

# Terminus 400AP Linux User Guide

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**JANUS** REMOTE  
COMMUNICATIONS

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## TABLE OF CONTENTS

TABLE OF CONTENTS and DISCLAIMER.....	2
400AP Linux User Guide Overview .....	3
Janus Remote Communications Cellular Plug-In Terminals.....	3
400AP Linux Communication I/O Mapping .....	4
Initialize and Power-On Plug-In Terminus.....	5
Test Plug-In Terminal AT Command Interface (ttyS1).....	6
Test Plug-In Terminal AT Command Interface (ttyUSB0).....	7
Initialize RS-485 Interface.....	8
Initialize CANBUS Interface.....	8
Terminal Emulator for use with the 400AP Console Serial Port.....	9
Revision History .....	10

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## Overview

The following document describes the process of configuring and testing the communication peripherals of the 400AP. The following list of communication peripherals require additional user setup in order to function.

Plug-In Terminus - GSM865CF, CDMA864CF and UMTS864CF  
External RS-485 Serial Port  
CANBUS Channel 0 and Channel 1

It is assumed in these directions that the listed user guides have been used to create and upload the Linux Kernel and File System. Documentation can be found at [http://www.janus-rc.com/400ap\\_downloads.html](http://www.janus-rc.com/400ap_downloads.html).

### Application Notes:

*Buildroot Toolchain Custom Installation for the 400AP*  
*Atmel SAM-BA Modifications*  
*Uploading Firmware Images to NAND Flash*

## Janus Remote Communications Cellular Plug-in Terminals:

The 400AP series terminal is equip with a cellular Plug-In terminal manufactured by Janus Remote Communications. The following table details 400AP models and the Plug-In terminal supplied.

400AP Model	Plug-in Terminal	Plug-in Terminal Description
GSM400AP V1.0	GSM865CF V1.0	GSM 2.5G radio, NavSync MS20 GPS module
GSM400AP V2.0	GSM865CF V2.0	GSM 2.5G radio, w/o GPS
CDMA400AP V2.0	CDMA864CF V2.0	Sprint, CDMA-1xRTT 3G radio, Integrated GPS
CDMA400AP V3.0	CDMA864CF V3.0	Verizon, CDMA-1xRTT 3G radio, Integrated GPS
UMTS400AP	UMTS864CF	UMTS 3.5G radio, Integrated GPS

Terminus Plug-In documentation can be found at the following URL.

<http://www.janus-rc.com/terminuscf.html>

The website includes hardware user guides and links to the Telit AT Command and Software User Guides for control of the Plug-In Terminus.

## 400AP Linux Communication I/O Mapping:

I/O	Linux Device	Dir	Driver	Run State	Note
Linux Console Port	ttyS0	BI	atmel_serial	n/a	1
Cellular AT Command Port	ttyS1	BI	atmel_serial	n/a	
External Serial Port (RS-232)	ttyS2	BI	atmel_serial	n/a	
External Serial Port (RS-485)	ttyS3	BI	atmel_serial	n/a	
MS20 NMEA Port	ttyS4	BI	atmel_serial	n/a	2
Telit Trace Port	ttyS5	BI	atmel_serial	n/a	3
ON_OFF	GPIO104	OUT	sysfs	0	
RESET	GPIO105	OUT	sysfs	0	
GPS_RESET	GPIO106	OUT	sysfs	0	2
SERVICE	GPIO108	OUT	sysfs	0	4
ENABLE	GPIO111	OUT	sysfs	0	
ENABLE_VBUS	GPIO113	OUT	sysfs	0	3
ENABLE AT PORT	GPIO94	OUT	sysfs	0	
PWRMON	GPIO95	IN	sysfs	n/a	
External GPIO_1	GPIO37	BI	sysfs	n/a	5
External GPIO_2	GPIO83	BI	sysfs	n/a	5
External GPIO_3	GPIO96	BI	sysfs	n/a	5
External GPIO_4	GPIO97	BI	sysfs	n/a	5

*Notes:*

1. Console serial port settings (115200,8,N,1)
2. GSM400AP V1.0 model only.
3. Not available on Beta units, pin/port will be connected on production units.
4. GSM400AP models only.
5. For 3.3Vdc CMOS level I/O, see Hardware User Guide

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## Initialize and Power On Plug-In Terminus:

The following steps use the sysfs GPIO drivers to initialize the Plug-In terminal installed in the 400AP.

### Step 1. Open a Terminal Emulator application. Login as root if needed, password is blank.

*Note: Refer to Terminal Emulator for use with the 400AP in this user guide.*

### Step 2. Run modem\_init script in Linux console.

This script needs to be run one time after the 400AP has been powered up.

#### modem\_init Script:

```
echo 94 >/sys/class/gpio/export
echo 95 >/sys/class/gpio/export
echo 104 >/sys/class/gpio/export
echo 105 >/sys/class/gpio/export
echo 106 >/sys/class/gpio/export
echo 108 >/sys/class/gpio/export
echo 111 >/sys/class/gpio/export
echo 113 >/sys/class/gpio/export

echo "high" >/sys/class/gpio/gpio94/direction
echo "in" >/sys/class/gpio/gpio95/direction
echo "low" >/sys/class/gpio/gpio104/direction
echo "low" >/sys/class/gpio/gpio105/direction
echo "low" >/sys/class/gpio/gpio106/direction
echo "low" >/sys/class/gpio/gpio108/direction
echo "low" >/sys/class/gpio/gpio111/direction
echo "low" >/sys/class/gpio/gpio113/direction
```

### Step 3. Run modem\_on\_off script in Linux console.

This script toggles the on off state of the Plug-In terminal every time it is run.

#### modem\_on\_off Script:

```
echo "0" >/sys/class/gpio/gpio113/value
echo "1" >/sys/class/gpio/gpio94/value
echo "1" >/sys/class/gpio/gpio104/value
sleep 3
echo "0" >/sys/class/gpio/gpio104/value
```

### Step 4. Check PWRMON state to verify that the Plug-In terminal has been turned on.

Issue: `cat </sys/class/gpio/gpio95/value`

A return value of 0 indicates that the Plug-In terminal has been turned on.

*Note: The PWRMON input can read high if GPIO94 is set high when the Plug-In terminal is off. Make sure to set GPIO94 and GPIO113 low before turning Plug-In terminal off. This will ensure an accurate read of the PWRMON input.*

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## Test Plug-In Terminal AT Command Interface (ttyS1):

All Plug-In terminals have an AT Command port exposed via a USART interface. The following instructions show how to send AT commands with the Microcom tool.

### Step 1. Run `modem_use_uart` script in Linux console.

This script is used to enable the CMOS drivers that connect between the 400AP and the Plug-In terminal.

`modem_use_uart` script:

```
echo "0" >/sys/class/gpio/gpio94/value
```

### Step 2. Launch `microcom` terminal emulator on 400AP Console port.

Issue: `microcom -s 115200 /dev/ttyS1`

### Step 3. In `microcom` issue an AT Command.

Issue: `AT+CGMI`

Response: `Telit`

*Note: Refer to Telit AT command guide.*

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## Test Plug-In Terminal AT Command Interface (ttyUSB0):

The CDMA and UMTS Plug-In terminals have an AT Command port exposed via USB interface. The following instructions show how to send AT commands with the Microcom tool.

### Step 1. Run `modem_use_usb` script in Linux console.

This script is used to enable the VBUS supply to the Plug-In terminal.

`modem_use_usb` script:

```
echo "1" >/sys/class/gpio/gpio113/value
```

### Step 2. After the Plug-In terminal is powered the USB driver will detect and initialize the following devices.

AT Command Port:	/dev/ttyUSB0
GPS NMEA Port:	/dev/ttyUSB1
Trace Port:	/dev/ttyUSB2

### Step 3. To create the devices issue: “`modprobe option`” followed by “`mdev -s`”.

*Note: These commands need to be executed after every boot.*

### Step 4. Launch microcom terminal emulator on 400AP Console port.

Issue: `microcom -s 115200 /dev/ttyUSB0`

### Step 5. In microcom issue an AT Command.

Issue: `AT+CGMI`

Response: Telit

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### Initialize RS-485 Interface:

The RS-485 interface is connected to ttyS3, which is configured for RS-232 mode when the 400AP boots. In order to change mode it is required to change the UART Mode Register at address 0xFFFFB8004.

**Step 1. Open a Terminal Emulator application. Login as root if needed, password is blank.**

*Note: Refer to Terminal Emulator for use with the 400AP in this user guide.*

**Step 2. Issue: DEVMEM 0xFFFFB8004 w 0xC00008C1**

**Step 3. To create ttyS3-ttyS5 devices issue: “mdev -s”.**

### Initialize CANBUS Interface:

The CANBUS interface controlled via device drivers that need to be manually started in order for the interface to operate.

**Step 1. Open a Terminal Emulator application. Login as root if needed, password is blank.**

*Note: Refer to Terminal Emulator for use with the 400AP in this user guide.*

**Step 2. Initialize CAN0 device interface.**

Issue: modprobe can  
Issue: modprobe can-dev  
Issue: modprobe can-raw  
Issue: modprobe mcp251x  
Issue: /sbin/ip link set can0 type can bitrate 500000  
Issue: /sbin/ip link set can0 up

**Step 3. Initialize CAN1 device interface.**

Issue: modprobe can  
Issue: modprobe can-dev  
Issue: modprobe can-raw  
Issue: modprobe mcp251x  
Issue: /sbin/ip link set can1 type can bitrate 500000  
Issue: /sbin/ip link set can1 up



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### Terminal Emulator for use with the 400AP Console Serial Port:

A Terminal Emulator is needed in order to communicate with the 400AP console serial port. The following instructions are for Minicom, but you can use a Terminal Emulator you are comfortable with.

**Step 1. Open a Linux Terminal window with user privileges that allow access to serial ports.**

**Step 2. Connect 400AP Console serial port to a PC serial port using a standard serial cable.**

**Step 3. Issue the following: minicom -s.**

Follow the on screen menus to configure the following parameters:

```
Serial Device:          /dev/ttyS0 (System Dependant)
Bps/Par/Bits:          115200 8N1
Hardware Flow Control: No
Software Flow Control: No
```

Save setup as DF1 before exiting.

**Step 4. Issue the following to launch Minicom Terminal Emulator: minicom -o**

# Terminus 400AP Linux User Guide



## Revision History

Revision	Revision Date	Note
00	01/19/12	Released User Guide
01	02/03/12	New I/O Mapping and Overview

**JANUS** REMOTE  
COMMUNICATIONS

Division of The Connor-Winfield Corporation  
2111 Comprehensive Drive • Aurora, Illinois 60505  
630.499.2121 • Fax: 630.851.5040

[www.janus-rc.com](http://www.janus-rc.com)

**Janus Remote Communications Europe**

Bay 143  
Shannon Industrial Estate  
Shannon, Co. Clare, Ireland  
Phone: +353 61 475 666