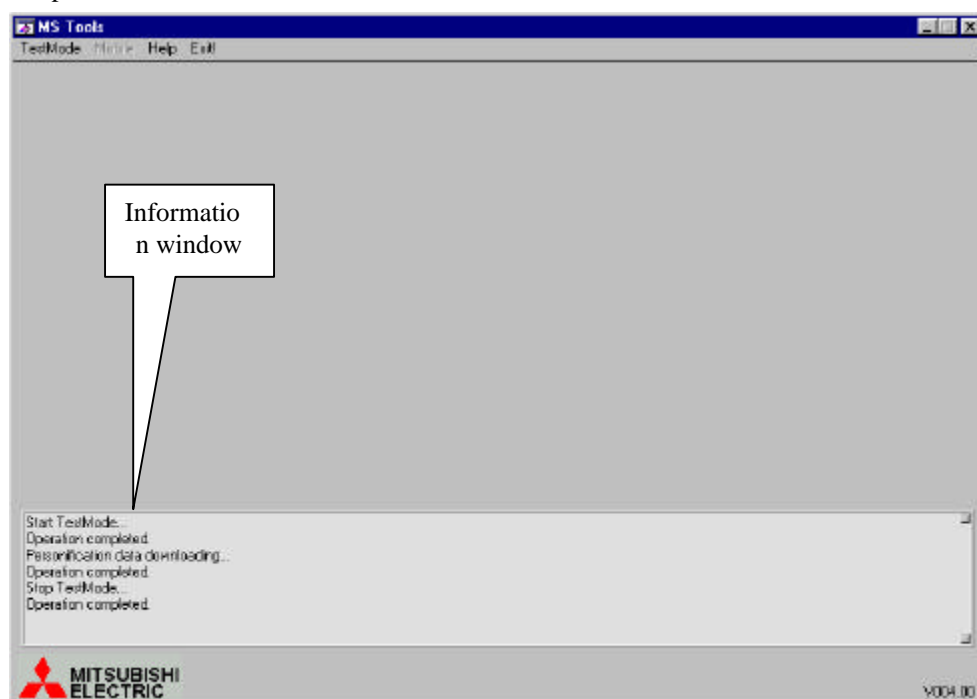


information window displays Operation completed



5.b.4 End of download

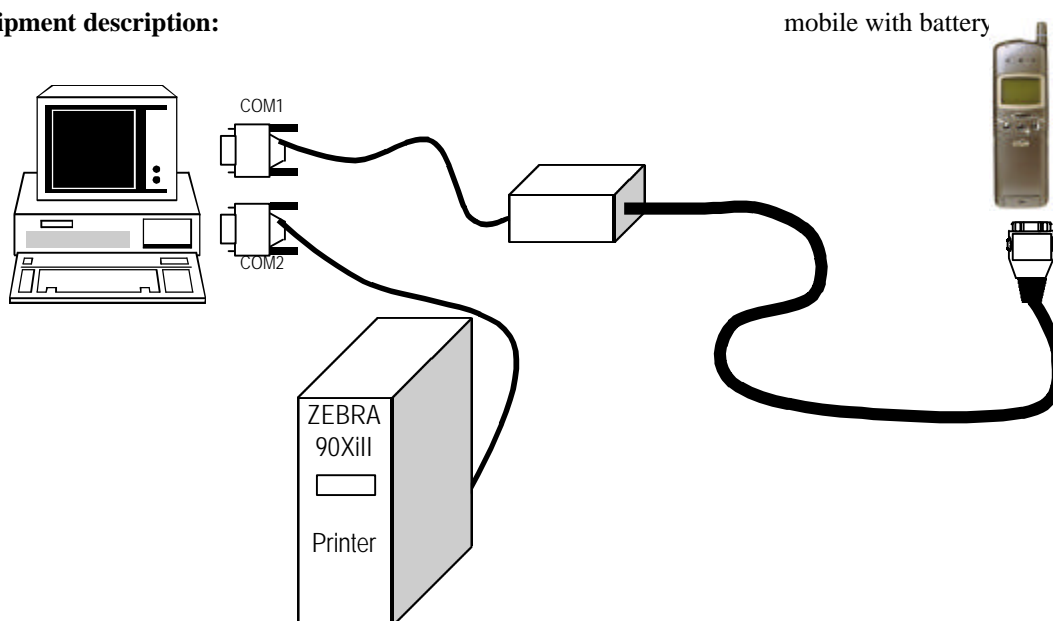
In TestMode menu, choose **Stop and go back to NormalMode**, then information window displays Operation completed



5.c How to print labels using MS Tools

5.c.1 Equipment, Software and drivers required

Equipment description:



Software required : MS tools

MS Tools software version 4.01 (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 these 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 France.

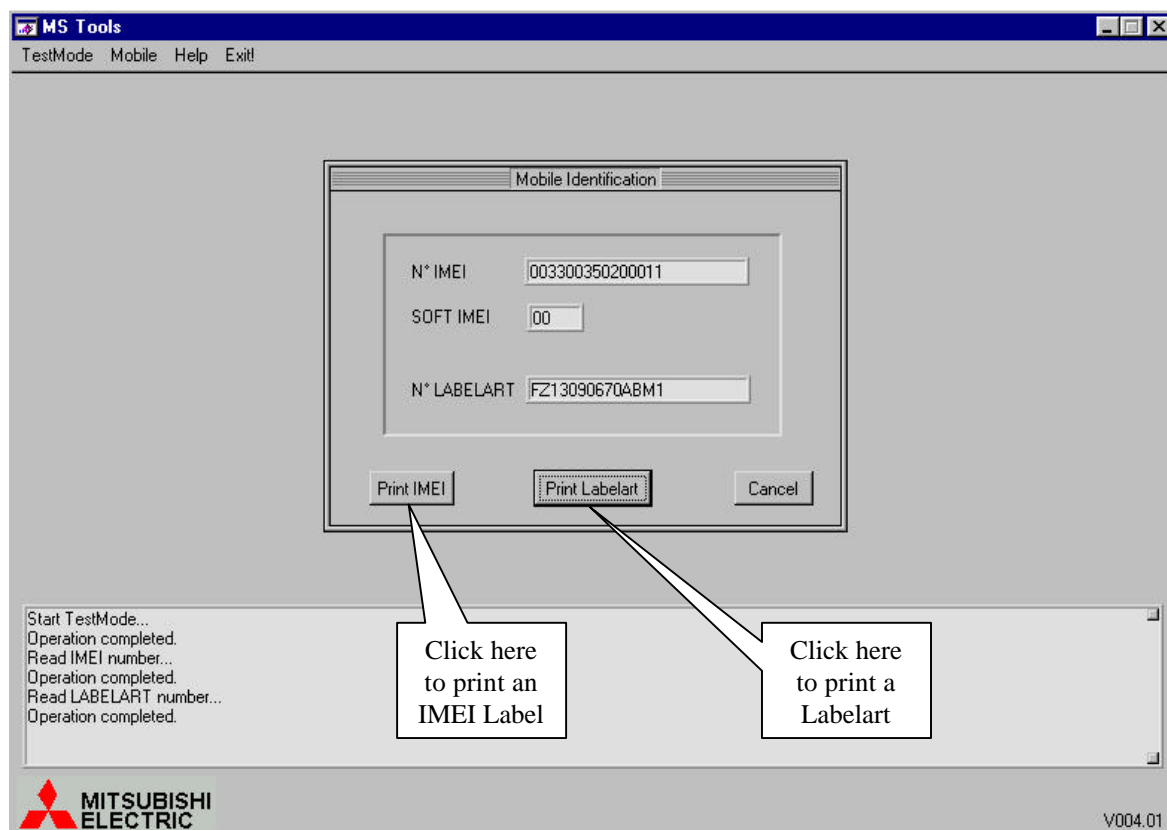
The NI VISA driver is located on **NATIONAL INSTRUMENTS NI 488.2** CD-ROM

To install this driver on your PC, launch the **setup.EXE** which is located in the **NI-VISA** folder on the CD-ROM.

5.c.2 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.



6 SOFTWARE AND SETTING VERSION

To display the software and the perso (personalisation), connect a charged battery, press the power key. Wait a few seconds, then hold the * key and press 5807.

Then on the mobile, the following message is displayed

For example:

```
-- VERSION ---
21157001
--- PERSO ----
21433S00
```

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 :

```
B099 07 -085 ← RX level (dBm)
MCC001 MNC01
1.a.1.1.1.1.1 And
                other
                datas
```

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

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