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# **insulaudit:decoding-carelink Documentation**

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**Insulaudit contributors**

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## 1.1 Link

### 1.1.1 link Module

**exception** `decocare.link.AlreadyInUseException`

Bases: `exceptions.Exception`

**class** `decocare.link.Link` (*port*, *timeout=None*)

Bases: `object`

**close** ()

**open** (*newPort=False*, *\*\*kws*)

**port** = `None`

**read** (*c*)

**readline** ()

**readlines** ()

**write** (*string*)

## 1.2 Stick

This manages communications with the usb stick itself. This is really the heart of the whole package.

Given a [Link](#), with read/write methods, this module will allow using the usb stick as a radio to communicate with compatible medical devices.

### 1.2.1 stick Module

**exception** `decocare.stick.BadCRC`

Bases: `decocare.errors.StickError`

`decocare.stick.CRC8` (*data*)

**class** `decocare.stick.InterfaceStats`

Bases: `decocare.stick.StickCommand`

Abstract stats decoder.

```
INTERFACE_IDX = 19
```

```
code = [5]
```

```
classmethod decode (klass, data)
```

Decode interface stats. The stick exposes 6 counters to monitor errors, crcs, naks, timeouts, rx, and tx packets. Very useful for debugging.

```
label = 'usb.interfaceStats'
```

```
parse (data)
```

```
#>>>
```

```
class decocare.stick.LinkStatus
```

Bases: *decocare.stick.StickCommand*

Basic ACK type of command. Used to poll the modem's radio buffer. When the radio buffer is full, we can download a packet from the buffer. Otherwise, we need to be mindful of the state the radio is in. This opcode tells you the current state of the radio/stick.

```
code = [3]
```

```
parse (result)
```

```
#>>>
```

```
reasons = ['OK']
```

```
record_error (result)
```

```
set_reason (status)
```

```
class decocare.stick.ProductInfo
```

Bases: *decocare.stick.StickCommand*

Get product info from the usb device.

Useful for identifying what kind of usb stick you've got; there are a few different kinds. Eg, European vs US regulatory domains require different frequencies for compliance.

```
SW_VER = 16
```

```
code = [4]
```

```
classmethod decode (klass, data)
```

```
classmethod decodeInterfaces (klass, L)
```

```
iface_key = {1: 'Paradigm RF', 3: 'USB'}
```

```
label = 'usb.productInfo'
```

```
parse (data)
```

```
#>>>
```

```
rf_table = {0: '916.5Mhz', 1: '868.35Mhz', 255: '916.5Mhz'}
```

```
class decocare.stick.RadioStats
```

Bases: *decocare.stick.InterfaceStats*

Count of packets and stats on the radio side of the stick.

```
code = [5, 0]
```

```
class decocare.stick.ReadRadio (size)
```

Bases: *decocare.stick.StickCommand*

Read buffer from the radio.



Downloads a packet from the radio buffer.

```
code = [12, 0]
```

```
dl_size = 0
```

```
format ()
```

```
parse (raw)
```

Detect BadCRC here. Also, look for eod set.

```
respond (raw)
```

```
size = 64
```

```
class decocare.stick.SignalStrength
```

Bases: *decocare.stick.StickCommand*

This seems to be required to initialize communications with the usb stick. Also, you should wait until a minimum threshold is reached.

```
code = [6, 0]
```

```
parse (data)
```

```
#>>>
```

```
class decocare.stick.Stick (link)
```

Bases: *object*

The carelink usb stick acts like a buffer.

It has a variety of commands providing synchronous IO, eg, you may generally perform a read immediately after writing to it, and expect a response.

The commands operate on a local buffer used to facilitate exchanging messages over RF with the pump. RF communication with the pump happens asynchronously, requiring us to go through 3 separate phases for each message we'd like to exchange with the pumps: \* transmit - send command \* poll\_size - loop \* download - loop

Each command is usually only 3 bytes.

The protocol offers some facility for detecting and recovering from inconsistencies in the underlying transport of data, however, we are somewhat ignorant of them. The tricky bits are exactly how to recover from, eg CRC, errors that can occur. The “shape” and timing of these loops seem to mostly get the job done.

The Stick object provides a bunch of useful methods, that given a link, will represent the state of one active usb stick.

```
clear_buffer ()
```

An alternative download solution. This can be helpful in scenarios where a prior run seems crashed your process, but the radio is still transmitting and receiving data. Running this method collects data from the radio until it's done receiving, more or less, at which point you should be free to try again.

```
close ()
```

```
static decode_hex (msg, Candidate)
```

```
download (size=None)
```

Theory is to download anything and everything available off the radio buffer, and to wait if necessary.

```
download_packet (size)
```

This is the tricky bit, where we stroke the radio and hope it gives us a buffer full of data.

```
interface_stats ()
```

debug both sets of interface stats.

**link** = None

**old\_download\_packet** (*size*)

Naive version of downloading a packet. Didn't quite work right.

**open** ()

Open and get signal strength so everything is ready to go.

**poll\_size** ()

query how many bytes are waiting in the radio buffer, ready to be downloaded

There seem to be a few sweet spots, where you want to download the data.

**process** ()

Working with the usb stick typically follows a pretty routine process: 1. send our opcode, get a response  
2. use some custom logic, per opcode to respond to the stick's response 3. parse the response from that,  
return result

This has to be done for each opcode.

**product\_info** ()

Get the product info from the connected stick.

**query** (*Command*)

query - simplify the process of working with the stick, pass your command, get the result

**radio\_stats** ()

just get radio stats.

**read\_status** ()

Get current link status.

**send\_force\_read** (*retries=1, timeout=1*)

Pretty simple, try really hard to ensure that we've sent our bytes, and we get a response. This is probably overkill, but seems to get the job done.

**signal\_strength** ()

just get signal strength from connected stick

**transmit\_packet** (*command*)

Address a pump with a request.

**usb\_stats** ()

just get usb stats.

**class** decocare.stick.StickCommand

Bases: object

Basic stick command

Each command is used to talk to the usb stick. The usb stick interprets the opcode, and then performs the function associated with the opcode. Altogether, the suite of opcodes that the stick responds to allows you to debug and track all packets you are sending/receiving plus allows you to send receive commands to the pump, by formatting your message into payloads with opcodes, and then letting the stick work on what you've given it. It's kind of like a modem with this funky binary interface and 64 byte payloads.

**code** = [0]

**delay** = 0.001

**format** ()

**format\_c12** (*msg, a2=0, a3=0*)

**label** = 'example stick command'

**parse** (*data*)

**respond** (*raw*)

**size** = 64

**class** `decocare.stick.TransmitPacket` (*command*)

Bases: `decocare.stick.StickCommand`

Format a packet to send on the radio.

This commands formats a packet from usb, and shoves it into the radio buffer. The radio buffer is broadcast “over the air” so that any device sensitive to the packets you sent will respond accordingly (probably sending data back). For this reason, the serial number of the device you’d like to talk to is formatted into the packet.

**calcRecordsRequired** ()

**code** = [1, 0, 167, 1]

**format** ()

Formatting of the packet to be sent gets done here.

**head** = [1, 0, 167, 1]

**parse** (*results*)

**respond** (*raw*)

**exception** `decocare.stick.UnresponsiveError`

Bases: `decocare.errors.StickError`

**class** `decocare.stick.UsbStats`

Bases: `decocare.stick.InterfaceStats`

Count of packets and stats on the usb side of the stick.

**code** = [5, 1]

The carelink usb stick acts like a modem. It responds to modem commands, in order to exchange data with a remote end-point. In this case, our little carelink usb modem responds to a variety of binary commands, which you must use in a co-ordinated flow to exchange data with the remote equipment. Also, in our case, the only remote equipment the carelink usb stick is known to talk to are the Me\*\*ronic Par\*\*igm series pumps.

The purpose of this module is to encapsulate the low level operations needed to use the stick in any practical sense. It serves as a set of guides and tutorials which should help people trying to understand or their therapy better. This module seems mostly correct, but things start to fall apart when downloading lots of data. The protocol is either sensitive to some timing somewhere that I’m unaware of, or when CRC errors or other things happen, I simply do the wrong thing to recover.

Please ask Medtronic for more information on how to learn what your device is doing.

## 1.3 Session

### 1.3.1 session Module

**class** `decocare.session.Pump` (*stick*, *serial*=‘208850’)

Bases: `decocare.session.Session`

**execute** (*command*)

**power\_control** (*minutes*=None)

```
    query (Command, **kws)
    read_history_0 ()
    read_model ()
    setModel (model=None, number=None)
class decocare.session.Session (stick)
    Bases: object
    download ()
    end ()
    execute (command)
    init (skip_power_control=False)
    transfer ()
```

## 1.4 Commands

Each kind of medical device responds to different commands, but some of them respond to a suite of overlapping commands. Here's a discussion of some of the commands available.

(There are many more.)

### 1.4.1 commands Module

```
class decocare.commands.BaseCommand (code, descr, *args)
    Bases: object
    bytesPerRecord = 0
    code = 0
    descr = '(error)'
    done ()
    effectTime = 0
    format ()
    hexdump ()
    maxRecords = 0
    params = []
    respond (data)
    responded = False
    retries = 2
    timeout = 3
class decocare.commands.KeypadPush (**kws)
    Bases: decocare.commands.PumpCommand
    classmethod ACT (klass, **kws)
```

```

classmethod DOWN (klass, **kws)
classmethod EASY (klass, **kws)
classmethod ESC (klass, **kws)
classmethod UP (klass, **kws)

code = 91

descr = 'Press buttons on the keypad'

maxRecords = 0

params = []

retries = 1

```

```

class decocare.commands.PowerControl (minutes=None, **kws)
    Bases: decocare.commands.PumpCommand

```

```

>>> PowerControl(serial='665455').format() == PowerControl._test_ok
True

```

```

code = 93

descr = 'RF Power On'

effectTime = 12

maxRecords = 0

params = [1, 10]

retries = 0

```

```

class decocare.commands.PowerControlOff (minutes=None, **kws)
    Bases: decocare.commands.PowerControl

```

Here's an example where arguments clearly modify behavior.

```

params = [0, 0]

```

```

class decocare.commands.PumpCommand (**kws)
    Bases: decocare.commands.BaseCommand

```

```

Validator
    alias of FieldChecker

allocateRawData ()

bytesPerRecord = 64

calcRecordsRequired ()

check_output (data)

data = bytearray(b'')

effectTime = 0.5

format ()

getData ()

log_name (prefix='')

maxRecords = 1

output_fields = []

```

```
    params = []
    retries = 2
    save (prefix='')
    serial = '208850'
    validate (data)

class decocare.commands.PumpResume (**kws)
    Bases: decocare.commands.SetSuspend
    descr = 'Resume pump (cancel suspend)'
    params = [0]

class decocare.commands.PumpSuspend (**kws)
    Bases: decocare.commands.SetSuspend
    descr = 'Suspend pump'
    params = [1]

class decocare.commands.ReadBasalTemp (**kws)
    Bases: decocare.commands.PumpCommand
    MM511 - 120 MM512 and up - opcode 152 # strokes per basalunit = 40 - mm12, 10 in mm11
    code = 152
    descr = 'Read Temp Basal'
    getData ()
    maxRecords = 1
    params = []
    retries = 2

class decocare.commands.ReadBatteryStatus (**kws)
    Bases: decocare.commands.PumpCommand
    code = 114
    descr = 'Read Battery Status'
    getData ()
    maxRecords = 1
    params = []
    retries = 2

class decocare.commands.ReadContrast (**kws)
    Bases: decocare.commands.PumpCommand
    code = 195
    descr = 'Read Contrast'
    getData ()
    maxRecords = 1
    params = []
    retries = 2
```

```
class decocare.commands.ReadCurPageNumber (**kws)
    Bases: decocare.commands.PumpCommand
```

```
    code = 157
```

```
    descr = 'Read Cur Page Number'
```

```
    getData()
```

```
    maxRecords = 1
```

```
    pages = 'unknown'
```

```
    params = []
```

```
    respond(data)
```

```
    retries = 2
```

```
class decocare.commands.ReadErrorStatus (**kws)
    Bases: decocare.commands.PumpCommand
```

```
>>> ReadErrorStatus(serial='665455').format() == ReadErrorStatus._test_ok
True
```

```
    code = 117
```

```
    descr = 'Read Error Status any current alarms set?'
```

```
    maxRecords = 1
```

```
    params = []
```

```
    retries = 2
```

```
class decocare.commands.ReadFirmwareVersion (**kws)
    Bases: decocare.commands.PumpCommand
```

```
    code = 116
```

```
    descr = 'Read Firmware Version'
```

```
    getData()
```

```
    maxRecords = 1
```

```
    params = []
```

```
    retries = 2
```

```
class decocare.commands.ReadGlucoseHistory (page=None, **kws)
    Bases: decocare.commands.ReadSensorHistoryData
```

```
>>> ReadGlucoseHistory(page=1).params
[0, 0, 0, 1]
>>> list(ReadGlucoseHistory(page=1).format())
[1, 0, 167, 1, 32, 136, 80, 128, 4, 0, 2, 2, 0, 154, 34, 0, 0, 0, 1, 155]
>>> ReadGlucoseHistory(page=2).params
[0, 0, 0, 2]
>>> ReadGlucoseHistory(page=3)
<ReadGlucoseHistory: size[1024]: [page] [3]: data[0]:>
>>> list(ReadGlucoseHistory(page=3).format())
[1, 0, 167, 1, 32, 136, 80, 128, 4, 0, 2, 2, 0, 154, 34, 0, 0, 0, 3, 54]
>>> ReadGlucoseHistory(page=3).params
[0, 0, 0, 3]
>>> ReadGlucoseHistory(params=[1]).params
```

```
[1]
>>> ReadGlucoseHistory (params=[2]).params
[2]
>>> ReadGlucoseHistory (params=[3]).params
[3]
```

**code = 154**

**descr = 'Read glucose history'**

**params = []**

**class** decocare.commands.**ReadHistoryData** (page=None, \*\*kws)  
Bases: *decocare.commands.PumpCommand*

```
>>> ReadHistoryData (serial='208850', params=[ 0x03 ]).format () == ReadHistoryData._test_ok
True
>>> ReadHistoryData (params=[ 0x01 ]).params
[1]
>>> ReadHistoryData (params=[ 0x02 ]).params
[2]
>>> ReadHistoryData (params=[ 0x03 ]).params
[3]
>>> ReadHistoryData (page=0x01).params
[1]
>>> ReadHistoryData (page=0x02).params
[2]
>>> ReadHistoryData (page=0x03).params
[3]
```

**code = 128**

**data = bytearray(b'')**

**descr = 'Read History Data'**

**done ()**

**effectTime = 0.1**

**getData ()**

**log\_name (prefix='')**

**maxRecords = 16**

**page = None**

**params = []**

**respond (raw)**

**retries = 2**

**class** decocare.commands.**ReadPumpID** (\*\*kws)  
Bases: *decocare.commands.PumpCommand*

**code = 113**

**descr = 'Read Pump ID'**

**getData ()**

**maxRecords = 1**

**params = []**



```
retries = 2
```

```
class decocare.commands.ReadPumpModel (**kws)
    Bases: decocare.commands.PumpCommand
```

```
>>> ReadPumpModel(serial='665455').format() == ReadPumpModel._test_ok
True
```

```
code = 141
```

```
descr = 'Read Pump Model Number'
```

```
getData()
```

```
maxRecords = 1
```

```
params = []
```

```
retries = 2
```

```
class decocare.commands.ReadPumpState (**kws)
    Bases: decocare.commands.PumpCommand
```

```
>>> ReadPumpState(serial='665455').format() == ReadPumpState._test_ok
True
```

```
code = 131
```

```
descr = 'Read Pump State'
```

```
maxRecords = 1
```

```
params = []
```

```
retries = 2
```

```
class decocare.commands.ReadPumpStatus (**kws)
    Bases: decocare.commands.PumpCommand
```

```
code = 206
```

```
descr = 'Read Pump Status'
```

```
getData()
```

```
maxRecords = 1
```

```
params = []
```

```
retries = 2
```

```
class decocare.commands.ReadRTC (**kws)
    Bases: decocare.commands.PumpCommand
```

```
code = 112
```

```
descr = 'Read RTC'
```

```
getData()
```

```
maxRecords = 1
```

```
params = []
```

```
retries = 2
```

```
class decocare.commands.ReadRadioCtrlACL (**kws)
    Bases: decocare.commands.PumpCommand
```

```
code = 118
descr = 'Read Radio ACL'
getData ()
maxRecords = 1
params = []
retries = 2

class decocare.commands.ReadRemainingInsulin (**kws)
    Bases: decocare.commands.PumpCommand

    basalStrokes = 10.0
    code = 115
    descr = 'Read Remaining Insulin'
    endByte = 2
    getData ()
    maxRecords = 1
    params = []
    retries = 2
    startByte = 0

class decocare.commands.ReadRemainingInsulin523 (**kws)
    Bases: decocare.commands.ReadRemainingInsulin

    basalStrokes = 40.0
    endByte = 4
    startByte = 2

class decocare.commands.ReadSettings (**kws)
    Bases: decocare.commands.PumpCommand

    XXX: changed in MM512 to 192
    alarm (alarm)
    byte_map = {}
    code = 192
    descr = 'Read Settings'
    getData ()
    maxRecords = 1
    output_fields = ['maxBolus', 'maxBasal', 'insulin_action_curve']
    params = []
    retries = 2
    temp_basal_type (data)

class decocare.commands.ReadSettings523 (**kws)
    Bases: decocare.commands.ReadSettings
```

```
    getData ()

class decocare.commands.ReadTotalsToday (**kws)
    Bases: decocare.commands.PumpCommand

    code = 121

    descr = 'Read Totals Today'

    getData ()

    maxRecords = 1

    params = []

    retries = 2

class decocare.commands.SetSuspend (**kws)
    Bases: decocare.commands.PumpCommand

    code = 77

    descr = 'Set Pump Suspend/Resume status'

    getData ()

    maxRecords = 1

    params = []

    retries = 2

decocare.commands.PushEASY (**kws)
decocare.commands.PushUP (**kws)
decocare.commands.PushDOWN (**kws)
decocare.commands.PushACT (**kws)
decocare.commands.PushESC (**kws)

class decocare.commands.TempBasal (**kws)
    Bases: decocare.commands.PumpCommand

    classmethod Program (klass, rate=None, duration=None, temp=None, **kws)

    code = 76

    descr = 'Set temp basal'

    classmethod format_params (klass, rate, duration)

    classmethod format_percent_params (klass, rate, duration)

    getData ()

    params = [0, 0, 0]

    retries = 0

class decocare.commands.ManualCommand (**kws)
    Bases: decocare.commands.PumpCommand

    getData ()

    log_name (prefix='')

class decocare.commands.ReadCurGlucosePageNumber (**kws)
    Bases: decocare.commands.PumpCommand
```

```
code = 205
descr = 'Read Cur Glucose Page Number'
getData ()
maxRecords = 1
params = []
retries = 2

class decocare.commands.SetAutoOff (**kws)
    Bases: decocare.commands.PumpCommand

    code = 78
    maxRecords = 0

class decocare.commands.SetEnabledEasyBolus (**kws)
    Bases: decocare.commands.PumpCommand

    code = 79
    maxRecords = 0

class decocare.commands.SetBasalType (**kws)
    Bases: decocare.commands.PumpCommand

    code = 104

class decocare.commands.TempBasalPercent (**kws)
    Bases: decocare.commands.TempBasal

    code = 105
    descr = 'Set temp basal by percent'
    params = [0, 0]
    retries = 0

class decocare.commands.Bolus (**kws)
    Bases: decocare.commands.PumpCommand

    Bolus some insulin.

    XXX: Be careful please. Best trying this not connected to the pump until you trust it.

    code = 66
    descr = 'Bolus'
    getData ()
    params = []

class decocare.commands.ReadErrorStatus508 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 38
    descr = 'error status'
    params = []

class decocare.commands.ReadBolusHistory (**kws)
    Bases: decocare.commands.PumpCommand
```

```
    code = 39
    descr = 'bolus history'
    params = []
class decocare.commands.ReadDailyTotals (**kws)
    Bases: decocare.commands.PumpCommand
    code = 40
    descr = '...'
    params = []
class decocare.commands.ReadPrimeBoluses (**kws)
    Bases: decocare.commands.PumpCommand
    code = 41
    descr = '...'
    params = []
class decocare.commands.ReadAlarms (**kws)
    Bases: decocare.commands.PumpCommand
    code = 42
    descr = '...'
    params = []
class decocare.commands.ReadProfileSets (**kws)
    Bases: decocare.commands.PumpCommand
    code = 43
    descr = '...'
    params = []
class decocare.commands.ReadUserEvents (**kws)
    Bases: decocare.commands.PumpCommand
    code = 44
    descr = '...'
    params = []
class decocare.commands.ReadRemoteControlID (**kws)
    Bases: decocare.commands.PumpCommand
    code = 46
    descr = '...'
    params = []
class decocare.commands.Read128KMem (**kws)
    Bases: decocare.commands.PumpCommand
    code = 55
    descr = '...'
    params = []
```

```
class decocare.commands.Read256KMem (**kws)
    Bases: decocare.commands.PumpCommand

    code = 56
    descr = '...'
    params = []

class decocare.commands.ReadBasalTemp508 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 64
    descr = 'Read Temp Basal 508 (old)'
    getData ()
    maxRecords = 1
    params = []
    retries = 2

class decocare.commands.ReadTodayTotals508 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 65
    descr = 'Read Totals Today'
    getData ()
    maxRecords = 1
    params = []
    retries = 2

class decocare.commands.ReadSensorSettings (**kws)
    Bases: decocare.commands.PumpCommand

    code = 153
    descr = 'Read sensor settings'
    params = []
    retries = 2

class decocare.commands.ReadSensorHistoryData (page=None, **kws)
    Bases: decocare.commands.ReadHistoryData

class decocare.commands.ReadISIGHistory (page=None, **kws)
    Bases: decocare.commands.ReadSensorHistoryData

    >>> ReadISIGHistory (page=0) .params
    [0, 0, 0, 0]

    >>> ReadISIGHistory (page=1) .params
    [0, 0, 0, 1]

    >>> ReadISIGHistory (page=2) .params
    [0, 0, 0, 2]

    code = 155
    descr = 'Read ISIG history'
```

```
maxRecords = 32
```

```
params = []
```

```
class decocare.commands.FilterHistory(begin=None, end=None, **kws)
```

```
Bases: decocare.commands.PumpCommand
```

```
classmethod ISO(klass, begin=None, end=None, **kws)
```

```
begin = None
```

```
code = None
```

```
end = None
```

```
getData()
```

```
class decocare.commands.FilterGlucoseHistory(begin=None, end=None, **kws)
```

```
Bases: decocare.commands.FilterHistory
```

```
>>> FilterGlucoseHistory.ISO(begin='2014-04-13', end='2014-04-14').params
[7, 222, 4, 13, 7, 222, 4, 14]
```

```
code = 168
```

```
class decocare.commands.FilterISIGHistory(begin=None, end=None, **kws)
```

```
Bases: decocare.commands.FilterHistory
```

```
>>> FilterISIGHistory.ISO(begin='2014-04-13', end='2014-04-14').params
[7, 222, 4, 13, 7, 222, 4, 14]
```

```
code = 169
```

```
class decocare.commands.ReadProfiles511_STD(**kws)
```

```
Bases: decocare.commands.PumpCommand
```

```
code = 122
```

```
class decocare.commands.ReadProfiles511_A(**kws)
```

```
Bases: decocare.commands.PumpCommand
```

```
code = 123
```

```
class decocare.commands.ReadProfiles511_B(**kws)
```

```
Bases: decocare.commands.PumpCommand
```

```
code = 124
```

```
class decocare.commands.Model511_ExperimentOP125(**kws)
```

```
Bases: decocare.commands.PumpCommand
```

```
code = 125
```

```
class decocare.commands.Model511_ExperimentOP126(**kws)
```

```
Bases: decocare.commands.PumpCommand
```

```
code = 126
```

```
class decocare.commands.ReadSettings511(**kws)
```

```
Bases: decocare.commands.PumpCommand
```

```
code = 127
```

```
class decocare.commands.ReadPumpTrace(**kws)
```

```
Bases: decocare.commands.PumpCommand
```

```
code = 163
```

```
    maxRecords = 16

class decocare.commands.ReadDetailTrace (**kws)
    Bases: decocare.commands.PumpCommand

    code = 164

    maxRecords = 16

class decocare.commands.Model511_Experiment_OP165 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 165

class decocare.commands.ReadNewTraceAlarm (**kws)
    Bases: decocare.commands.PumpCommand

    code = 166

    maxRecords = 16

class decocare.commands.ReadOldTraceAlarm (**kws)
    Bases: decocare.commands.PumpCommand

    code = 167

    maxRecords = 16

class decocare.commands.WriteGlucoseHistoryTimestamp (**kws)
    Bases: decocare.commands.PumpCommand

    code = 40

class decocare.commands.ReadLanguage (**kws)
    Bases: decocare.commands.PumpCommand

    code = 134

class decocare.commands.ReadBolusWizardSetupStatus (**kws)
    Bases: decocare.commands.PumpCommand

    code = 135

class decocare.commands.ReadCarbUnits (**kws)
    Bases: decocare.commands.PumpCommand

    code = 136

    getData ()

class decocare.commands.ReadBGUnits (**kws)
    Bases: decocare.commands.PumpCommand

    code = 137

    getData ()

class decocare.commands.ReadCarbRatios (**kws)
    Bases: decocare.commands.PumpCommand

    code = 138

    classmethod decode_ratios (klass, data, units=0)

    getData ()

    item_size = 3
```





```
class decocare.commands.ReadProfile_STD512 (**kws)
    Bases: decocare.commands.PumpCommand
```

```
>>> import json
>>> schedule = ReadProfile_STD512.decode(ReadProfile_STD512._test_result_1)
>>> len(schedule)
4
>>> print json.dumps(schedule[0])
{"i": 0, "start": "00:00:00", "rate": 0.8, "minutes": 0}
>>> print json.dumps(schedule[1])
{"i": 1, "start": "06:30:00", "rate": 0.9500000000000001, "minutes": 390}
>>> print json.dumps(schedule[2])
{"i": 2, "start": "09:30:00", "rate": 1.1, "minutes": 570}
>>> print json.dumps(schedule[3])
{"i": 3, "start": "14:00:00", "rate": 0.9500000000000001, "minutes": 840}
```

```
code = 146
```

```
static decode (data)
```

```
getData ()
```

```
maxRecords = 2
```

```
output_fields = []
```

```
validate (data)
```

```
class decocare.commands.ReadProfile_A512 (**kws)
    Bases: decocare.commands.ReadProfile_STD512
```

```
code = 147
```

```
class decocare.commands.ReadProfile_B512 (**kws)
    Bases: decocare.commands.ReadProfile_STD512
```

```
code = 148
```

```
class decocare.commands.ReadLogicLinkIDS (**kws)
    Bases: decocare.commands.PumpCommand
```

```
code = 149
```

```
class decocare.commands.Model512Experiment_OP150 (**kws)
    Bases: decocare.commands.PumpCommand
```

```
code = 150
```

```
class decocare.commands.ReadBGAlarmEnable (**kws)
    Bases: decocare.commands.PumpCommand
```

```
code = 151
```

```
class decocare.commands.GuardianSensorSettings (**kws)
    Bases: decocare.commands.PumpCommand
```

```
code = 209
```

```
class decocare.commands.GuardianSensorSettings (**kws)
    Bases: decocare.commands.PumpCommand
```

```
code = 209
```

```
class decocare.commands.GuardianSensorDemoGraphTimeout (**kws)
    Bases: decocare.commands.PumpCommand
```

```

    code = 210

class decocare.commands.GuardianSensorAlarmSilence (**kws)
    Bases: decocare.commands.PumpCommand

    code = 211

class decocare.commands.GuardianSensorRateChangeAlerts (**kws)
    Bases: decocare.commands.PumpCommand

    code = 212

class decocare.commands.ReadSavedSettingsDate (**kws)
    Bases: decocare.commands.PumpCommand

    code = 193

class decocare.commands.ReadBolusReminderEnable (**kws)
    Bases: decocare.commands.PumpCommand

    code = 197

class decocare.commands.ReadBolusReminders (**kws)
    Bases: decocare.commands.PumpCommand

    code = 198

class decocare.commands.ReadFactoryParameters (**kws)
    Bases: decocare.commands.PumpCommand

    code = 199

class decocare.commands.ReadCalibrationFactor (**kws)
    Bases: decocare.commands.PumpCommand

    code = 156

class decocare.commands.ReadVCNTRHistory (page=None, **kws)
    Bases: decocare.commands.ReadSensorHistoryData

    code = 213

class decocare.commands.ReadOtherDevicesIDS (**kws)
    Bases: decocare.commands.PumpCommand

    code = 240

class decocare.commands.PumpTraceSelect (**kws)
    Bases: decocare.commands.PumpCommand

    code = 160

class decocare.commands.PumpEnableDetailTrace (**kws)
    Bases: decocare.commands.PumpTraceSelect

    params = [1]

class decocare.commands.PumpDisableDetailTrace (**kws)
    Bases: decocare.commands.PumpTraceSelect

    params = [0]

class decocare.commands.Experiment_OP161 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 161

```

```
class decocare.commands.Experiment_OP162 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 162

class decocare.commands.Model511_Experiment_OP119 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 119

class decocare.commands.Model511_Experiment_OP120 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 120

class decocare.commands.Model511_Experiment_OP121 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 121

class decocare.commands.Model511_Experiment_OP122 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 122

class decocare.commands.Model511_Experiment_OP123 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 123

class decocare.commands.Model511_Experiment_OP124 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 124

class decocare.commands.Model511_Experiment_OP125 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 125

class decocare.commands.Model511_Experiment_OP126 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 126

class decocare.commands.Model511_Experiment_OP127 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 127

class decocare.commands.Model511_Experiment_OP128 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 128

class decocare.commands.Model511_Experiment_OP129 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 129

class decocare.commands.Model511_Experiment_OP130 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 130

class decocare.commands.SelectBasalProfile (**kws)
    Bases: decocare.commands.PumpCommand
```

```
code = 74

class decocare.commands.SelectBasalProfileSTD (**kws)
    Bases: decocare.commands.SelectBasalProfile

    params = [0]

class decocare.commands.SelectBasalProfileA (**kws)
    Bases: decocare.commands.SelectBasalProfile

    params = [1]

class decocare.commands.SelectBasalProfileB (**kws)
    Bases: decocare.commands.SelectBasalProfile

    params = [2]

class decocare.commands.PumpExperiment_OP69 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 69

class decocare.commands.PumpExperiment_OP70 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 70

class decocare.commands.PumpExperiment_OP71 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 71

class decocare.commands.PumpExperiment_OP72 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 72

class decocare.commands.PumpExperiment_OP73 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 73

class decocare.commands.PumpExperiment_OP75 (**kws)
    Bases: decocare.commands.PumpCommand

    code = 75
```

## 1.5 Download

### 1.5.1 download Module

```
class decocare.download.Downloader (stick=None, device=None, log_format='logs/')
    Bases: object

    download ()
        Download a single page, copy paste from elsewhere.

    log_format = 'logs/'

class decocare.download.PageDownloader (stick=None, device=None, log_format='logs/')
    Bases: decocare.download.Downloader

    download ()
```

```
download_page(x)
log_format = 'logs/'
read_current()
```

## 1.6 History

### 1.6.1 history Module

This module provides some basic helper/formatting utilities, specifically targeted at decoding ReadHistoryData data.

```
class decocare.history.AlarmPump(head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
```

```
    head_length = 4
    opcode = 6
```

```
class decocare.history.AlarmSensor(head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
```

Glucose sensor alarms. The second byte of the head represents the alarm type. The third byte contains an alarm-specific value.

For example, a “Low Glucose” alarm type is: [

```
    0x0b, # 11: Opcode 0x66, # 102: Low glucose subtype 0x50 # 80: Glucose level (For a pump
    configured to mg/dL)
```

]

```
alarm_types = {112: 'Weak Signal', 113: 'Lost Sensor', 115: 'Low Glucose Predicted', 101: 'High Glucose', 102: 'Low
```

```
decode()
```

```
head_length = 3
opcode = 11
```

```
class decocare.history.BGReceived(head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
```

```
body_length = 3
decode()
opcode = 63
```

```
class decocare.history.BasalProfileStart(head, larger=False)
    Bases: decocare.records.base.KnownRecord
```

```
body_length = 3
decode()
opcode = 123
```

```
class decocare.history.Battery(head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
```

```
opcode = 26
```

```
class decocare.history.BigBolusWizardChange (head=bytearray(b''),          model=None,
                                             larger=False)
    Bases: decocare.records.base.KnownRecord
    body_length = 143
    opcode = 90

class decocare.history.BolusWizard512 (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
    body_length = 12
    opcode = 47

class decocare.history.ChangeAlarmNotifyMode (head=bytearray(b''),          model=None,
                                              larger=False)
    Bases: decocare.records.base.KnownRecord
    body_length = 0
    opcode = 99

class decocare.history.ChangeAudioBolus (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
    decode ()
    opcode = 95

class decocare.history.ChangeBGReminderEnable (head=bytearray(b''),          model=None,
                                              larger=False)
    Bases: decocare.records.base.KnownRecord
    decode ()
    opcode = 96

class decocare.history.ChangeBasalProfile_new_profile (head=bytearray(b''),
                                                         model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
    body_length = 145
    decode ()
    opcode = 9

class decocare.history.ChangeBasalProfile_old_profile (head, larger=False)
    Bases: decocare.records.base.KnownRecord
    body_length = 145
    decode ()
    opcode = 8

class decocare.history.ChangeBolusWizardSetup (head=bytearray(b''),          model=None,
                                              larger=False)
    Bases: decocare.records.base.KnownRecord
    body_length = 40
    opcode = 79

class decocare.history.ChangeCaptureEventEnable (head=bytearray(b''),          model=None,
                                              larger=False)
    Bases: decocare.records.base.KnownRecord
```

```
    opcode = 131
class decocare.history.ChangeMaxBasal (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
    decode ()
    opcode = 44
class decocare.history.ChangeMazaheri2e (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
    body_length = 100
    opcode = 46
class decocare.history.ChangeOtherDeviceID (head=bytearray(b''), model=None,
                                             larger=False)
    Bases: decocare.records.base.KnownRecord
    body_length = 30
    opcode = 125
class decocare.history.ChangeParadigmLinkID (head=bytearray(b''), model=None,
                                              larger=False)
    Bases: decocare.records.base.KnownRecord
    body_length = 14
    decode ()
    opcode = 60
class decocare.history.ChangeRemoteID (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
    opcode = 39
class decocare.history.ChangeTempBasalType (head=bytearray(b''), model=None,
                                             larger=False)
    Bases: decocare.records.base.KnownRecord
    decode ()
    opcode = 98
class decocare.history.ChangeTime (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
    opcode = 23
class decocare.history.ChangeTimeDisplay (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
    opcode = 100
class decocare.history.ChangeWatchdogMarriageProfile (head=bytearray(b''),
                                                       model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
    body_length = 5
    opcode = 129
class decocare.history.ClearAlarm (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
```



```
    opcode = 12
class decocare.history.ConnectDevicesOtherDevicesEnabled (head=bytearray(b''),
                                                           model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
    decode ()
    opcode = 124
class decocare.history.DeleteOtherDeviceID (head=bytearray(b''),
                                             larger=False)
    Bases: decocare.records.base.KnownRecord
    body_length = 5
    opcode = 130
class decocare.history.EnableDisableRemote (head=bytearray(b''),
                                             larger=False)
    Bases: decocare.records.base.KnownRecord
    body_length = 14
    opcode = 38
class decocare.history.HistoryPage (raw, model)
    Bases: decocare.history.PagedData
    clean (data)
    decode (larger=False)
class decocare.history.Ian50 (head, model, **kwargs)
    Bases: decocare.records.base.KnownRecord
    body_length = 30
    opcode = 80
class decocare.history.Ian54 (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
    body_length = 57
    opcode = 84
class decocare.history.Ian69 (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
    body_length = 2
    opcode = 105
class decocare.history.IanA8 (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord
    head_length = 10
    opcode = 168
class decocare.history.JournalEntryExerciseMarker (head=bytearray(b''),
                                                    larger=False)
    Bases: decocare.records.base.KnownRecord
    Capture Event > Exercise marker
    body_length = 1
```

**opcode = 65**

```
class decocare.history.JournalEntryMealMarker (head=bytearray(b''), model=None,
                                              larger=False)
```

Bases: decocare.records.base.KnownRecord

Capture Event > Meal marker

**body\_length = 2**

**decode ()**

**opcode = 64**

```
class decocare.history.JournalEntryOtherMarker (head=bytearray(b''), model=None,
                                              larger=False)
```

Bases: decocare.records.base.KnownRecord

Capture Event > Other

**body\_length = 0**

**opcode = 67**

```
class decocare.history.LowBattery (head=bytearray(b''), model=None, larger=False)
```

Bases: decocare.records.base.KnownRecord

**opcode = 25**

```
class decocare.history.LowReservoir (head=bytearray(b''), model=None, larger=False)
```

Bases: decocare.records.base.KnownRecord

```
>>> rec = LowReservoir( LowReservoir._test_1[:2] )
>>> decoded = rec.parse(LowReservoir._test_1)
>>> print str(rec)
LowReservoir 2012-12-07T11:02:43 head[2], body[0] op[0x34]
```

```
>>> print pformat(decoded)
{'amount': 20.0}
```

**decode ()**

**opcode = 52**

```
class decocare.history.Model522ResultTotals (head=bytearray(b''), model=None,
                                              larger=False)
```

Bases: decocare.records.base.KnownRecord

**body\_length = 40**

**date\_length = 2**

**date\_str ()**

**head\_length = 1**

**opcode = 109**

**parse\_time ()**

```
class decocare.history.NewTimeSet (head=bytearray(b''), model=None, larger=False)
```

Bases: decocare.records.base.KnownRecord

**opcode = 24**

```
class decocare.history.OldBolusWizardChange (head, larger=False)
```

Bases: decocare.records.base.KnownRecord

```

    body_length = 117

    decode ()

    opcode = 90
class decocare.history.PagedData (raw, model)
    Bases: object

    PagedData - context for parsing a page of cgm data.

    clean (data)

    eat_nulls (data)
class decocare.history.PumpResume (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 31
class decocare.history.PumpSuspend (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 30
class decocare.history.ResultDailyTotal (head, larger=False)
    Bases: decocare.records.base.InvalidRecord

    On 722 this seems like two records.

    date_length = 2

    date_str ()

    decode ()

    head_length = 5

    opcode = 7

    parse_time ()
class decocare.history.Rewind (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 33
class decocare.history.Sara6E (head, larger=False)
    Bases: decocare.history.Model522ResultTotals

    Seems specific to 722?

    body_length = 48

    decode ()

    opcode = 110
class decocare.history.SelectBasalProfile (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 20
class decocare.history.SetAutoOff (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 27

```

```
class decocare.history.SetBolusWizardEnabled (head=bytearray(b''), model=None,
                                              larger=False)
```

```
    Bases: decocare.records.base.KnownRecord
```

```
    decode ()
```

```
    opcode = 45
```

```
class decocare.history.SettingSomething57 (head=bytearray(b''), model=None, larger=False)
```

```
    Bases: decocare.records.base.KnownRecord
```

```
    opcode = 87
```

```
class decocare.history.TempBasal (head=bytearray(b''), model=None, larger=False)
```

```
    Bases: decocare.records.base.KnownRecord
```

```
    body_length = 1
```

```
    decode ()
```

```
    opcode = 51
```

```
class decocare.history.TempBasalDuration (head=bytearray(b''), model=None, larger=False)
```

```
    Bases: decocare.records.base.KnownRecord
```

```
    decode ()
```

```
    opcode = 22
```

```
class decocare.history.UnabsorbedInsulin512 (head, model=None)
```

```
    Bases: decocare.records.bolus.UnabsorbedInsulinBolus
```

```
    opcode = 48
```

```
decocare.history.decode_bg_targets (data, bg_units)
```

```
decocare.history.decode_carb_ratios (data)
```

```
decocare.history.decode_insulin_sensitivies (data)
```

```
decocare.history.decode_remote_id (msg)
```

```
    practice decoding some remote ids:
```

```
    0x27
```

```
    0x01 0xe2 0x40
```

```
    0x03 0x42 0x2a
```

```
    0x28 0x0c 0x89
```

```
    0x92 0x00 0x00 0x00
```

```
>>> decode_remote_id(_remote_ids[0])
'123456'
```

```
>>> decode_remote_id(_remote_ids[1])
'213546'
```

```
>>> decode_remote_id(_remote_ids[2])
'821650'
```

```
decocare.history.decode_wizard_settings (data, num=8, model=None)
```

```
decocare.history.describe ()
```

```
decocare.history.describe_rate (offset, rate, q)

class decocare.history.hack51 (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 81

class decocare.history.hack52 (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 82

class decocare.history.hack53 (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    body_length = 1

    opcode = 83

class decocare.history.hack55 (head, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 85

class decocare.history.hack56 (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    body_length = 5

    opcode = 86

class decocare.history.old6c (head, model, **kwds)
    Bases: decocare.history.Model522ResultTotals

    opcode = 108

decocare.history.parse_midnight (data)

decocare.history.parse_record (fd, head=bytearray(b''), larger=False, model=None)
    Given a file-like object, and the head of a record, parse the rest of the record. Look up the type of record, read
    in just enough data to parse it, return the result.

class decocare.history.questionable22 (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 34

class decocare.history.questionable23 (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 35

class decocare.history.questionable24 (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 36

class decocare.history.questionable3b (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 59

class decocare.history.questionable5e (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 94
```

```
class decocare.history.questionable61 (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 97

class decocare.history.questionable65 (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 101

class decocare.history.questionable66 (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 102

class decocare.history.questionable6f (head=bytearray(b''), model=None, larger=False)
    Bases: decocare.records.base.KnownRecord

    opcode = 111

decocare.history.suggest (head, larger=False, model=None)
    Look in the known table of commands to find a suitable record type for this opcode.

decocare.history.unmask_m_midnight (data)
    Extract date values from a series of bytes. Always returns tuple given a bytearray of at least 3 bytes.

    Returns 6-tuple of scalar values year, month, day, hours, minutes, seconds.
```

## 1.7 lib

Sundry stuff to make working with data easier.

### 1.7.1 lib Module

This module provides some basic helper/formatting utilities.

```
>>> hexdump( bytearray( [0x00] ) )
'0000    0x00                                .'
```

```
>>> 0x00 == HighByte( 0x0F )
True
```

```
>>> 0x0F == LowByte( 0x0F )
True
```

```
>>> CRC16CCITT.compute( bytearray( [ 2, 6, 6, 3 ] ) )
16845
```

```
>>> CRC16CCITT.compute( bytearray( [ 0x02, 0x09, 0x00,
...                                0x05, 0x0D, 0x02, 0x03 ] ) )
29146
```

```
>>> BangInt( bytearray( [ 0x71, 0xDA ] ) )
29146
```

```
>>> BangInt( bytearray( [ 0x62, 0xC2 ] ) ) == CRC16CCITT.compute( bytearray( [ 2, 0x06, 0x08, 3 ] ) )
True
```

```
>>> CRC8.compute( bytearray( [ 0x00, 0xFF, 0x00 ] ) )
177
```

```
>>> BangInt( bytearray( [ 0x02, 0x02 ] ) )
514
```

```
>>> BangLong( bytearray( [ 0x0, 0x0, 0x02, 0x02 ] ) )
514L
```

```
decocare.lib.BangInt(ints)
```

```
decocare.lib.BangLong(bytez)
```

```
class decocare.lib.CRC16CCITT
```

```
    classmethod compute(klass, block)
```

```
    lookup = [0, 4129, 8258, 12387, 16516, 20645, 24774, 28903, 33032, 37161, 41290, 45419, 49548, 53677, 57806, 61935, 46576]
```

```
class decocare.lib.CRC8
```

```
    classmethod compute(klass, block)
```

```
    lookup = [0, 155, 173, 54, 193, 90, 108, 247, 25, 130, 180, 47, 216, 67, 117, 238, 50, 169, 159, 4, 243, 104, 94, 197, 43, 176, 13]
```

```
decocare.lib.HighByte(arg)
```

```
decocare.lib.LowByte(arg)
```

```
class decocare.lib.Timer
```

```
    Bases: object
```

```
    millis()
```

```
decocare.lib.basal_time(raw)
```

```
decocare.lib.decodeDC(msg)
```

```
>>> decodeDC(_decode_test_1) == bytearray(_decode_result_1)
True
>>> decodeDC(_decode_test_2) == bytearray(_decode_result_2)
True
```

```
decocare.lib.decodeDCByte(B)
```

```
decocare.lib.decode_hexline(line)
```

```
decocare.lib.encodeDC(msg)
```

```
>>> encodeDC(_enc_test_1) == bytearray(_enc_result_1)
True
>>> encodeDC(_enc_test_2) == bytearray(_enc_result_2)
True
```

```
decocare.lib.filter_date_today()
```

```
decocare.lib.format_filter_date(date)
```

```
>>> format_filter_date(parse.date('2014-04-09'))
[7, 222, 4, 9]
```

`decocare.lib.hexbytes (hexstr)`

`decocare.lib.hexdump (src, length=8, indent=0)`

Return a string representing the bytes in `src`, `length` bytes per line.

`decocare.lib.int_dump (stream, indent=0)`

```
>>> int_dump(bytearray([0x01, 0x02]))
'  1    2 '
```

`decocare.lib.makeByte (highNibble, lowNibble)`

0 <= highNibble <= 15 0 <= lowNibble <= 15 0 <= result <= 255

**class** `decocare.lib.parse`

**static date** (*data*)

```
>>> parse.date( '2010-11-10T01:46:00' ).isoformat( )
'2010-11-10T01:46:00'
```

```
>>> parse.date( '2010-11-10 01:46:00' ).isoformat( )
'2010-11-10T01:46:00'
```

```
>>> parse.date( '2010-11-10 01:46PM' ).isoformat( )
'2010-11-10T13:46:00'
```

```
>>> parse.date( '2010-11-10 13:46' ).isoformat( )
'2010-11-10T13:46:00'
```

```
>>> parse.date( '2010-11-10 1:46AM' ).isoformat( )
'2010-11-10T01:46:00'
```

## 1.8 decocare

### 1.8.1 decocare Package

#### decocare Package

decocare - a pure python module for serial communication with insulin pumps.

This module implements the communication protocol necessary to audit or command MM insulin pumps. Tested with 515, and 522.

See:

- <https://github.com/bewest/decoding-carelink>
- <https://github.com/bewest/insulaudit>
- <https://github.com/bewest/insulaudit-ssh-tools>
- <https://github.com/bewest/diabetes>
- <https://github.com/medevice-users/diabetes#projects>
- *Link*
- *Stick*
- *Session*



- *Commands*
- *Download*
- *History*
- *lib*

## errors Module

**exception** `decocare.errors.AckError`

Bases: `decocare.errors.StickError`

**exception** `decocare.errors.BadDeviceCommError`

Bases: `decocare.errors.AckError`

**exception** `decocare.errors.DataTransferCorruptionError`

Bases: `exceptions.Exception`

**exception** `decocare.errors.StickError`

Bases: `exceptions.Exception`

## tests Module

**class** `decocare.records.tests.BW722` (*head, model=None*)

Bases: `decocare.records.bolus.BolusWizard`

**decode** ()

**class** `decocare.records.tests.TestSaraBolus`

**bolus\_1\_ok** = {'bg': 103, 'bg\_target\_low': 100, 'sensitivity': 60, 'bg\_target\_high': 120, 'unabsorbed\_insulin\_total': 0.5,

**bw\_1\_bytes** = bytearray(b'[g\xa1Q\x0e\x04\r\rP\x00x<d\x00\x00(\x00\x00\x14\x00(x')

**bw\_2\_bytes** = bytearray(b'[\xfc\x07T\x0f\x04\r\rP\x00P\x00x<dX\x00\x00\x00\x00\x1c\x00<x')

**cal\_bg\_bytes** = bytearray(b'\n\xfc\x04T\x04\r')

**csv\_breakdown** = '\n 9/4/13 14:17:33,,,,,,Normal,1.0,1.0,,,,,,,,,,,,,,BolusNormal\n "AMOUNT=1\n CONCENTRATIO

**hexdump** = '\n 5b 67\n a1 51 0e 04 0d\n 0d 50 00 78\n 3c 64 00 00 28 00 00 14 00 28 78\n 5c 08 44 79 c0 3c 4b d0\n 01 00 28

**classmethod** `test_cal_bg` (*klass*)

```
>>> TestSaraBolus.test_cal_bg( )
CalBGForPH 2013-09-04T15:20:52 head[2], body[0] op[0x0a]
{
  "amount": 252
}
```

`decocare.records.tests.big_days` (*x=0*)

# page 17, RECORD 11 >>> `parse_date( big_days(0) ).isoformat( )` '2012-11-20T21:53:41'

# page 17, ~ RECORD 12 >>> `parse_date( big_days(1) ).isoformat( )` '2012-11-20T22:07:38'

```
>>> parse_date( big_days(2) ).isoformat( )
'2012-11-20T21:53:41'
```

```
>>> parse_date( big_days(3) ).isoformat( )
'2012-11-20T22:07:38'
```

```
# page 16, RECORD ~15 >>> parse_date( big_days(4) ).isoformat( ) '2012-11-25T16:41:34'
```

```
>>> parse_date( big_days(5) ).isoformat( )
'2012-11-25T13:54:32'
```

```
# page 15 >>> parse_date( big_days(6) ).isoformat( ) '2012-11-29T20:25:37'
```

```
# page 0 >>> parse_date( big_days(7) ).isoformat( ) '2012-12-20T14:59:02'
```

```
>>> parse_date( big_days(8) ).isoformat( )
'2012-12-20T15:28:25'
```

```
decocare.records.tests.decode_wizard(data)
    BYTE 01: 02: 03: 04: 05: 06: 07: 08: 09: 10: 12: 13: 14: 15: 16: 17: 18: 19: 20: 21: 22:

decocare.records.tests.dictlines(d)

decocare.records.tests.unsigned_bolus_wizard()
# >>> unsigned_bolus_wizard()
```

## 1.8.2 Modules

Each module can be run and tested independently. They will refuse to run if the tests do not pass.

## 1.9 Modules

The *decocare Package* implements the Medtronic Carelink protocol, sometimes known as ComLink2. The implementation is built using python modules as building blocks, each module allowing us to prove some specific part of the protocol.

Decoding-carelink implements a python module named decocare. The python module allows learning more about how Medtronic Insulin pumps and related devices work.

- *decocare Package*

---

**Note:** This information was gleaned through extensive testing and analysis of the behavior of actual devices, not from documentation. Please call and ask your vendor for the technical information needed to properly maintain these projects.

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