

ITRONIX®

Training for the

f_εx²¹

FCC RF EXPOSURE INFORMATION

Please read this information before using the radio modem

In August 1996 the Federal Communications Commission (FCC) of the United States with its action in Report and Order FCC 96-326 adopted an updated safety standard for human exposure to radio frequency (RF) electromagnetic energy emitted by FCC regulated transmitters. Those guidelines are consistent with the safety standard previously set by both U.S. and international standards bodies. The design of this phone complies with the FCC guidelines and these international standards.

Use only the supplied or an approved antenna. Unauthorized antennas, modifications, or attachments could impair call quality, damage the phone, or result in violation of FCC regulations.

CAUTION

To comply with FCC RF exposure requirements this device must be operated with a minimum separation distance of 4cm (1.6 inches) between the user/nearby persons and the antenna, with the antenna in the vertical upright position, which is the intended position of the antenna when operating the RIM 902 radio modem installed in the unit.

For more information about RF exposure, please visit the FCC website at www.fcc.gov

Itronix (UK).....	5
Introduction	6

Hardware

Unit Exterior	
Case.....	8
Sealing	8
Operating Temperatures.....	8
Storage Temperatures	8
I/O Ports	
RJ11 Connector	9
9-Pin Serial Port	9
PCCard Slot	9
CF Slot.....	10
Charging Studs	10
IR Port	11
Audio Socket	12
Speaker	12
Serial Label.....	13
Serial Number.....	13
Model Number	13
Configuration String.....	13
Display	
STN	14
TRN.....	14
Mono.....	14
Battery Life Figures for flex21 Screen Types.....	15
LED Indicator.....	16
Keyboard.....	16
Microphone.....	16
Battery	
Location and Housing	17
About the Battery.....	17
Keyboard.....	18
Special Keys.....	18
Power On/Off	19
Contrast	19
Backlight	19
Numeric Keypad	20
Touch Screen	21
Stylus.....	21
Note on Stylus Location	21

Operating System, Software and basic Set-up Procedures

Core System Version.....	23
Operating System	23
Bundled Applications.....	24
Basic System Set-up	25
Fitting the Battery Pack	25
Powering the Unit for the First time	25
Screen Calibration	26
Setting Time and Date	26
Record Personal Information	27
fex21 Utilities.....	28
Backlight Control Panel Applet.....	28
Brightness and Contrast.....	29
fex21 Util Applet.....	30
Power	30
Main battery level.....	30
Main Battery Status	31
Charge Remaining	32
AC Line Status	32
Enable Charging	32
Allow Suspend with AC Adapter Connected.....	32
Battery Info	33
Smart Battery	33
Serial Number.....	33
Date of Manufacture	33
Chemistry	33
Max Capacity	33
Charge Cycles	33
Gas Gauge	34
E2PROM & E2PROM CRC.....	34
Thermistor	34
Temperature	34
Charging	34
Comms	35
Port1 Charging Studs/Main Connector	35
Port2 Charging Studs/Main Connector	35
Power Output	35
Versions	36
Util Applet Version.....	36
CPU	36
CPU Ver.....	36
Unit Serial Number	36
Husky Driver Version	37
Husky Driver Date.....	37
Controller Version	37
Platform Version	37
Keyboard Utility	38

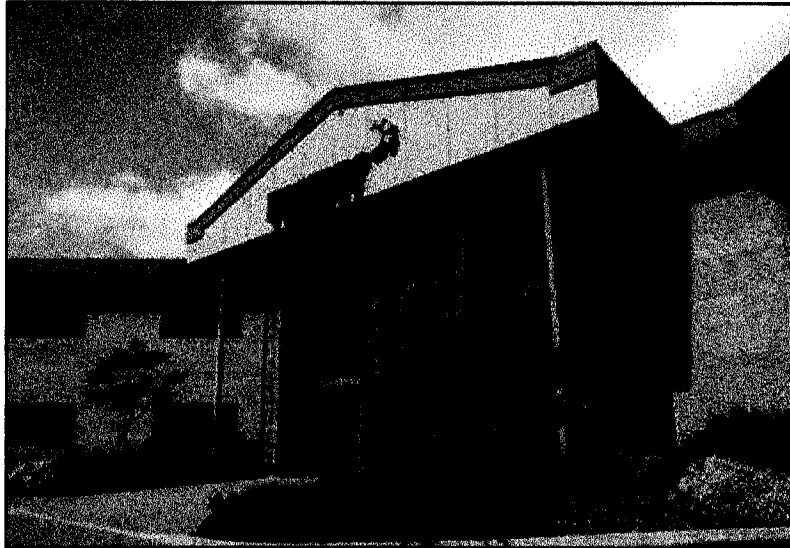
Troubleshooting Guide

Reset Mechanism	40
Rev 05 and Earlier	
Warm Reset	40
Cold Reset	40
Rev 06 and Later	
Warm Reset	40
Cold Reset	40
Communications Problems	
Charging Studs	41
Internal Soft Modem	42
Basic Modem Functionality	42
Modem Speed	44
Increasing Comms Baud Rate	44
Battery	
Gas Gauge	45
Battery Temperature	45
Backup Battery	45
Cards	
CF Insertion	46
Unknown PC Card	46
Screen Noise When Writing to CF	46
Active Sync	
Baud Rate Changes	47
Cable Requirements	47
Storage Requirements	
Handheld Device	48
Battery Management During Storage	48
Battery Life Too Short	49
System Time-Outs	49
Backlight Usage	49
AC Power	49
PCMCIA	49
Damaged or Old Batteries	49
Unit Will Not Power Up	50

Notes

fex21 Technical Notes

Itronix UK



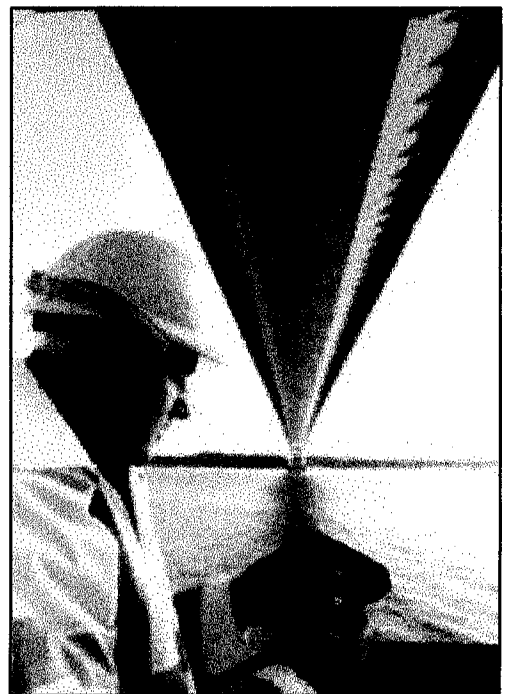
Itronix (UK) is the global leader in mobile computing for vertical business applications. With the world's broadest range of terminals, handheld computers, PC companions and notebooks, Itronix (UK) can provide the full range of *Enterprise Mobile Solutions*, backed by software solutions from a Partner and Distributor Network operating across five continents.

Itronix (UK) specialises in the provision of rugged and reliable computers, hardware for outdoor and indoor utilisation across the full range of applications. Fulfilling the diversity of Enterprise requirements, including *revenue generation activities* (sales and marketing, meter reading, premium collection) and *performance enhancement activities* (manufacturing, stock control and inventory, shipping, transport and logistics, maintenance and services).

Itronix (UK) offers business Enterprise mobile solution expertise across rugged handheld computers, Rugged H/PC companions, Rugged Laptops, and rugged peripherals including wireless communications and scanning. Operating systems and GUIs include DOS, Windows CE and Windowsxx.

Introduction

The Husky fex21 was designed and built with field use in mind. It is the world's first ruggedised HPC. It contains a Toshiba MIPS RISC processor currently available in 75Mhz and 92Mhz versions. Current memory options are 16 and 32mbyte units each containing 16mbyte of ROM. The ROM is a non-volatile storage area and houses the operating system and Husky utilities.



Hardware

Unit Exterior**Case**

The fex21 case is built utilising the latest plastics technology to ensure the optimum ruggedness for the case style. Utilising High Impact Polycarbonate ABS, also known as Impact Modified Plastic, the fex21 is built to withstand harsh working conditions whilst retaining the weight advantage that modern plastics technology offers.

Sealing

Sealed to the internationally recognised environmental standard IP65, the fex21 is designed to withstand water ingress as a result of driving rain over sustained periods. This is achieved through a total of nine water resistant rubber seals around the case

Temperatures

The fex21 is designed to work through a wide range of temperatures in line with it's rugged capabilities. For the mono unit the operating temperature ranges from -10°C to +50°C. For the colour screen this range changes to 0°C to +40°C.

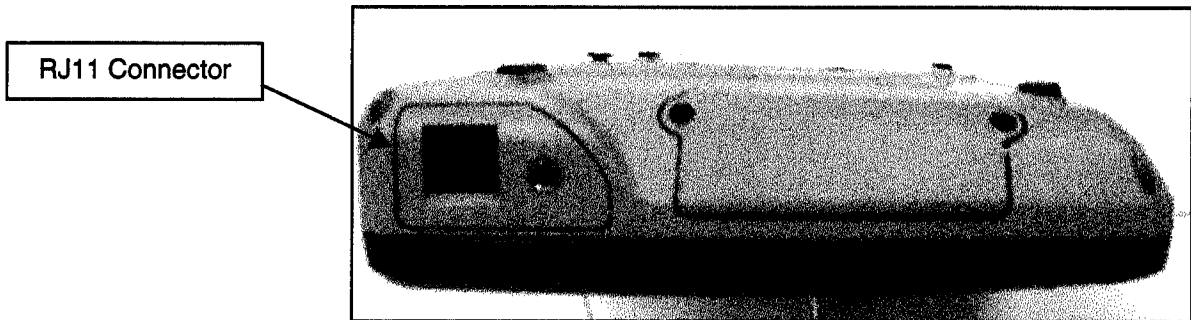
The storage temperatures for all devices range from -20°C to +60°C.



I/O Ports

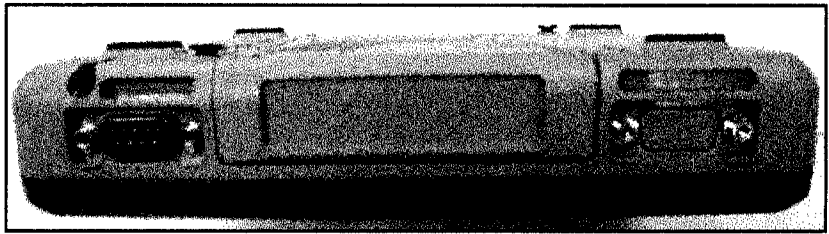
RJ11 Connector

Located on the right hand side of the unit the RJ11 connector provides the external interface for the internal softmodem.



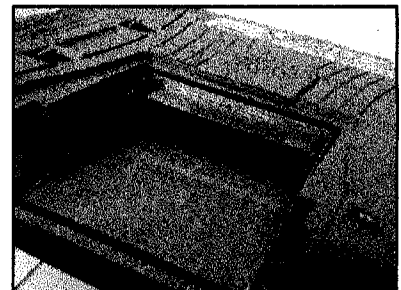
9-Pin Serial Port

Depending upon the chosen option the fex21 will have either one or two 9-pin D-Type connectors. These are located on the top of the unit either side of the PCMCIA hatch. Looking from the top down the left most connector is the primary COM port or COM1 and the right hand connector is the secondary COM port or COM4. These ports will be discussed in further detail later in the course.



PCCard Slot

Located at the rear of the unit the PCCard slot has a user accessible cover retained by means of two spring clips. The unit contains two type II PCMCIA slots which enables the user to utilise either two type II cards or one type III card.



CF Slot

The Compact Flash slot is located on the right hand side of the unit next to the RJ11 connector. This slot provides connection for a single Compact Flash card. As this card is not hot swappable the hatch cover is retained by use of two screws.

Users are discouraged from accessing this slot as it is not hot swappable. Refer to the troubleshooting guide later in this document for further documentation on swapping CF cards

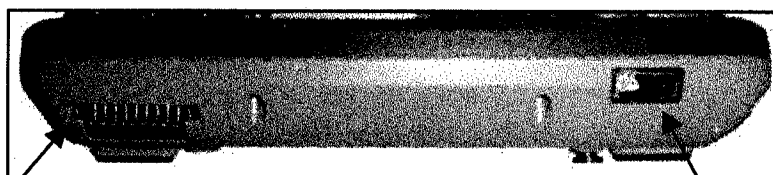


Compact Flash Slot

Charging Studs

Located at the base of the unit the charging studs are utilised primarily when the unit is placed in a Desk Mount Docking Cradle. They provide charging and communications functionality within the Cradle. The studs connectors also provide a charging access when the unit is not in the desk mount docking station.

Further details regarding charging via these connectors can be found in the fex21 getting started guide.



Charging Studs

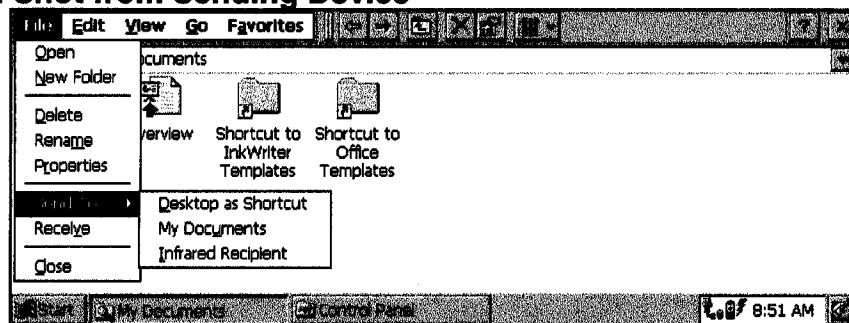
Infra Red Port

Infra Red Communications Port

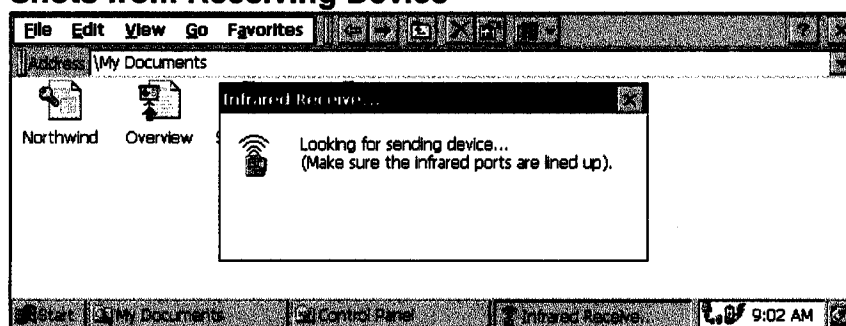
The feX21 infra red port is located at the right hand side front of the unit. This can be used for serial communications with other suitable IR-equipped devices such as printers and IrDA dongle connections to desktop PCs.

The IrDA port can also be used for quick file transfer between CE devices utilising the Windows CE send/receive IR file utility. This can be achieved by highlighting the file to be sent and choosing **FILE/SEND TO/INFRA RED RECIPIENT** on the sending device. On the receiving device choose **FILE/RECEIVE**. This will transfer the file from one CE device to another.

Screen Shot from Sending Device

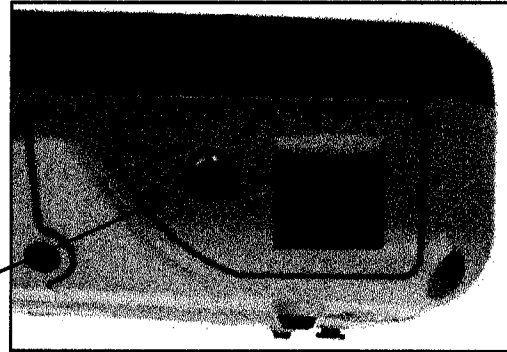


Screen Shots from Receiving Device



Audio Socket

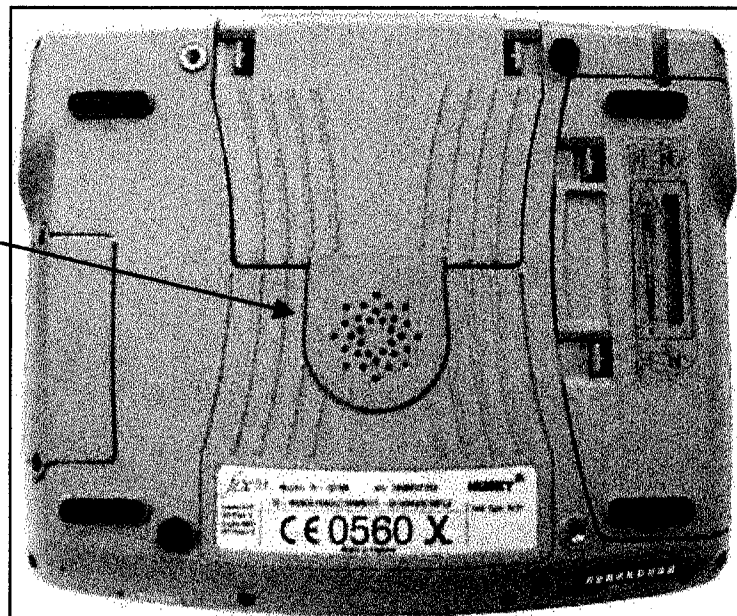
The audio socket placed next to the RJ11 connector provides a connection for an optional Itronix supplied headset. This provides an alternative to the built in microphone and allows the user to utilise the voice recorder with reduction of background noise.



Audio Socket

Speaker

The speaker is located at the base of the unit just below the PCMCIA hatch. It is mounted behind the circular pattern of holes and is sealed against water ingress. The best sound can be achieved with the unit placed on a hard surface as this will reflect the sound back towards the user. If the fex21 is placed on a soft surface such as a vehicle seat or office chair then the sound will be significantly reduced.



Speaker

Serial Label

The fex21 serial label contains three main pieces of information, Serial Number, Configuration String and model number.

Serial Number

The serial number is the ten digit number on the unit. This number will be unique to the device on which it is placed.

Model Number

The model number signifies which particular subset of fex21 build the unit belongs to. This number is utilised within the Husky factory to denote required build components or by the customer to re-order identical units.

Configuration String

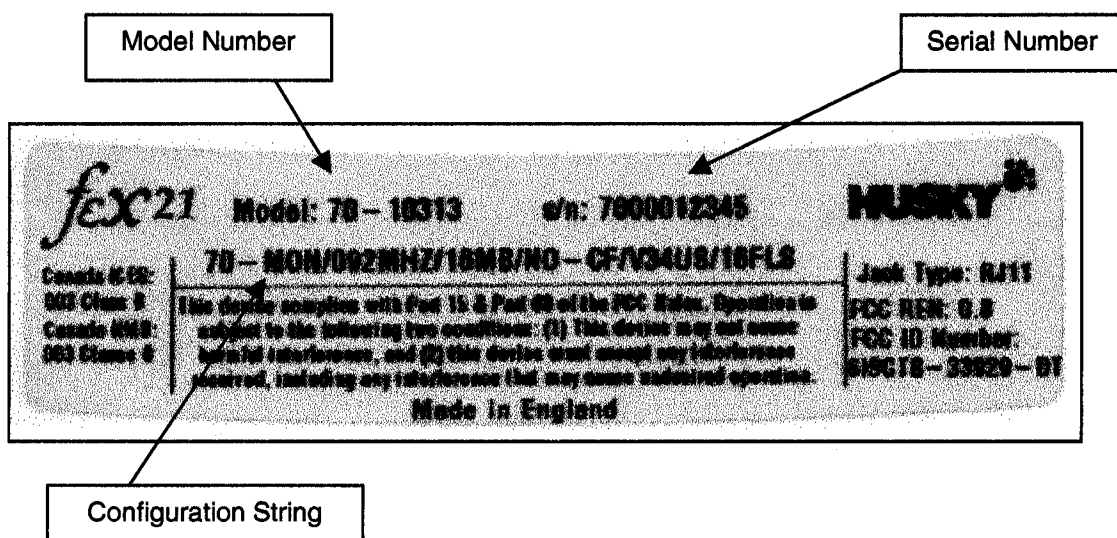
The configuration string gives a brief coded overview of the machine build configuration. When talking to customers it will be this information that will be of most use to the engineer. This will tell the engineer exactly what components the unit contains.

The following is an example of an fex21 configuration string:

70-MON/092MHZ/16MB/NO-CF/V34US/16FLS

This gives us the following information:

70-MON	=	Mono fex21 model 70-
092MHZ	=	92 MHz processor
16MB	=	16MB RAM
NO-CF	=	No compact flash fitted in factory
V34US	=	V34 United States approved modem
16FLS	=	16 MB flash (Operating System storage only)



Display

The feX21 has three display options, STN, TRN and Mono. Each of these screen types are suited to specific conditions and uses.

STN

The STN screen is the standard colour transmissive screen. This screen provides the best colour option for indoor use as it is both bright and easily visible indoors. However this screen suffers significant degradation for outdoor use. This screen option is not recommended if the unit is to be used outdoors or in direct sunlight.

TRN

The Transflective screen utilises the latest display technology to provide the optimum visibility in both indoor and outdoor conditions. If a colour screen is required for outdoor use then this would be the recommended solution.

Mono

The feX21 monochrome screen is the ideal choice for indoor/outdoor use when colour is not an issue to the software. This option offers a 16-greyscale display and has good visibility both indoors and outdoors.

All screens are 6.5" ½ VGA 640x240 LCD with integral backlight. The STN screen requires the backlight to be active at all times (When powered up) but does allow stepped dimming. Mono and Transflective screens can both be used without backlight therefore offering improved power consumption.

Battery Life Figures for fex21 Screen Types

Below is a table of battery life estimations currents drawn for the different fex21 screen types. Please note that these are not guaranteed exact figures. They are estimations taken from measured currents.

Power supply left for 30 seconds prior to reading current. Battery voltage 5.08V

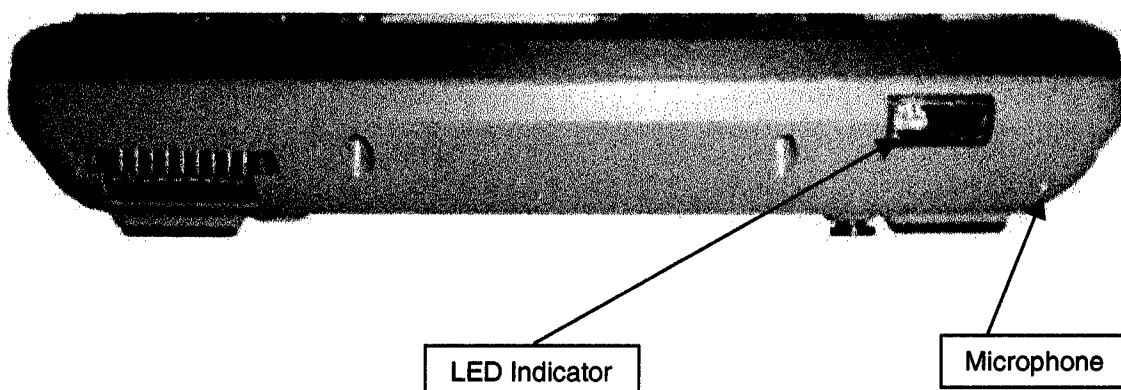
Status	Current (mA)					
	Mono	Mono + EL	STN EL=min	STN EL=max	Trans EL=min	Trans EL=max
Standby	2	2	2	2	2	2
Idle	73	178	190	330	90	325
Pen active	180	285	302	444	202	440
Keyboard active	192	299	309	451	211	453
Application running	215	315	300	445	204	440

Status	Battery life (Hours) = 1600/Current					
	Mono	Mono + EL	STN EL=min	STN EL=max	Trans EL=min	Trans EL=max
Standby	800.00	800.00	800.00	800.00	800.00	800.00
Idle	21.92	8.99	8.42	4.85	17.78	4.92
Pen active	8.89	5.61	5.30	3.60	7.92	3.64
Keyboard active	8.33	5.35	5.18	3.55	7.58	3.53
Application running	7.44	5.08	5.33	3.60	7.84	3.64

LED Indicator

The fex21 incorporates a battery-charging indicator situated behind the IrDA window. This red LED indicates the state of charging in the following ways:

- LED off: AC Adapter not connected or AC adapter not switched on
- LED On: The unit is running on AC adapter power. This state also indicates that charging is complete, disabled or not allowed (battery too hot/cold, or no rechargeable battery fitted).
- Slow regular flashing (once per second): The unit is running on AC power and the battery is charging.
- Fast irregular flashing: The unit is running on AC adapter power. Battery charging has not started or has been aborted. This may be indicative of a battery fault or that a battery has over-heated. Please refer to the battery section in the trouble-shooting guide for further details.



Microphone

The fex21 has a built in microphone, as indicated above by a small opening just below and to the right of the IrDA window. This can be used to record and store sound such as spoken dictation utilising the Windows CE voice recorder. The recordings can be stored in either Mobile Voice or PCM formats and in a variety of different sample rates. Optimum sound quality can be achieved by recording in PCM format at a sample rate of 11,025Hz. This can be altered in the Recording Format option under the Tools menu within the Microsoft Voice Recorder software.

Batteries

Location and Housing

The fex21 battery is located in the back of the unit lying parallel to the primary COM port (COM1). The battery can be removed by pulling the two small catches forward until they click open. Please note that the stylus must be removed from its housing before attempting to remove the battery



About the Battery

The fex21 is designed for use with either a rechargeable NiMH battery pack or 4 AA-size alkaline cells. Both types are contained within a specially designed battery holder. The fex21 is supplied as standard with a rechargeable battery. The alkaline battery holder is available as an optional extra upon request from Itronix (UK).

Use of non-rechargeable alkaline batteries is only recommended as an emergency measure. The quality of alkaline cells cannot be guaranteed, as they are not supplied by Itronix (UK).

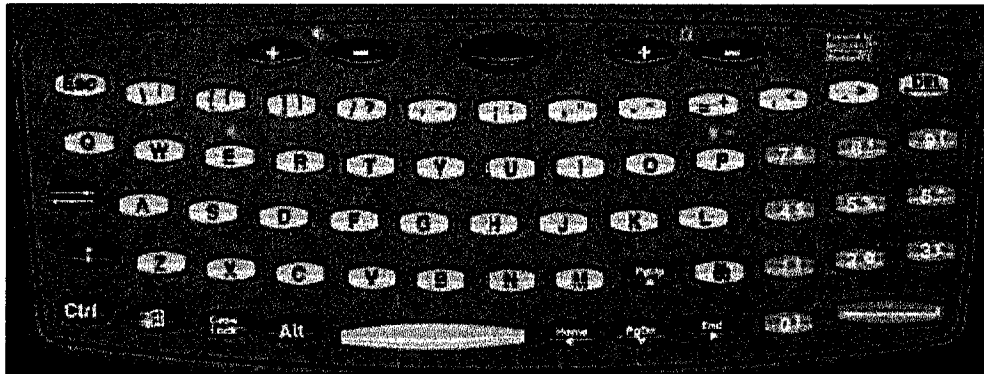
In addition to the main NiMH battery the fex21 has a built in rechargeable backup battery. This internal cell is used to retain the contents of the unit RAM in the event of complete power loss from the main cell. This backup battery will retain the RAM contents of the unit for up to 72 hours (depending upon charge state). This backup cell also allows the user to safely swap the main cell without compromising the machine data integrity.

Keyboard

The fex21 keyboard is made up of 67 hardened rubber keys. The keys are arranged in colour coded groupings and incorporate a separate numeric keypad. The keyboard can currently be supplied in the following language variants:

- UK/US
- Swedish
- French
- German
- Danish
- Spanish

There is also a membrane keyboard option available upon request.



Special Keys

In addition to the standard keys normally available on an HP/C keyboard the fex21 has an added function key, the PAW key. This extra key is located just to the left of the numeric keypad next to the number 1. The PAW key allows access to extra key options printed on the keyboard overlay. The extra keys provided vary depending upon the country specifications of the unit.

To access the extra characters it is necessary to hold down the PAW key in combination with other keys on the keyboard. On the UK/US keyboard for example, to access the '#' key it is necessary to hold down the PAW+P keys. These keys can also be used in conjunction with the SHIFT key to produce further combinations. Again on the UK/US keyboard holding down the PAW+SHIFT+P keys will produce the '¬' key.

Many international languages require the use of accents in conjunction with specific letters. The fex21 also caters for these options by use of what are known as 'Dead Keys'. Use of a dead key in isolation will not produce a character output but will provide an accent in conjunction with the next key pressed.

Power Key

The power key is located at the top centre of the keyboard. This key performs two main functions, it turns the unit power on and off and also forms part of the unit reset function.

When the fex21 is first powered on after having a new battery fitted the power key will need to be pressed twice in order to start the unit.

Contrast Keys

The two contrast keys are located to the left of the power key. One is marked with a '+' symbol and the other with a '-' symbol. To increase the screen contrast press the key marked '+' and to decrease the contrast press the key marked '-'.

The fex21 also has a default contrast setting that the unit can be reset to at any time. To attain the default contrast setting, press both contrast keys at the same time.

Backlight Keys

To the right of the power key are the two backlight keys, again marked '+' and '-'. These keys have slightly differing functions depending on the screen configuration of the unit.

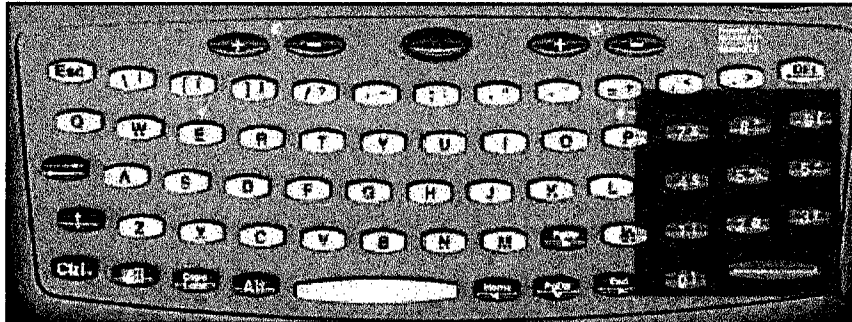
On a mono fex21 the backlight keys simply turn the EL backlight on and off. To power on the EL backlight press the '+' key and to power it off press the '-' key.

The Transmissive colour fex21 screen, (STN), requires the backlight to be active at all times. In this instance the backlight keys reduce and increase the intensity of the CCFL backlight. To increase the intensity of the backlight press the '+' key and to reduce the intensity press the '-' key. Note that the brighter the backlight intensity the more power the unit consumes. It is recommended that the backlight be reduced to the minimum comfortable intensity in order to maximise battery life.

The Transflective colour fex21 screen, (TRN), does not require the backlight to be powered at all times. As with the transmissive screen the backlight keys can be used to increase and decrease the backlight intensity but will also power the backlight on and off at the extremes of adjustment.

Numeric Keypad

Unlike many other Windows CE devices the fex21 is also equipped with a separate numeric keypad. This colour coded keypad section is located on the right hand side of the keyboard and is arranged in much the same way as a standard PC keyboard keypad.



A standard H/PC unit has the numeric keys placed along the top row of the keyboard. It was decided early in the development of the fex21 that this configuration would probably be unacceptable to most of the traditional Husky users. The majority of Husky units are used for field data collection, a task that traditionally requires large quantities of numeric data input. Most users have become accustomed to the standard numeric keypad layout and Husky have always provided this keyboard design. It is for this reason that the fex21 has the numeric keys implemented in a separate colour coded keyspace within the keyboard design.

Touch Screen

The fex21 is primarily designed to maximise the use of the touch screen technology. The screen itself is a 6.5" VGA 640x240-pixel LCD display utilising the latest resistive touch screen technology. The screen is made using a glass plate covered with a layer of Mylar separated by a small gap. Each of these components contains one half of a resistive grid. When pressure is applied to the top layer of the grid it moves to touch the bottom layer therefore creating a point of altered resistance. This point is interpreted as a grid position and is used by the fex21 to determine where the user has tapped the screen. The O/S interprets this grid position in the same way that a mouse click would be interpreted by a desktop PC application.

The use of a resistive screen enables the pointing system to be much simpler. Previous touch screen devices required the use of an active pen specific the system being used. This could cause problems in the field if the pen was lost or the pen batteries became drained. With the resistive technology the user can simply substitute their finger for the stylus if required.

Stylus

The fex21 stylus is designed to be easy to use, lightweight and gentle on the touch screen. It is stored in a channel placed along the length of the battery tube.

The stylus tip is made of a soft material and spring loaded to avoid excessive wear on the screen coating. As the touchscreen requires a point contact, your fingernail can be used in place of a lost or damaged stylus. Hard or metal tipped objects such as ballpoint pens should not be used as this may scratch or damage the touch screen. A replacement pen can be ordered from Itronix (UK) if required.

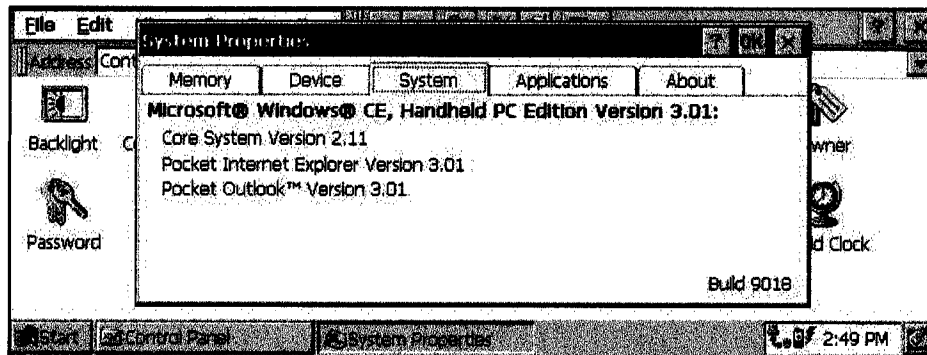
Note on Stylus Location

As previously mentioned the fex21 stylus can be stored in a specially cut channel that runs the length of the battery pack. Before attempting to remove the battery the stylus must be removed from it's housing. Attempting to remove the battery pack while a pen is fitted may result in damage to the battery pack, fex21 case and pen.

Operating System, Software and Basic Set-up Procedures

Core System Version

The fex21 is built on the Windows CE core system version 2.11. The core system is the small piece of code that the whole CE operating system is built around, otherwise known as the operating system kernel. The core system version is completely separate to the Windows CE version. The current CE version in use on the fex21 has recently been upgraded from version 3.0 to version 3.01 however, the core system version still remains at version 2.11



Operating System

The current fex21 operating system is Windows CE Handheld PC Edition Version 3.01. This version includes Pocket Internet Explorer Version 3.01 and Pocket Outlook Version 3.01.

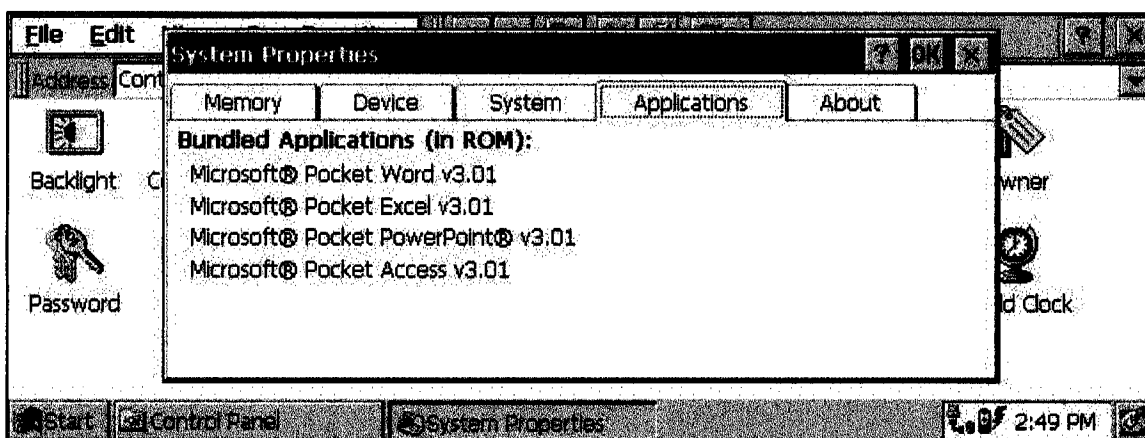
Windows CE is a processor dependent operating system and as such requires care when selecting pre-written software. The fex21 system is built around a Toshiba R3000 family MIPS RISC processor. When selecting software the user must look for packages written specifically for this processor type. This is not usually a problem as this processor family is one of the most popular with the majority of H/PC software being available for this hardware platform.

Bundled Applications

In addition to the standard operating system functionality the flex21 also includes a bundle of Microsoft Pocket Office applications:

- Pocket Word v3.01
- Pocket Excel v3.01
- Pocket Access v3.01
- Pocket PowerPoint v3.01

Together these applications form a formidable mobile office solution for the Sales Rep or mobile engineers.



These apps are bundled as part of the operating system build in ROM. In the event of total power loss or hard reset the applications will not be lost or corrupted. However, any data contained within the applications or stored in the machines RAM will be lost.

As these applications can be relied upon to always be present on the system any application can be written to use their functionality. For example database applications need not be written from the ground up but can be designed to utilise the pocket Access system already available on the device.

It is beyond the scope of this course to detail the differences between these applications and their desktop equivalent. Descriptions of these differences can be found on the Microsoft web site:

<http://www.microsoft.com/mobile/hpc/features/default.asp>

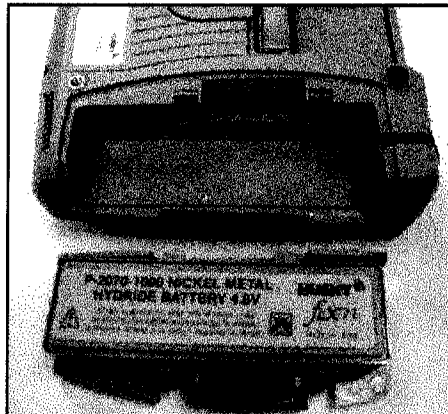
Basic System Set-up

When the fex21 is first removed from the box there are a few system set-up procedures that will need to be followed. The following sections cover the basic fex21 set-up procedure.

Fitting the Battery Pack

If your fex21 is supplied for use with Alkaline batteries then they will need to be fitted into the battery pack - you should insert four AA size alkaline cells into the battery holder, taking care that the polarity of each is correct. If in doubt check the label fitted to the battery holder.

Rechargeable NiMH (Nickel Metal Hydride) batteries, if supplied, are in a sealed pack ready to be fitted to the unit.



To fit either battery pack, slot the battery pack into the fex21 by locating the two small lugs in the side of the device and pressing the battery pack firmly in place until the two small catches click into position.

Powering the unit on for the first time

After fitting the battery, press the power key, located at the top centre of the keyboard, TWICE to power the unit on. The fex21 screen will be blank during the first few seconds of power up, to check if the unit is powering up press the backlight plus key once. If the backlight comes on the unit is powering up.

Note

The power key will need to be pressed twice to activate the unit only after total power loss or after inserting the battery after a long absence.

It may take a few seconds before the screen displays data, however this is normal. To power the unit off again simply press the power key once.

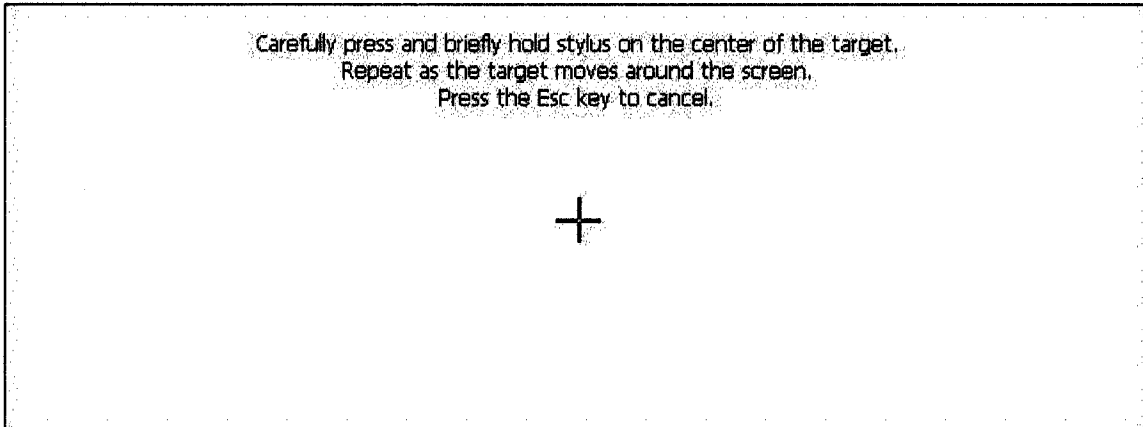
It may also be necessary to place the unit on external power as the battery may have discharged completely during transit.

If the unit fails to power up refer to the trouble shooting section of this document for reset procedures.

Screen Calibration

When the device is powered up for the first time, it will display the Windows CE Welcome screen. To navigate to the pen calibration screen tap the screen or press return. The touchscreen calibration instructions will be displayed on the device. Read these instructions then tap the screen or press return again.

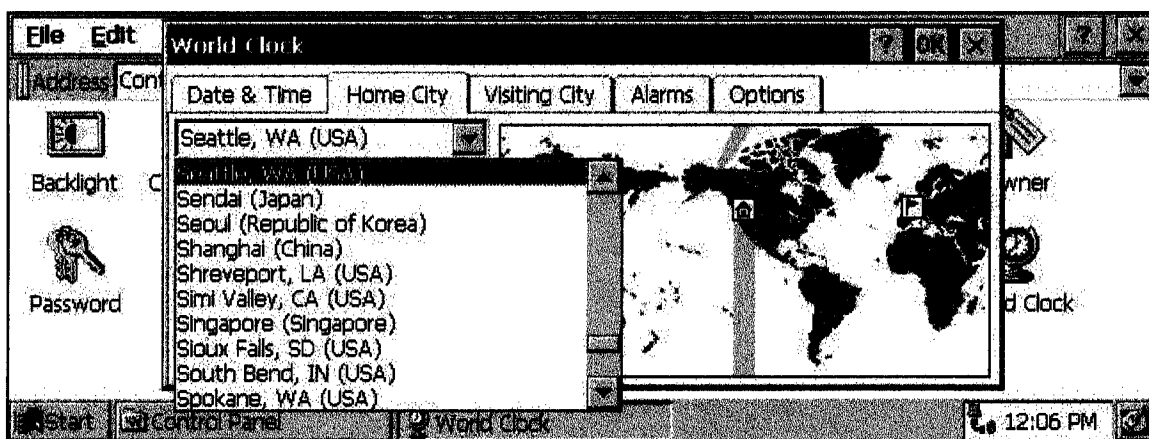
A rectangle will be displayed on screen with a cross in the centre. Hold the tip of the pen in the centre of this cross until it disappears. The cross will then move to the four corners of the screen in turn, hold the pen on the cross each time it moves. When a successful calibration has been achieved the cross will disappear completely and further instructions will be displayed.



Setting Time and Date

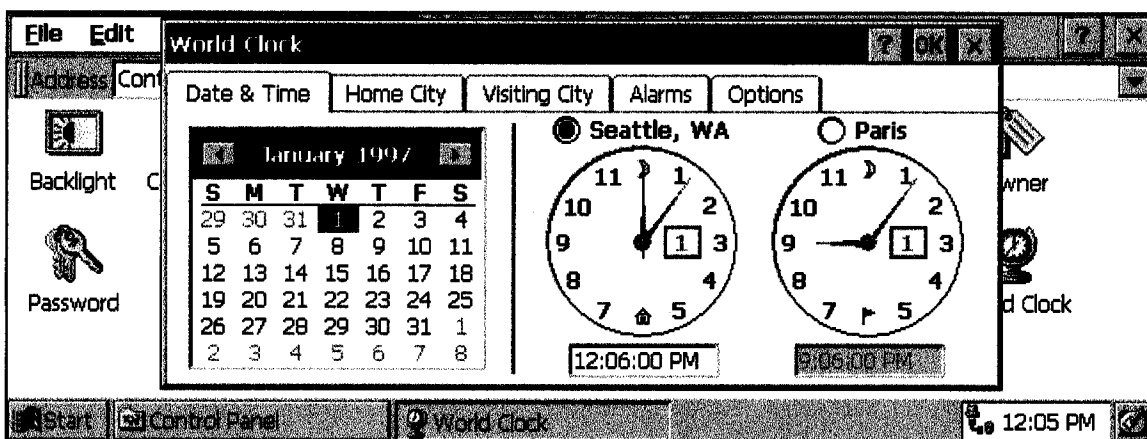
Once the touchscreen calibration has been completed the World Clock will be displayed.

If it is not already selected, click on the Home City tab then select your home city from the drop down list.



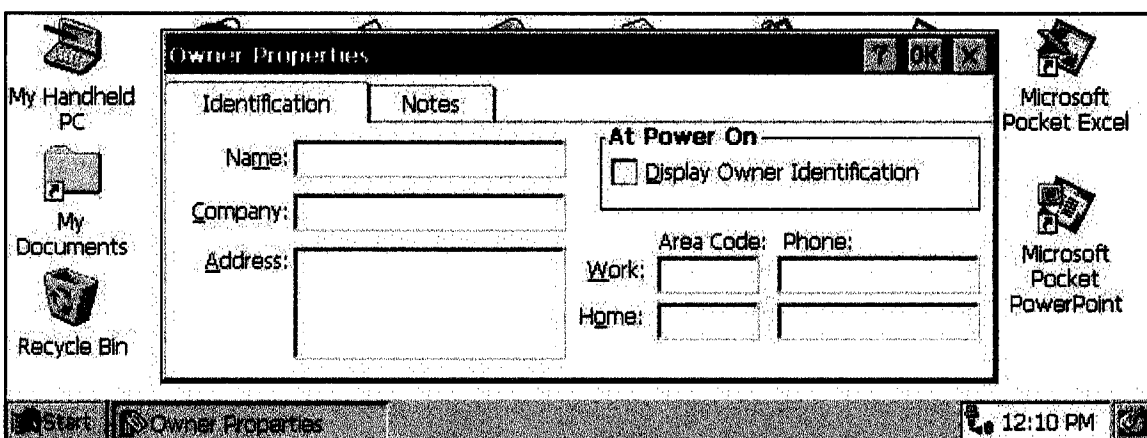
Setting Time and Date cont...

Once the correct City has been chosen, tap next and the Date & Time tab will then be displayed. Set the correct date on the calendar and then set the correct time on the left-hand clock by dragging the hour and minute hands on the clock face using the pen, or by typing in the time.



Record Personal Information

Finally the Owner Properties screen will be displayed. You can, if you wish, use this to enter your name and contact details (this is optional). By entering these details and checking the 'Display Owner Identification' checkbox you will ensure that your details are displayed each time the unit is powered on.

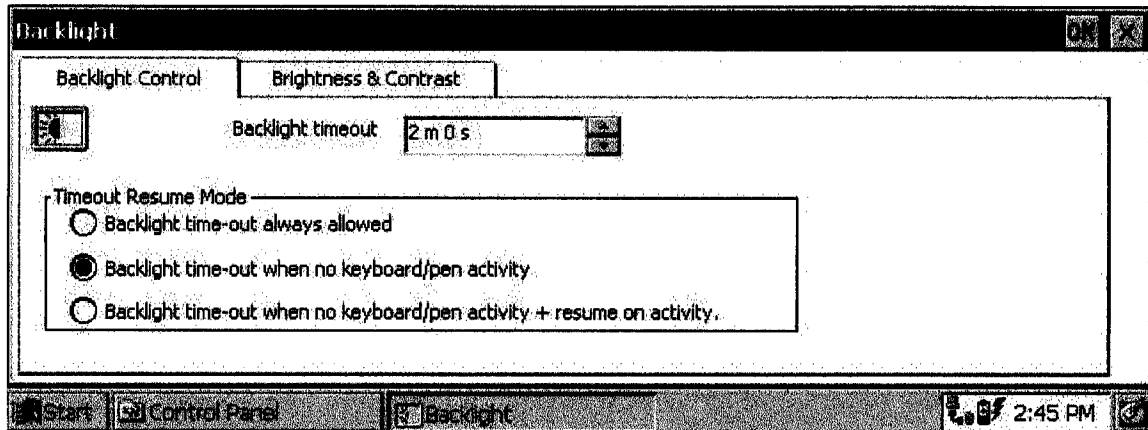


flex21 Utilities

The flex21 is supplied with two custom utilities, the flex21 Util applet and the flex21 Backlight Control applet. Both utilities are accessible from the Control Panel.

Backlight Control Applet

The Backlight Control Applet can be accessed through the Control Panel by double tapping the Backlight icon.



The Timeout Resume mode determines under what conditions the backlight is allowed to timeout.

When set to backlight timeout always allowed the backlight will time-out after the specified period regardless of keyboard or pen activity. The time-out timer will not be reset after a system event.

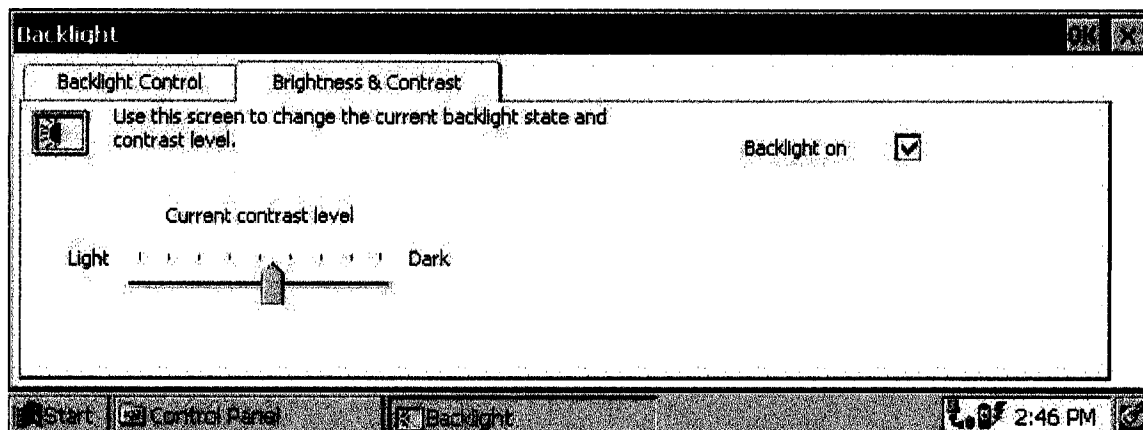
If the system is set to '*Backlight time-out when no keyboard/pen activity*' then the backlight will reset it's backlight time-out clock each time a key is pressed or the screen is tapped. This effectively means that if the unit is being constantly used the backlight will not time-out.

When set to '*Backlight time-out when no keyboard/pen activity+resume on activity*' the backlight will behave in the same way as the previous option but will automatically switch back on whenever the screen is tapped or a key is pressed. The user is not required to manually power on the backlight with the backlight key.

The backlight time-out period can be shortened or lengthened by using the scroll arrows at the side of the control. It is recommended that this time-out period be as short as possible to conserve battery power. The backlight time-out can be disabled by reducing the time-out period below 30 seconds. This will have the effect of leaving the backlight on constantly.

Brightness and Contrast

The brightness and contrast tab on the backlight control applet provides a further way to control the screen contrast and backlight power switch.



The '*Current contrast level*' slider displays where in the contrast scale the user has the feX21 set. By sliding the control forwards and backwards with the stylus the user can adjust the contrast level without using the contrast keys on the feX21 keyboard.

The contrast control will update in real time as the slider is moved but will not be saved until the pen is removed. It is possible to adjust the contrast to a point where the slider control can no longer be seen, if this happens then pressing the two contrast keys together will return the contrast to its default value.

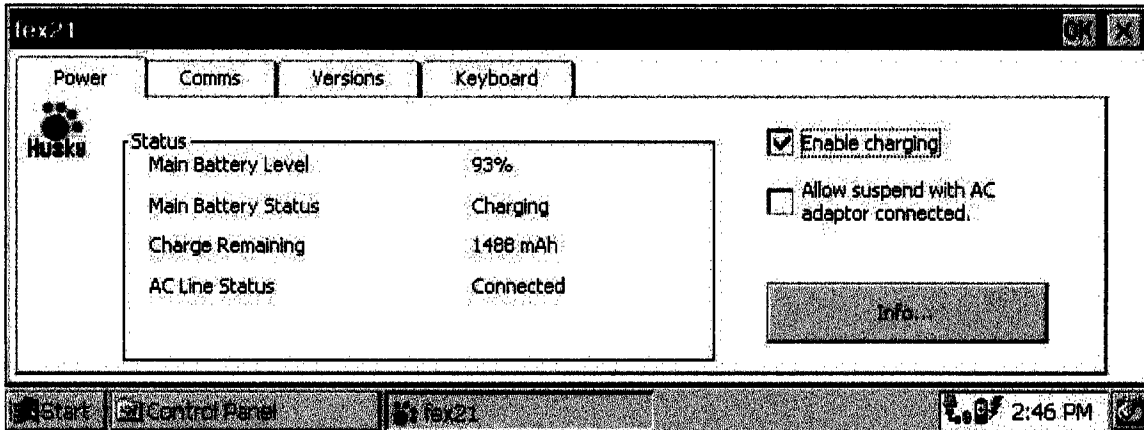
The '*Backlight on*' checkbox provides a further way to power the backlight on and off. By checking this box the backlight will be powered on and un-checking will turn the backlight off. On an STN colour unit turning the backlight on using this method will set the backlight to its maximum intensity and turning off will select its lowest intensity.

fex21 Util Applet

The fex21 Util Applet provides access to the many utilities required to make the most of the device. This is where the power management and communications settings can be controlled.

Power

The power tab within the applet allows the user to view the status of the power system and gain detailed information on how the battery is performing.



Main Battery Level

The *Main Battery Level* displays the current percentage remaining in the main power cell. This is an accurately estimated value based on the time active since last full charge and takes into account any self discharge of the cell whilst the device is powered off. The value also accounts for the battery power consumed maintaining the RAM contents of the unit. If the system thinks for any reason this value may be inaccurate then there will be a question mark (?) displayed adjacent to the value. If this happens then the unit will need to be placed on charge until the value reaches 100%, at this point the gas gauge will be reset and the value will once more be accurate.

Please note that if the unit has recently been charged to 100% charging will not restart until the gas gauge value has gone below 96% or for 24 hours after last charge. This feature was introduced into micro version 99D0 and above to prevent damaging charge regimes.

Main Battery Status

The main battery status can display four possible states:

- High
- Low
- Critical
- Charging

The High, Low and critical values are taken as a voltage reading from the battery and further reinforce the main battery level percentage. It is also from these values that the battery warnings are taken.

When the battery is charging an accurate voltage reading cannot be taken from the battery as it constantly changing so the flag *Charging* is used in it's place.

Charge Remaining

The charge remaining denotes the value in mAh left in the main cell. This value is calculated in the same way as the charge percentage remaining.

AC Line Status

The AC line status denotes whether or not the external charger is connected to the fex21. This status will read either *connected* or *not connected*.

Enable Charging

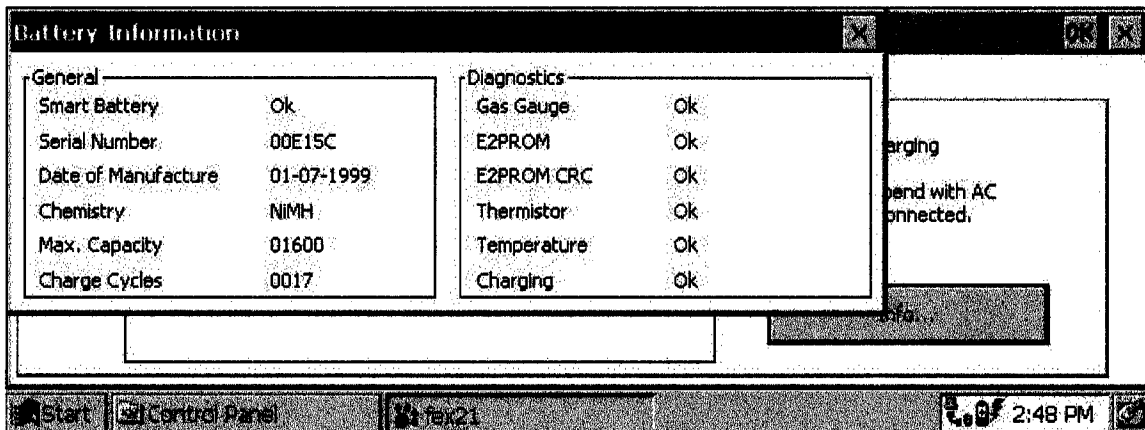
Charging can be enabled or disabled by use of this checkbox. When checked the unit will begin to charge automatically whenever the AC line is connected to the device. When not checked the unit will not charge regardless of what the AC line status is.

Allow suspend with AC adapter connected

If this box is checked then the unit can be powered off by use of the power key whilst the AC adapter is connected. This is not allowed by default, as the fex21 **must** be powered on in order to charge. Immediately the unit is powered off the device will cease charging. The device will not suspend automatically whilst on external power even with this option selected.

Battery Info Button

The fex21 contains a 1600mAh smart battery as it's main power cell. This smart battery is capable of providing a lot of information to the user. By pressing the Info button within the fex21 Util Applet power tab this detailed battery data can be viewed. Please note if the fex21 is being used with alkaline cells then this information will not be available to the user.



Smart Battery

This line will tell the user whether the smart battery status is OK or FAILED. If it reads FAILED then the reason for failure can be displayed in the Diagnostics box opposite. If the unit is working on external power or contains alkaline cells this option will display 'None Fitted' and the remaining information will be greyed out.

Serial Number

This value displays the serial number of the battery not the serial number of the unit into which it is inserted.

Date of Manufacture

This value displays the date the battery was manufactured, (Date format is British dd-mm-yyyy). This can be useful in determining when the battery is due for replacement, as can the charge cycles. It is recommended that the battery be replaced every 18 months or 500 charge cycles, whichever is sooner.

Chemistry

This displays the battery chemistry in use. Currently this is limited to NiMH only however other battery types may become available in the future.

Max Capacity

This displays the design capacity in mAh of the battery being used.

Charge Cycles

This value represents the number of times the battery has been charged and discharged.

Gas Gauge

This value denotes whether the gas gauge is deemed by the system to be OK or inaccurate. If set to inaccurate then the battery will need to be charged to 100% in order to reset the gas gauge.

E2PROM & E2PROM CRC

These two values denote whether the E2PROM (Smart battery information store) is working correctly. If either of these values read anything other than OK then all data from the smart battery may be incorrect. If this happens then the battery will have to be replaced.

Thermistor

The fex21 contains a NiMH cell, which it is dangerous to charge at extreme temperatures. The on board thermistor is the temperature control for charging. If the thermistor is set High or Low then this indicates that the thermistor itself is faulty. In this instance charging will be aborted and will not re-commence. This failure also means the battery will have to be replaced.

Temperature

This value denotes whether the battery temperature is too low, too high or OK. The battery will not charge if the temperature value is set to anything other than OK due to the danger presented by charging NiMH batteries at temperature extremes.

The battery will not charge above 52°C or below 0°C

Charging

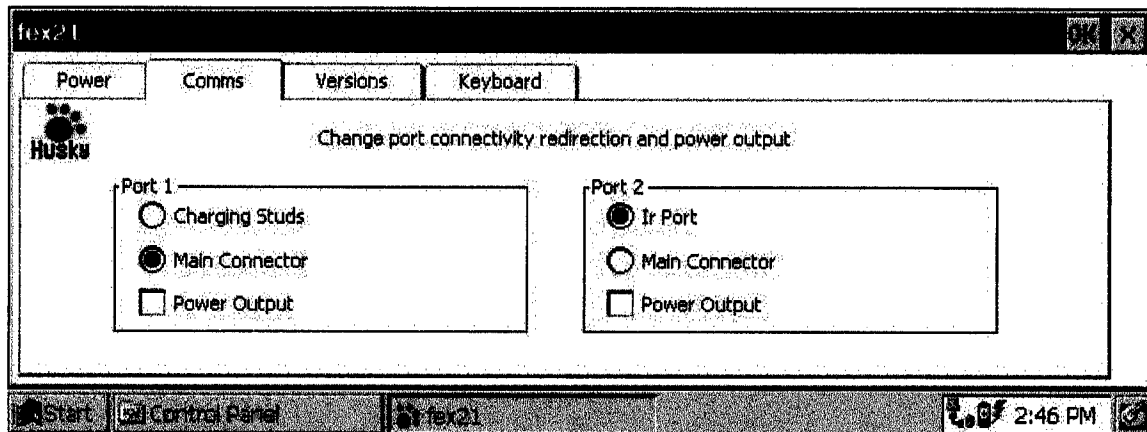
This line will denote whether charging is OK, failed or aborted. If this is set to any value than OK then the other information stored within the info screen will usually point to a reason for failure. There will also be an error code displayed if charging has failed. The codes are interpreted as follows:

- | | | |
|---|---|--|
| 0 | = | Incorrect chemistry (Battery not a NiMH cell therefore the system will not attempt charging) |
| 1 | = | Battery Over Temperature (Battery is too hot to safely charge) |
| 2 | = | Battery over volts (Battery voltage is too high. This indicates a battery failure) |
| 3 | = | Time out (Battery has not completed charging within the maximum time limit of 2.5 hours, this code is also an indication of a battery problem) |

If charging is aborted for any of the above reasons then the aborted flag will remain in place. The charging flag will not be reset until the charger is removed and the unit powered off then back on.

Comms

The Comms tab within the fex21 Util Applet allows the user to set the fex21 communications parameters for port1 and port2.



Port1 Charging Studs/Main Connector

These two radio buttons allow the user to select between communications through either the Main 9-way d-type for Com1 or the fex21 charging studs located at the base of the unit. Both options allow standard serial communications through the different hardware connectors.

Port2 Ir Port/Main Connector

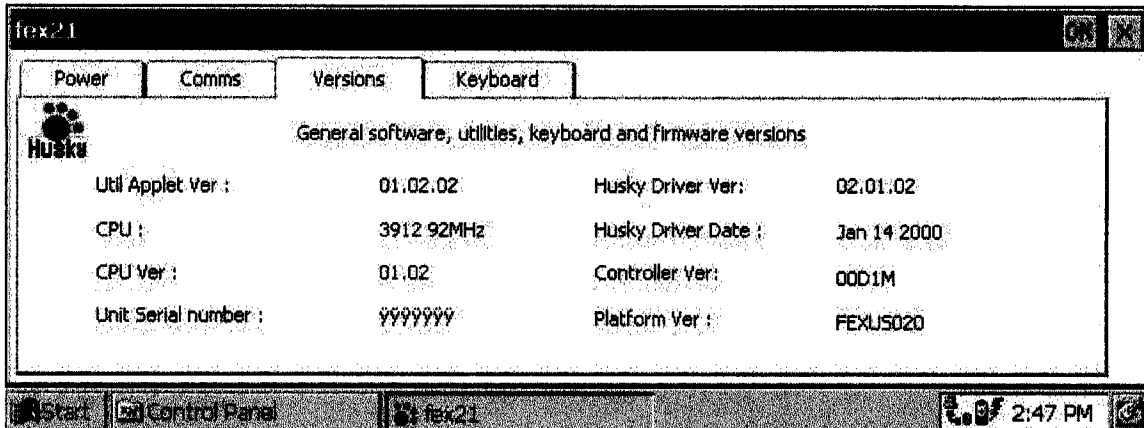
This option allows the user to select the Main port2 connector (where fitted) or the IrDA port at the base of the unit for serial communications. Note that for programming purposes both these ports are denoted as Com4 and not Com2. Under Windows CE COM2 is reserved for PCMCIA devices and is not available for the user or the programmer.

Power Output

The fex21 9-way d-type connectors both allow 5v power output on pin9. This allows parasitic devices such as barcode readers to be used with either port on the device.

Versions Tab

The versions tab provides the user with detailed information on exactly which software/firmware versions their particular device has installed. This is of particular use when the customer calls for technical support.



Util Applet Version

This denotes the version of the fex21 util applet the present on the device. This is usually the least important of the version numbers to the customer.

CPU

This information denotes the type and clock speed of the processor present in the device. The example above is using the Toshiba 3912 processor rated at 92MHz.

CPU Ver

This denotes the CPU version number as specified by Toshiba for their CPU processor. Husky have no control over this number.

Unit Serial Number

This figure displays the serial number of the unit being used. This should always match the number on the back of the unit.

Husky Driver Version

This denotes the version of the installed FEX21API.DLL. This DLL provides access to all the Husky specific functions required for system programming. The version number is usually of particular relevance when dealing with programming enquiries from the customer.

Husky Driver Date

This denotes the date the Husky Driver was last built.

Controller Version

This number corresponds to the version of Micro Controller installed on the device. The Micro Controller is responsible for all charging, screen display and backlight systems on the fex21 amongst other things. This version number is usually one of the most important details when dealing with customer problems.

Platform Version

This ID reports the O/S version and build number present on the device. Although independent of the Microsoft platform version, (Current being CE version 3.01), it is of vital importance in establishing whether a user has a device with the latest Husky O/S build on board. The Platform Version number does have a logical meaning:

Eg FEXUS020:

FEX = fex21

US = US/UK Language Variant - Other language variants include:

ES – Spanish

DE – German

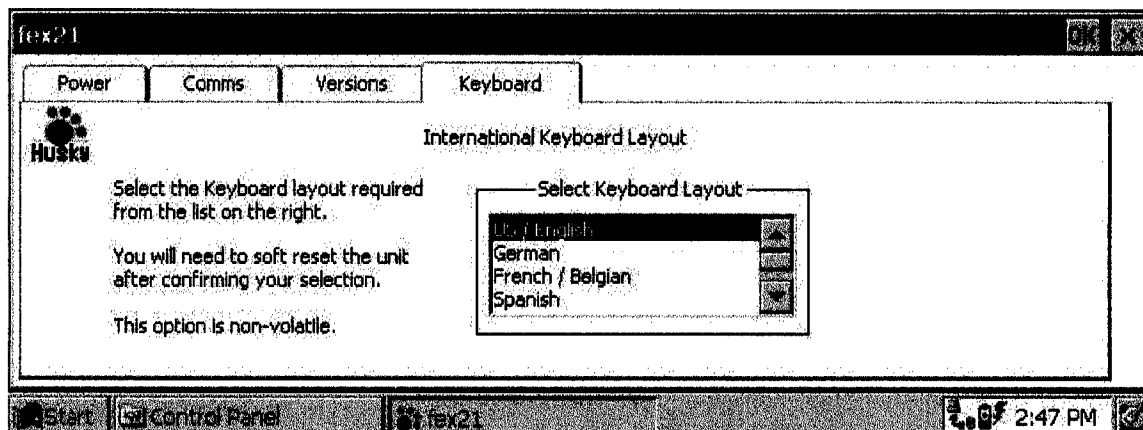
FR - French

020 = Husky Build version 020

Again this information is of great importance when offering technical support to end-users. This allows us to know exactly what system the user has on their device.

Keyboard Utility

The fex21 utility also provides a keyboard change utility.



This utility allows the user to select which keyboard language is available on the fex21. For example if the user required UK Windows with a Swedish keyboard then this option can be changed via this utility.

In order for a keyboard change to take effect the user will have to warm reset the device.

Note

This option is only available within the UK Operating System build. All other language variants of the CE system will need to use a software utility to change this option.

Trouble Shooting

Reset Mechanism

The flex21 contains two sets of reset sequences dependent upon the hardware revision of the unit. There are currently two main revisions in the field, rev05 and Rev06. The rev05 units are all 75mhz units and rev06 are all 92mhz systems. The processor clock speed can be determined by inspecting the configuration string on the unit serial label. Refer to the serial number section earlier in this guide for more details on the serial label.

Rev05 and earlier

Warm Reset

To warm reset a rev05 device the user is required to hold down the two contrast keys and the power key for 4-6 seconds. This will reset the device and close all running applications whilst keeping the RAM contents intact. The unit should be powered off before attempting a warm reset, unless the unit cannot be powered off utilising the power key.

Cold Reset

To achieve a cold reset on an older device the user should hold down both contrast keys and the power key for in excess of 16 seconds. This will reboot the machine, clear the contents of RAM and reset the system to factory defaults. Any data stored on compact flash will not be affected by this reset unless a file was open at the time of reset.

Rev06 and later

Warm Reset

To warm reset a newer device, hold down the two contrast keys only for 4-6 seconds. Unlike earlier Rev units it is not necessary to power the unit off to achieve this.

Cold Reset

To cold reset the system, hold down the two contrast keys, the power key and the backlight plus key for 4-6 seconds.

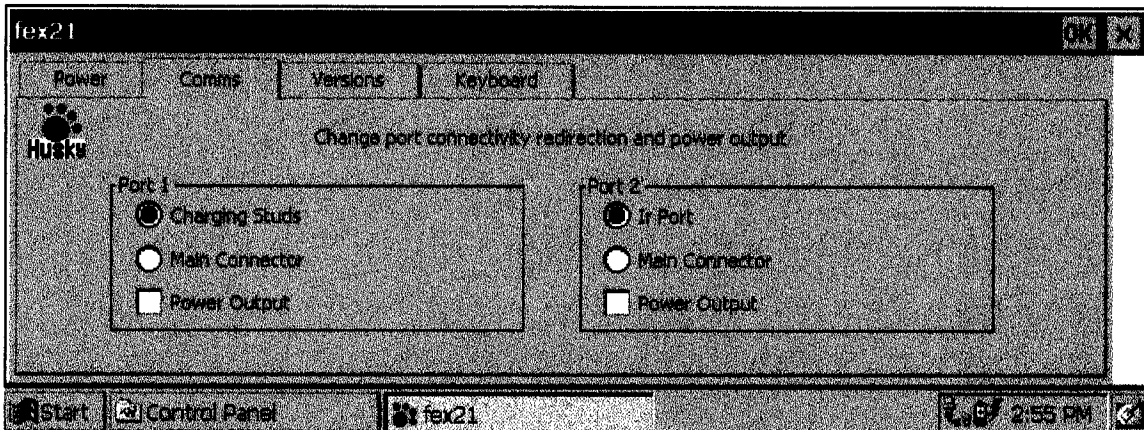
Both these reset mechanisms will have exactly the same effect on the devices. The reset key combination has changed only and not the effect.

The above reset mechanisms will provide a solution to a majority of flex21 problems. However, they should only really be used once all other options have been considered and not as a primary solution.

Communications Problems

Charging Studs

One of the most common communications problems with the fex21 is users attempting to use charging studs communications without redirecting comms from the main connector. To redirect comms from the main connector to charging studs the user must navigate to the comms tab of the fex21 Util Applet and check the charging studs radio button. This will then cut off the comms facility of the main 9-way d-type and route all com1 serial communications through the charging studs connector.



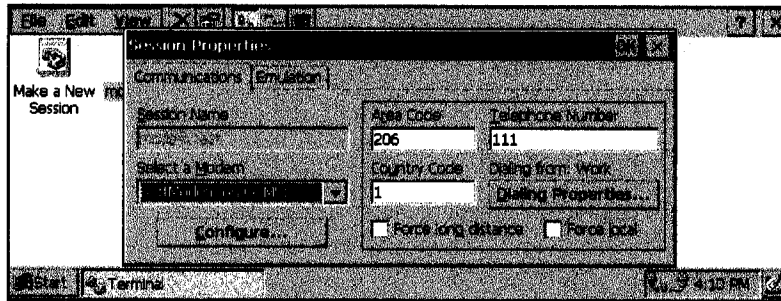
You will also notice that this screen also allows the user to redirect port two output in the same way. As the secondary COM port on the fex21 utilises com4 the IR port has to be disabled and redirected to main connector to allow 9-way comms.

Internal Soft Modem

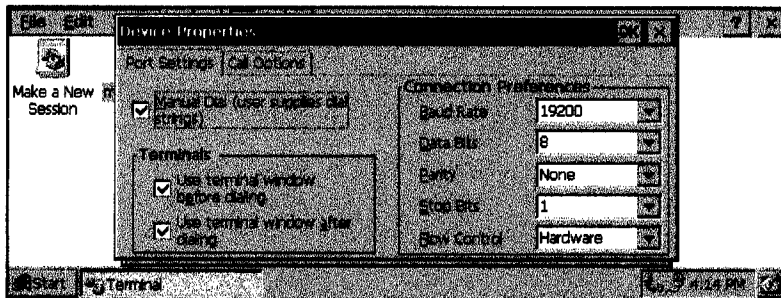
If a user is having problems connecting via the fex21 internal soft modem there are two main ways to test the unit.

Basic modem functionality

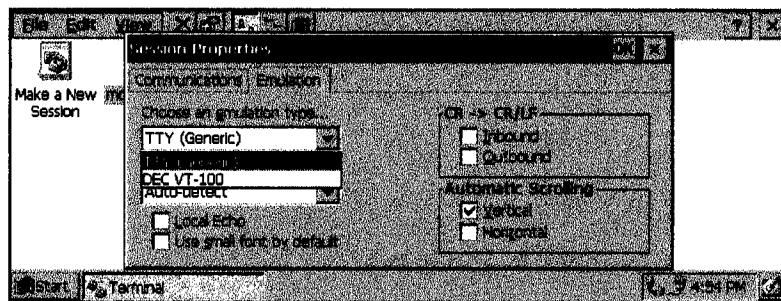
To test that the modem is attempting to connect, set up a basic terminal session on the device using an arbitrary value in the telephone number section.



Next, tap configure and ensure all three check boxes are ticked then tap OK

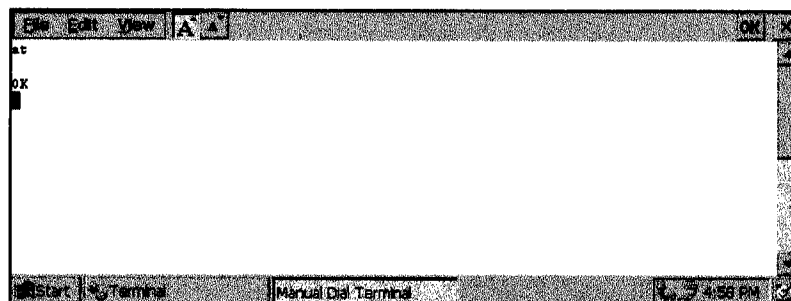


Select the Emulation tab and in the emulation type drop down list select TTY (Generic) then tap OK.



Double tap the icon just created and the terminal screen will open and display the manual dial screen.

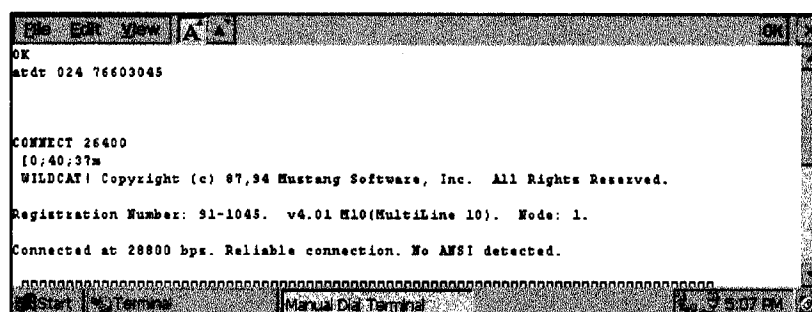
At the prompt type AT then press RETURN. If the modem is working correctly the session will return OK after pressing RETURN.



The next test is to attempt to dial out to a physical connection using a PSTN network. To do this simply connect the Itronix supplied phone cable to the feX21 and a nearby phone socket. Once connected select a simple text based bulletin board to dial and enter the following command:

ATDT xxxxxxxx (Where xxxxxxxx is the number of the chosen bulletin board).

Upon successful connection a screen similar to the following will be displayed



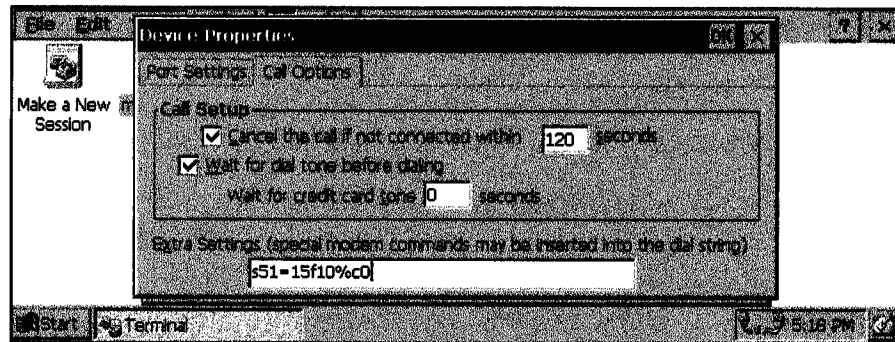
If both of these tests work then the internal SoftModem is working correctly.

If either test indicates failure then the modem has failed and will require return to factory for replacement.

Modem Speed

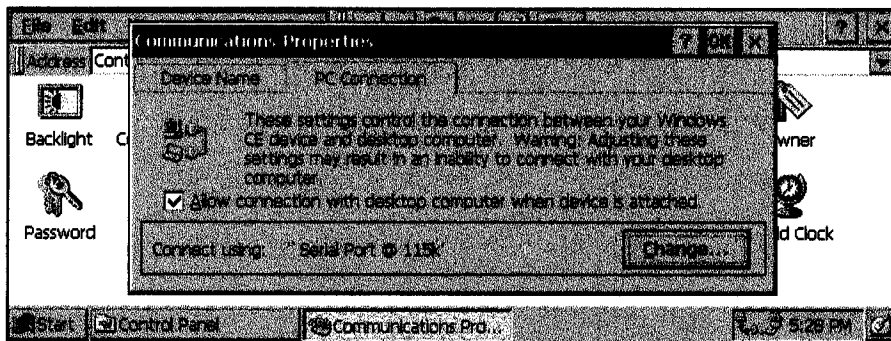
The feX21 internal modem can sometimes become slow and laboured for communications. If this happens there is a way to speed up the communications process. By issuing a dial string command within the extra settings option of the dial properties the user can force the system to amend it's baud rate and increase the throughput of data.

The dial string to use is:
s51=15f10%c0



Increasing Comms Baud Rate

The feX21 default baud rate for serial communications when using Active Sync is 19200. This can be changed by use of the communications option within the Control Panel.



Tapping the change button will display a drop down list box from which you can select the required baud rate. The option 'Serial Port @ 115K' is the fastest available speed.

Battery

Gas Gauge

One subject that has arisen many times in connection with the fex21 is charge life. The fex21 gas gauge does not become accurate until the battery has been charged to 100%. Many users charge the battery to 99% and believe that this will be sufficient for a working day. It is actually the case that a 99% charge is usually more indicative of a charging failure. This value has previously been used in the Micro Controller as a default display value. This practice has now been changed in newer Micro versions.

In order to ensure the gas gauge is accurate the user must charge the unit to 100% prior to use. At this level the gas gauge resets all its values and begins to display accurate information.

In later versions of the Micro Controller the gas gauge value will have an adjacent question mark if the system believes it to be inaccurate. One example of this is when a battery from another unit is placed in the fex21. The gas gauge value will not be known by the unit and therefore question mark will be placed adjacent to the reading.

Please note that as this information is controlled by the Micro Controller this is not O/S version specific.

Battery Temperature

The fex21 contains a 1600mAh NiMH main cell for its primary power supply. Due to the battery chemistry charge temperature is of great importance. The fex21 battery system will abort charging at 52°C. When this happens, the battery indicator LED will flash irregularly.

When the battery is charged for the first time it will almost certainly reach this critical temperature before it reaches full charge. This means that charging is aborted before completion and the gas gauge is not reset. If this does happen then remove the charger and power the unit down for about an hour to allow the battery to cool. Re-insert the charger and power the unit back up to continue charging. In this instance charging may complete within a few minutes.

Back-up Battery

The lack of back-up battery information has caused some confusion with many customers. Unlike many other CE devices the fex21 is equipped with a rechargeable backup cell. This cell is constantly trickle charged from the main battery. An unfortunate side effect of this recharge procedure is that a value cannot be obtained for remaining battery life. It is for this reason that the backup battery power remaining screen within the operating system is greyed out. This is normal for the fex21 and does not indicate battery failure.

Cards

CF Insertion

As with all CE devices the compact flash slot does not provide hot swap capability. The fex21 should be powered down before a compact flash card is inserted and it must be warm reset before the card is used.

If a compact flash card is inserted with the unit powered up it will usually cause a system lockup. This lockup will not be disastrous and can usually be recovered by warm resetting the unit. However, this situation can be easily avoided by ensuring the system is powered off before card insertion and warm reset immediately after card insertion. This is done so that Windows CE can register the card during reset.

Unknown PC card

All PC cards require windows CE drivers to be installed before use in the fex21, or any CE device. A wide variety of cards already have support built into Windows CE by default, particularly many communications cards. However, some cards require drivers to be obtained from the manufacturer before use. If a card does not have support built into the system an error message:

Unknown Card In Slot x (Where x is the slot number into which the card was inserted)

Will be displayed within a dialog box on screen. The appearance of this error message will require the user to obtain CE specific drivers for that card. If no drivers are available then the card cannot be used within the Windows CE operating system.

There was previously a fault whereby the system reported this error message when the drivers were installed. This fault was fixed in the Husky Service Patch and subsequently incorporated in the update to Operating System version 3.01, therefore this will not affect correctly configured systems.

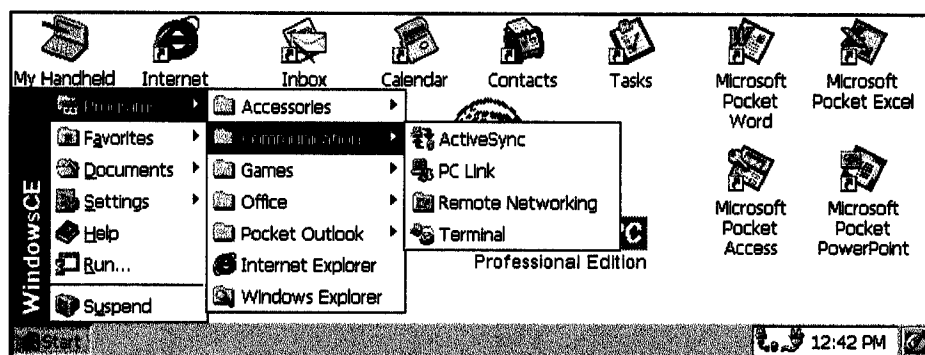
Screen Noise When Writing to CF

The fex21 will generate mild screen interference when writing large files to a compact flash card. This is not causing damage to any part of the device and can be safely ignored.

Active Sync

Baud Rate Changes

As mentioned in 'Increasing Comms Baud Rate' earlier in this guide it is possible to change the CE default communications baud rate. When this baud rate is changed it can cause minor problems to the Active Sync connection. Active Sync has an auto-baud facility that allows the PC software to detect the baud rate being used by the handheld and adjust accordingly. Usually when the handheld baud rate is changed the PC will fail to connect on the first attempt. If this happens the user should initiate another comms attempt manually by utilising the PC link option.



Utilising this option will force the handheld to retry communications.

Cable Requirements

Many customers have attempted to use their existing PC comms cables to communicate with the fex21. Although this can work with basic communications it is not recommended. The fex21 is supplied with it's own custom designed cable. This cable has been thoroughly tested for use and also contains the correct level of shielding. This is the only cable approved for use with the fex21. When attempting to diagnose any communications problem it is the cable that should be checked first.

Storage Requirements

Handheld Device

For optimum performance the fex21 should be stored in a dry environment free from direct sunlight at room temperature when not in use.

The maximum storage temperature for the fex21 is +60°C and the minimum storage temperature is -20°C. Unlike the operating temperature the storage temperature is the same for all devices.

The device should not be stored at extremes of temperature. For example leaving the fex21 on the dashboard of a vehicle in direct sunlight could cause damage to the unit.

Any important data held on the device should be backed up before placing the unit in storage as this can be lost if the batteries are allowed to go flat. Data stored on Compact Flash will not be lost.

Battery Management During Storage

Allowing the battery to drain completely during storage will cause irreversible damage to the cells and lower the overall charge capacity this can be avoided by using the correct storage method.

If the fex21 is being stored for extended periods with the main power cell installed the battery must be fully charged before storage and subsequently re-charged every 30 days thereafter. By doing this the user will avoid capacity loss within the cell.

An fex21 battery that is being stored externally to a unit will need to be re-charged every 90 days to avoid capacity loss.

Battery Life Too Short

One thing that causes problems on any mobile computer is battery life. Users will always complain that battery life is too short. Below are a few things that can be done to maximise battery life on the fex21.

System time-outs

The system time-outs, i.e. the backlight and power down time-outs, should be set to as short a period as possible. The unit should be allowed to enter suspend at the earliest opportunity. On entering suspend the device will automatically save the current settings and the system will resume where the user left off. This means that all the user has to do is press the power key to resume work.

Backlight Usage

The unit backlight should be used only when necessary. Although the system design makes use of low power components the backlight still draws a significant amount of power over normal usage. The backlight should be used only when necessary and allowed to time-out at the earliest opportunity.

AC Power

It is recommended that the fex21 be used on external power wherever possible. This will help to conserve battery power and top up the battery level where allowed.

PCMCIA

When using PC Cards the user should look specifically for low power versions. The PC Cards should be allowed to power down at the earliest opportunity and should not remain active when not in use.

Care should be taken when choosing the style of card to use, for example when deciding on mass storage media a flash card should be used in preference to a spinning disk drive wherever possible. Spinning drives draw significantly more current than flash cards.

Damaged or Old Batteries

Batteries that have exceeded their useful life (500 charge cycles) or have been damaged as a result of extended storage without charging can have a significantly reduced charge capacity. In this instance the batteries will need replacing.

Unit Will Not Power Up

Occasionally the fex21 will fail to power up at first attempt. This is almost always due to power problems within the unit and usually occurs after a prolonged period of storage. There are several options to try when this happens:

As a first option attempt to warm reset the device.

If the Warm Reset does not work then a cold reset should be tried, note that this will destroy all RAM stored data on the device.

If both of these options fail it suggests the unit does not contain enough power to re-boot, the system should be placed on external power and the reset sequences tried again.

If this option fails then leave the unit on charge for as long as possible, up to a maximum of 24 hours, and try to reset again.

If all of the above fail then leave the unit on charge without a main battery installed for a period of several hours and once again try to power the machine up.

Finally, if one is available, try powering the unit with a battery from a known good fex21. This may prove a damaged battery is being used.

Usually one of the above methods will re-start the system, however if they all fail it is usually an indication of hardware failure and will require the unit to be returned for repair.

Notes