

IPEN Accelerometer Data Collection Training

Prepared by:

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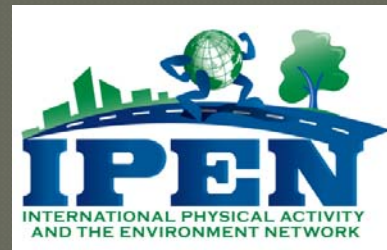
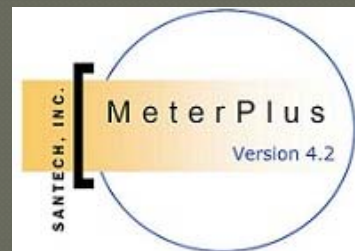
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Overview

TRAINING #1

(PRE DATA COLLECTION)

1. IPEN
2. IPAQ & A-NEWS
3. Accelerometry 101
4. About the ActiGraph
5. Preparing for ActiGraph data collection
6. Charging, Initializing, & Delivering
7. Compliance Tips and Prompting
8. Certification

TRAINING #2

(POST DATA COLLECTION)

1. Receiving ActiGraph data
2. Cleaning and Scoring
3. Certification

Overview

TRAINING #3 (MANAGEMENT & TRAINING)

1. Hiring
2. Delivery & Compliance Training
3. Checking (Quality Control)
4. Electronic tracking
5. Certification
6. Data transfer



Measurement Training

#1 of 3

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IPEN study- quality control issues

- IPEN study will pool data from over 12 countries
- This will greatly improve our understanding of how built environments effect physical activity
 - We are maximizing the range of walkability within and across countries
- The data will inform policy makers around the world
 - We are providing evidence for best practice in health community design
 - Important for developing countries who are starting to sprawl
 - Let's stop the global obesity epidemic
- Data must be of good quality
- Data collection procedures must be comparable
- Data analysis decisions will take into account variation in quality & comparability
- Funding limitations mean that every participant counts and every piece of data collected should be the best it can be

Physical Activity Measurement

- When people self report physical activity, nation prevalence studies show that 30-60% of adults are active for 30 minutes 5 days a week
- Accelerometer data, which is a more objective measure, show that this is only 5%
- People over-estimate how active they are!

Why IPAQ & Accelerometer

- ◎ IPAQ was designed to measure physical activity prevalence in international studies
 - People over-estimate their activity
 - Not sensitive to change
 - But includes domains of activity which are so important for built environment studies
- ◎ Accelerometer is more objective
 - But underestimates cycling, and does not provide the domains of activity which are so important for built environment studies!!

IPAQ & A-NEWS

- ◎ In-person survey administration (data collectors)
 - Provide clarifications, definitions as needed
 - Checking for over-reporting on IPAQ
 - Double-reporting or responding for entire week instead of one day
 - Coding responses correctly in NEWS
 - Probing when necessary– there are no “I don’t know” or “not applicable” options!
 - Checking for completeness during interview and again at the end
- ◎ Data screening in the office (supervisors)
 - Check for missing responses
 - Check that skip patterns were followed correctly
 - Check for over-reporting on IPAQ
 - Go back to participants to follow-up if possible

● IPAQ (a few examples)

1. The next questions are about all the physical activity you did in the **last 7 days** as part of your paid or unpaid work.
On how many days did you do **vigorous** ... How much time **on ONE of those days** ...
On how many days did you do **moderate**... How much time **on ONE of those days** ...
On how many days did you **walk** ... How much time **on ONE of those days** ...
[Add hours per day for 3 categories and ask for clarification if >8. The categories are mutually exclusive so there shouldn't be overlap between walking, moderate and vigorous. Exception is if each type is only done 1 or 2 days per week.]
2. Think about *only* those physical activities that you did for at least 10 minutes at a time.
During the last 7 days, on how many days did you do **vigorous** physical activities like heavy lifting, chopping wood, shoveling snow, or digging *in the garden or yard*?
_____ days per week & _____ hours _____ minutes per day
[Total time for any one activity should be > 8 hours and total time per domain should not add up to > 16 hours. Note the number of days for each activity; total time can add up to > 16 hours if each is done only a few days per week.]

◎ A-NEWS (a few examples)

1. There are bicycle or pedestrian trails in or near my neighborhood that are easy to get to. *[If no bicycle or pedestrian trails, choose “Strongly disagree”]*

Strongly disagree Somewhat disagree Somewhat agree Strongly agree

2. It is easy to walk to a transit stop, bus, train from my home. *[If they don't have these things in their neighborhood, choose “Strongly disagree”. If they have never walked there, ask them to imagine walking there and make their best judgment.]*

Strongly disagree Somewhat disagree Somewhat agree Strongly agree

Let's look at the surveys

How the accelerometer works: The Science

- **Velocity (speed)**: a change in position with respect to time (e.g., meters per second; mph)
- **Acceleration**: a change in velocity with respect to time (meters per second per second); often standardized in gravitational acceleration units (g)

How the accelerometer determines PA intensity

- Tiny structures in the device produce electrical signals proportional to the acceleration it detects (data are sampled 30 times per second)
- Filtered to eliminate signals unlikely to be caused by human movement (vibration, temperature changes, electrical interference, car accidents, etc.)
- Further processing occurs to clean the signal and make it easier to interpret. Signals are summed across a user-defined period (the “epoch”- typically 1 min) and an output read to the flash memory.
- The output is a COUNT (no units) per epoch, where a higher COUNT = greater activity intensity

How the accelerometer works: what you tell participants

- It records overall movement, much like a pedometer
- It's harmless – it runs on a battery, like your watch
- There isn't an 'on' and 'off' switch
- It can't tell what type of activity you're doing
- It can't tell where you are, it's not a tracking device
- You don't need to be an 'active' person for the device to work
- “Movement meter” – it's just recording, not monitoring or measuring
- There is no screen to look at
- It is expensive for researchers, but has no street value

How the accelerometer works: DO NOT tell participants

- The accelerometer will tell us how much you exercise, walk, jog, etc.
- Make sure to move a lot while you're wearing the device !
- You live in a walkable neighborhood so we expect the accelerometer to show you'll be walking a lot
- It's OK to remove the accelerometer when you're not doing much since we're mostly interested in physical activity
- The accelerometer can tell if you're sitting around watching TV, doing yoga, working on your computer, etc.

About the Actigraph: GT1M & GT3X



- Can collect data in 1, 2, or 3 planes of movement (GT1M=1,2 planes & GT3X=3 planes)
- Minutes spent in different intensity categories
- Energy Expenditure
- Steps per day
- Water resistant (not waterproof!)
- Rechargeable battery via USB connection
- Fewer problems than with older models

- Increased memory that will last for months or years!
- USB connector for charging, initializing, and downloading
- Lithium ion battery lasts ~14 days (GT1M) and ~ 20 days (GT3X)
- Auto low power mode

Preparing for Data Collection

Equipment
Stages of the Actigraph
Logistics & Staffing
Tracking
Device turn around time

Equipment - hardware

TIP:

To avoid build up of label gunk, first add layer of clear tape to back of device

ActiGraphs

- Label with device serial number and contact information (“If found, please call”) and cover with waterproof tape



- Inventory in tracking database

UP ↑ ID342704
Property of Project Obama
1600 Pennsylvania Avenue
Washington, DC 20500
If found, please call
1 800 YES-WE-CAN

Serial #	<input type="text"/>	<input checked="" type="checkbox"/> Active
Status	<input type="text"/>	<input type="checkbox"/> Lost
		<input type="checkbox"/> Broken
<input type="button" value="Add Record"/>		

Equipment - hardware

- Charging hub, USB charging cables
 - Need a charging schedule and location (7 can charge at a time)
- Computer with internet access for data transfer to IPEN-CC and firmware updates for Actigraph

Equipment - software

◎ ActiLife

- Needed to initialize and download and create participant graphs (for feedback)

◎ MeterPlus

- Needed for data screening and scoring

◎ Access tracking database

- Participant contact tracking
- ActiGraph tracking

Equipment – other supplies

- Machine washable elastic belts (different sizes)
 - Wash if worn next to skin
 - Wash every few wears
- Labels
- Waterproof tape (and probably “Goo Gone” cleaner)
 - Tape on meter and over label
- Meter logs
- Meter instructions
- Graphs

Stages of Actigraph

1. Charge

Charge devices fully before distributing

2. Initialize

Initialize device to begin collecting data using the Actilife software

3. Download

Download device using Actilife and save file to computer

4. Screen

Screen data file for valid wearing time using the MeterPlus software

5. Enough time?

Decide if enough valid data has been collected

Logistics & Staffing

- Linking Actigraph serial number to participant in the field
 - In field assign serial # to participant ID #
 - Make sure field records are entered into database
- Tracking dates of delivery and pick-up
- Assigning drop-off and pick-up visits
 - Pick up scheduled on 8th wearing day (9 days after delivery) IF participant didn't start late or miss any days.
- At least a 50% FTE will be needed to manage the equipment initialization and downloading (includes prompt calling).
- At least a 50% FTE is needed for data management (includes data screening, compliance decisions and data scoring).

- Meter Tracking
- Meter Inventory
- Contacts

Access Tracking Database

- Two functions: Track devices and track people
 - Meter (tracking & inventory) form to track dates, wearing time, history of devices
 - Queries to track return times, problem units, compliance rates, outstanding units
 - Used by person initializing and screening meter files
 - Participant (contacts) form to track visits, phone calls, etc.
 - Queries to track recruitment numbers and rates, demographics, history of participant in study
 - Used by person doing recruitment and/or managing and scheduling data collectors
- Tracking some things in 2 places is a good quality control practice

Sample Form – Meter Database

Tracking Database		Data Problems		Wear Time Log			
Participant ID#	<input type="text"/>	Bad data	<input type="checkbox"/>	Log	<input type="checkbox"/>		
Country	<input type="text"/>	Not Downloaded	<input type="checkbox"/>	Past Midnight	<input type="checkbox"/>		
City	<input type="text"/>	Never Worn	<input type="checkbox"/>				
Stage	<input type="text"/>	Other Data Problems	<input type="text"/>				
Recruiter	<input type="text"/>						
Round #	<input type="text"/>						
Serial #	<input type="text"/>						
Last Day (battery or memory)	<input type="text"/>						
Outgoing		Comments		DAY 1			
Date Delivered	<input type="text"/>	<input type="text"/>		Day	<input type="text"/>		
Date Activated	<input type="text"/>			Date	<input type="text"/>		
Date Charts Prepared	<input type="text"/>			Time on:	<input type="text"/>	Time off:	<input type="text"/>
Date Sent for Repair	<input type="text"/>			Time removed	<input type="text"/>	<input type="text"/>	<input type="text"/>
Date Sent to IPEN-CC for consult	<input type="text"/>			Reason removed	<input type="text"/>	<input type="text"/>	<input type="text"/>
Incoming		Length of Time Out		DAY 2			
Date Retrieved	<input type="text"/>	Length of Time out	<input type="text"/>	Day	<input type="text"/>		
Date Downloaded	<input type="text"/>	Loss		Date	<input type="text"/>		
Valid Days	<input type="text"/>	Lost Unit	<input type="text"/>	Time on:	<input type="text"/>		
If not enough valid days, valid hours	<input type="text"/>			Time off:	<input type="text"/>		
Rewear Requested	<input type="text"/>			Time removed	<input type="text"/>		
Drop?	<input type="text"/>			Reason removed	<input type="text"/>		
				Valid hours	<input type="text"/>		
				Reason for invalid day	<input type="text"/>		
				DAY 3			
				Day	<input type="text"/>		
				Date	<input type="text"/>		
				Time on:	<input type="text"/>		
				Time off:	<input type="text"/>		
				Time removed	<input type="text"/>		
				Reason removed	<input type="text"/>		
				Valid hours	<input type="text"/>		
				Reason for invalid day	<input type="text"/>		
				DAY 4			
				Day	<input type="text"/>		
				Date	<input type="text"/>		
				Time on:	<input type="text"/>		
				Time off:	<input type="text"/>		
				Time removed	<input type="text"/>		
				Reason removed	<input type="text"/>		
				Valid hours	<input type="text"/>		
				Reason for invalid day	<input type="text"/>		

Let's try it examples for
TRACKING DATABASE

Device turn-around

- A 7-day wear ties up 1 device for 12-14 days
 - 1 day prep + 1 pre wear day + 7 day wear + 2-4 post wear days + 1 day download and charge
- How many devices do we need? Answer is **37**

$$X = \# \text{ days data collection} / [\text{days used per person}] \quad X = (120/13) = 9.23$$

$$Y = X * [\text{loss rate}] \quad Y = (9.23 * .05) = .46$$

$$Z = X - Y \quad Z = (9.23 - .46) = 8.77$$

$$\text{Inventory} = \# \text{ of participants to measure} / Z \quad \text{Inventory} = (325/8.77) = 37$$

*Assumptions: 5% loss rate; 30% re-wear rate; average 13 day wearing + in-office + charging time, 4 month data collection period.

Initializing devices to collect data

Charging

Setting data collection parameters

File naming

Attaching belts



Charging

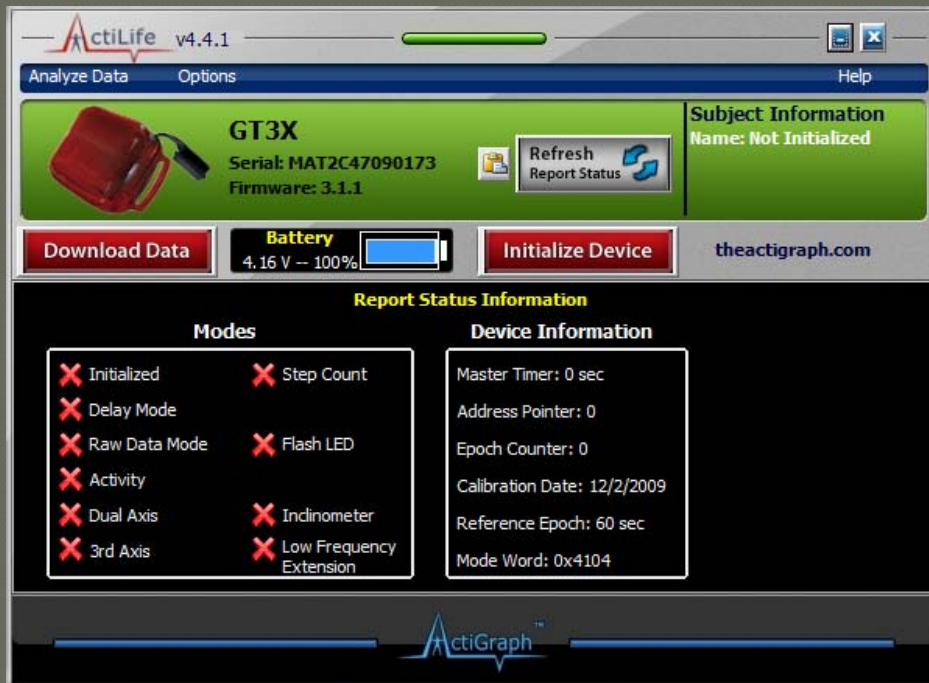
- Storage capacity exceeds battery life, so getting a unit charged is **ALWAYS** the primary concern.
- Charging (& downloading) is done via a USB 2.0 port
- Connect USB hub straight to socket if possible. If not, can be connected to computer to charge.
- Full charge takes less than 3 hrs (batt status = $>4v$). Less than 3.1v and device will **NOT** have sufficient power to download or initialize.
- LED will
 - FLASH while charging
 - LIT when fully charged
 - FLASH w/ initialized but not yet collecting
 - FLASH TURNS OFF when collecting data

NOTE: The device **CAN** be put on charge while still collecting data (device will just record zero counts)

Initializing

- The **ActiLife** software & drivers must be installed on any computer on which ActiGraph initialization and/or downloading will occur
 - Does not need to be same SAME computer

Required software - ActiLife (comes with device)



- ActiLife v4.4.1 software
- Used for initializing devices (i.e., setting data collection parameters, variables to collect, etc.)
- Used for downloading devices
- Can be used for data analysis but limited capabilities
- Firmware updates (YES!)
- Software updates (NO!)

Initializing the Actigraph

The screenshot shows the ActiLife v4.4.1 software interface. At the top, there is a menu bar with 'Analyze Data', 'Options', and 'Help'. Below the menu bar, there is a green header area containing a red ActiGraph device image, the model 'GT3X', serial number 'MAT2C47090173', and firmware version '3.1.1'. To the right of this is a 'Subject Information' section with 'Name: Not Initialized'. A 'Refresh Report Status' button is located between the device info and subject info. Below the header, there is a 'Download Data' button, a 'Battery' status indicator showing '4.16 V -- 100%' with a full battery icon, and a red 'Initialize Device' button which is circled in yellow. A large black arrow points from the text 'Click to Initialize' on the right towards the 'Initialize Device' button. Below the 'Initialize Device' button is a 'Report Status Information' section with two columns: 'Modes' and 'Device Information'. The 'Modes' column lists several options, each with a red 'X' indicating they are disabled: 'Initialized', 'Delay Mode', 'Raw Data Mode', 'Activity', 'Dual Axis', '3rd Axis', 'Step Count', 'Flash LED', 'Inclinometer', and 'Low Frequency Extension'. The 'Device Information' column lists: 'Master Timer: 0 sec', 'Address Pointer: 0', 'Epoch Counter: 0', 'Calibration Date: 12/2/2009', 'Reference Epoch: 60 sec', and 'Mode Word: 0x4104'. At the bottom of the interface is the ActiGraph logo.

Click
to Initialize

Can collect other data types such as steps or 2nd axis

Initialize GT1M

Select Other Optional Modes

- Activity (Default Mode)
- Step Count
- Flash LED
- Dual Axis

Epoch Period

Epoch (in seconds): 60

Filter Option

Normal

Start Date & Time

4 / 2 / 2010 M/d/yyyy 12:00 AM

Stop Date & Time

Enable Stop Time

4 / 2 / 2010 M/d/yyyy 1:00 PM

Status Information

Device Detected: GT1M Memory Available: 1 MB Battery Voltage: 4.18 V

Maximum record time based on selected settings: 113d 18h 39m 0s

Subject Information

Name: 1014003003 Up to 16 characters

OK Cancel

60 seconds common epoch for adults

Always midnight, 1 day after drop-off day

Don't enable stop time

Check battery fully charged (4.18 V)

Enter ID number at this stage (if known)

Let's try it

GT3X initialization menu

Can collect a few additional data types such as 3rd axis and inclinometer



Initialize GT3X

Select Other Optional Modes

GT3X Mode

Activity (Default Mode)

Step Count

Flash LED

Dual Axis

3rd Axis

Inclinometer

Epoch Period

Epoch (in seconds): 60

Filter Option

Normal

Start Date & Time

4 / 8 / 2010 M/d/yyyy 12:00 AM

Stop Date & Time

Enable Stop Time

4 / 8 / 2010 M/d/yyyy 3:00 PM

Status Information

Device Detected: GT3X Memory Available: 4 MB Battery Voltage: 4.04 V

Maximum record time based on selected settings: 1433d 14h 23m 0s

Subject Information

Name: 1170011002 Up to 16 characters

OK Cancel

GT3X coding

- Inclinometer

0 – Off

1 – Standing

2 – Lying

3 – Sitting

- Vector Magnitude $[(x^2+y^2+z^2)^{1/2}]$:
square root of the sum of the squared
accelerations of all three axes: composite
measure of acceleration

File naming

- Need a consistent convention to identify files at IPEN-CC
- Filenames need to start with the country code:
 - Country code= international dialing code
 - Optional to include:
 - Walkability code
 - Neighborhood, Tract, City code (smallest unit available)
 - ID number within neighborhood, tract, or city

Example Filename: 55_2583642001

55=Brazil 2="Low"walkability Census Tract 001=Participant #1 in Tract

Attaching the Belt & Wear position

- ◉ 3 different size belts (36in, 48in, 60in).
- ◉ Take off one half of the buckle, thread through device
- ◉ Worn on waist, over right hip, snug fit
- ◉ Over or under clothing

Let's try it



Compliance

Actigraph Delivery
Prompt Calls
Rewears

Delivery of Actigraph: Checklist

- Make link between device serial number and participant
- Show participant the graphs of compliant and noncompliant data patterns
- Offer to provide personalized graphs to participants when they are done
- Adjust belt to fit participant and show them how to wear it
- Make sure participant can start right away – no travel plans
- Give participant meter log and explain
- Give participant meter instructions and review
- Give participant your contact information
- Make sure all talking points are covered

See Handout

Delivery of Actigraph: Talking points

CHECKLIST

How to wear the meter

- Wear for 7 complete days
- Wear for 12 hours every day!
- Wear during waking time, don't wear it to bed at night
- Need to start right away – battery will only last 10 days
- Will ask for re-wear if don't get enough wearing time
- Go about your normal activities - don't do anything different

Tips for compliance

- Put next to bed or cell phone where you will see it first thing each morning
- Complete meter log each day as a reminder
- Show Excel graphs of what wearing and non-wearing days look like

How to care for meter

- Valuable for research; no monetary value
- Don't get meter wet!
- Don't let anyone else wear it – it's only for you.

Stay in contact

- Someone from our office will call you the day after tomorrow to check on you
- Call with any questions
- If you miss a day, add on a day at the end. If you miss more than one day, call us and we'll let you know what to do

Prompt Calls

- Calls made on Days 2 and 5

- Reminder to wear
- Check if on schedule
- Troubleshoot problems or delayed wearing
- Answer questions



- What to do if participant started late, hasn't started, can't find meter

Considerations:

- Battery life
- Re-visit schedule
- Likelihood of better outcome if do it again
- How believable the person is

- What to do if can't reach participant by visit or phone

- KEEP TRYING! Persistence usually pays off.
- Leave postage-paid envelopes for them to send meter back to you
- Stress to them that someone else is waiting to wear the meter
- Offer reward as LAST resort

Data Collection

Outgoing

Meter serial number

Date meter delivered

Rewear serial number

Date rewear meter delivered

Retrieval

Date survey retrieved

Survey complete?

Date survey entered

Date Meter received

Meter valid days

Need rewear?

Date rewear meter received

Valid days rewear

Valid days total

Incentive

Date payment sent

Payment amount

Lost meter

Meter lost

Meter serial number

Meter Follow-up Calls

First Call

1st Call Date

1st Call Time

1st Call Outcome

Comment

Second Call

2nd Call Date

2nd Call Time

2nd Call Outcome

Comment

Third Call

3rd Call Date

3rd Call Time

3rd Call Outcome

Comment

Fourth Call

4th Call Date

4th Call Time

4th Call Outcome

Comment

Asking for rewear

1st Call Date

1st Call Time

1st Call Outcome

comments

2nd Call Date

2nd Call Time

2nd Call Outcome

comments

3rd Call Date

3rd Call Time

3rd Call Outcome

comments

Rewear Meter Follow-up Calls

First Call

1st Call Date

1st Call Time

1st Call Outcome

Comment

Second Call

2nd Call Date

2nd Call Time

2nd Call Outcome

Comment

Third Call

3rd Call Date

3rd Call Time

3rd Call Outcome

Comment

Fourth Call

4th Call Date

4th Call Time

4th Call Outcome

Comment



Rewears (sample script in manual)

- Data manager will make decision if rewear is needed
- Call participant to ask for rewear
 - Reminder that re-wear is part of study requirements
 - Data checked by manager, not your decision
 - Either not enough useable data or equipment malfunction
 - Will ask for number of days to make 7 total
 - Personal favor, really want to keep them in the study, can pay extra incentive if equipment malfunction
- Rewear visit
 - Give tips on how can do better this time
 - Keep on until right before bedtime, put on first thing in the morning, remember to put it back on after swimming, bathing.

Practice time

- Delivery visit
- Rewear call
- Survey administration and screening
- Initializing
- Access meter tracking
- Access participant tracking

End of Training 1

Certification

- Delivery visit
- Rewear call
- Mock survey administration and survey screening (in-person and post-data collection screening)
- Initializing and Access tracking of meter and participant
- Quiz



Measurement Training

#2 of 3

TRAINING #2

(POST DATA COLLECTION)

- 1.Receiving Actigraph data
- 2.Cleaning and Scoring
- 3.Certification

Receiving Actigraph Data

Downloading
MeterPlus vs other Software
Screening
Rewears
Scoring

Downloading

The screenshot shows the ActiLife v4.4.1 software interface. At the top, there is a title bar with the ActiLife logo and version number. Below the title bar is a menu bar with 'Analyze Data', 'Options', and 'Help'. The main content area is divided into several sections:

- Device Information:** A red device icon is shown next to the text 'GT3X', 'Serial: MAT2C47090173', and 'Firmware: 3.1.1'. A 'Refresh Report Status' button is located to the right.
- Subject Information:** A green box containing the text 'Subject Information' and 'Name: Not Initialized'.
- Battery Status:** A section showing 'Battery' with a value of '4.16 V -- 100%' and a battery level indicator.
- Action Buttons:** Two red buttons are visible: 'Download Data' (circled in red) and 'Initialize Device'.
- Report Status Information:** A section with two columns: 'Modes' and 'Device Information'. The 'Modes' column lists various settings, all of which are currently disabled (indicated by a red 'X' in a box):
 - Initialized
 - Delay Mode
 - Raw Data Mode
 - Activity
 - Dual Axis
 - 3rd Axis
 - Step Count
 - Flash LED
 - Inclinometer
 - Low Frequency ExtensionThe 'Device Information' column lists:
 - Master Timer: 0 sec
 - Address Pointer: 0
 - Epoch Counter: 0
 - Calibration Date: 12/2/2009
 - Reference Epoch: 60 sec
 - Mode Word: 0x4104

At the bottom of the interface, there is a footer with the ActiGraph logo.

Software

- ◉ What have you been using?
- ◉ Pros
- ◉ Cons

MeterPlus

◎ Pros

- Friendly data screening feature which includes valid wearing time determinations
- Easy to use with user-defined parameters
- Bouts, Energy Expenditure, Time Filters, age-specific scoring, multiple profiles of cutpoints saved
- Batch processing (scores hundreds, thousands of files at a time)

◎ Cons

- Doesn't create graphical output
- Takes time to manually screen each file – detecting wearing time isn't automated

5 steps in MeterPlus

1. Screen

Screen data files individually for enough valid wear time.

2. Rewears

Decide if a rewear will be requested.

3. Clean

Eliminate non-wearing time and save days of data you really want to keep as MPD files.

4. Score

Batch score your files and create one comma-delimited file containing variables for your entire sample.

5. Analyze

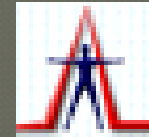
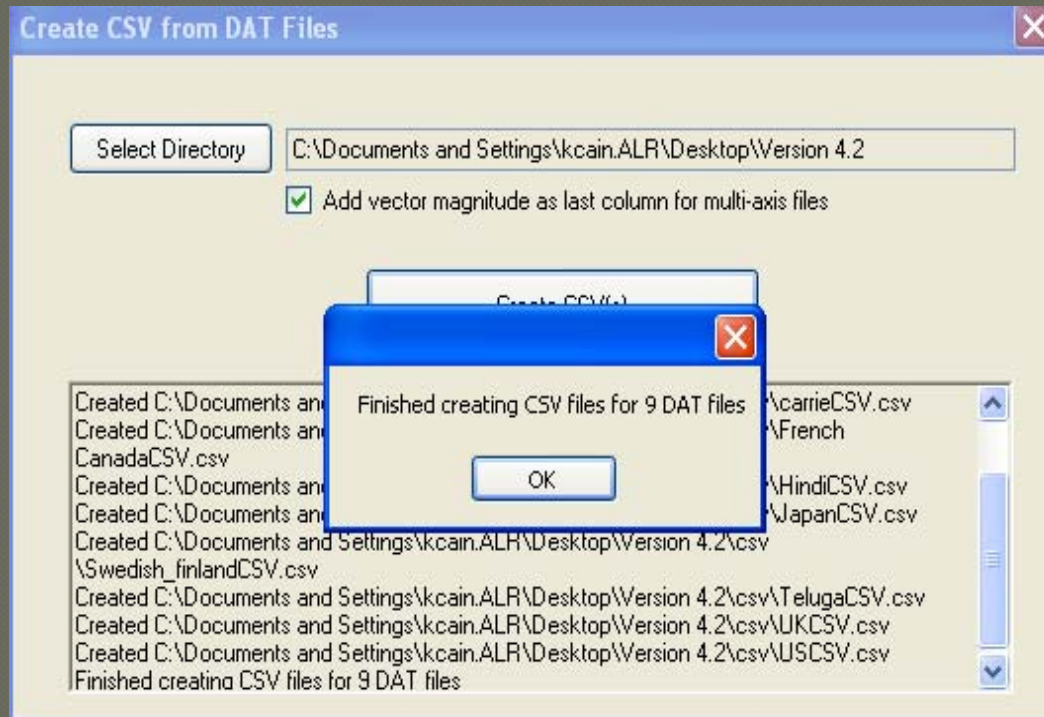
Import the comma-delimited file into statistical software and analyze.

File Creation for Actigraph data MeterPlus v4.2



Open CSVConverter.EXE
(program to parse the
original DAT files)

Pre-processing: Convert DAT to CSV



ConvertDatToCSV.exe

Use if you have multiple data types, or need
Vector Magnitude calculated

Step 1. Data screening

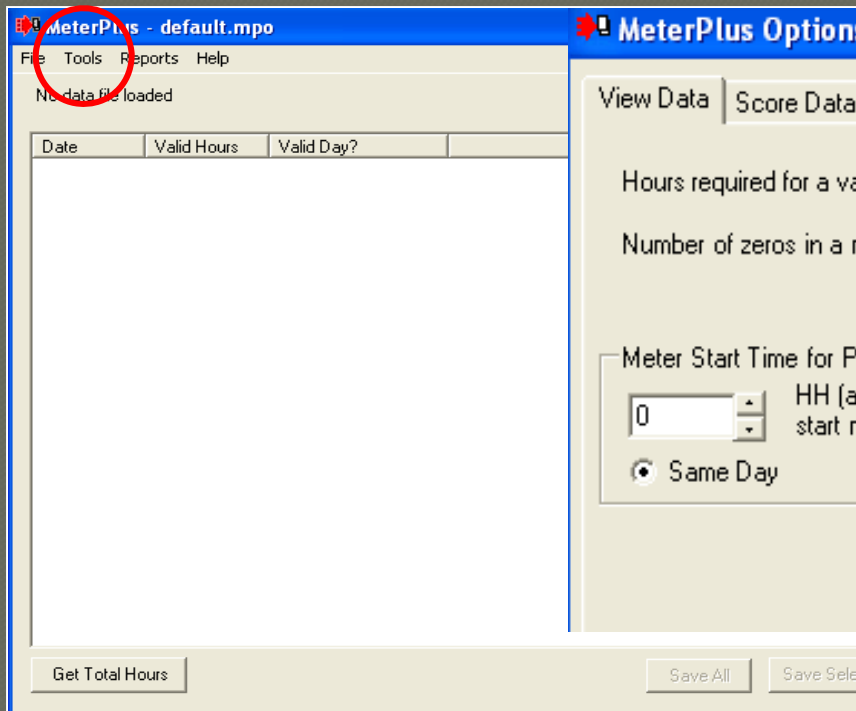
- Screen data right away
- Looking for valid wear time & device malfunction
 - Deciding if re-wear is necessary

IPEN cleaning & scoring criteria

- 60 minutes of “0” counts for valid hour
- 10 valid hours for valid day
- 5 valid days for compliance

Step 1. Screening data

Straightforward interface to program settings to screen for valid wearing time. This screening tool can be used to evaluate whether enough usable data have been gathered.



Valid wearing
time criteria

Time Zone
adjustments
(ignore)

Top left cell is **ALWAYS** **MIDNIGHT**

One column is **ALWAYS** 1 epoch (in this case 30s)

Daily Info for Thursday, February 05, 2009

Number of Data Points each Hour: 120

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	178	98	10	2	37	239	58	735	1780	1895	2137	1808	1631	1252		
31	13	0	6	144	0	5	0	0	70	3	27	6	2	4		
0	876	1309	1697	1897	1975	1602	287	1639	417	238	554	1415	321	383		
0	15	31	2	33	20	5	7	49	59	1	0	0	0	19		
0	16	0	31	4	21	23	52	21	18	1	2	0	8	2		
0	5	0	3	10	0	23	23	11	0	278	0	341	680	1108		
0	1	392	1	4	10	0	2	8	2	0	13	213	485	86		
0	246	10	366	174	366	209	1733	2238	2305	1999	1762	517	311	22		
0	57	0	4	4	10	0	0	4	13	17	0	3	20	0		
0	215	190	891	300	967	222	424	174	326	599	407	655	297	614	292	
0	195	213	117	58	223	169	193	39	22	58	6	56	19	243	162	
0	18	0	77	174	109	4	117	67	0	0	13	111	1	10		
0	0	32	0	240	36	2	3	1384	362	0	0	596	8	671	235	
0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Change Valid Value Valid Invalid

8am

9pm

One line is **ALWAYS** 1 hr

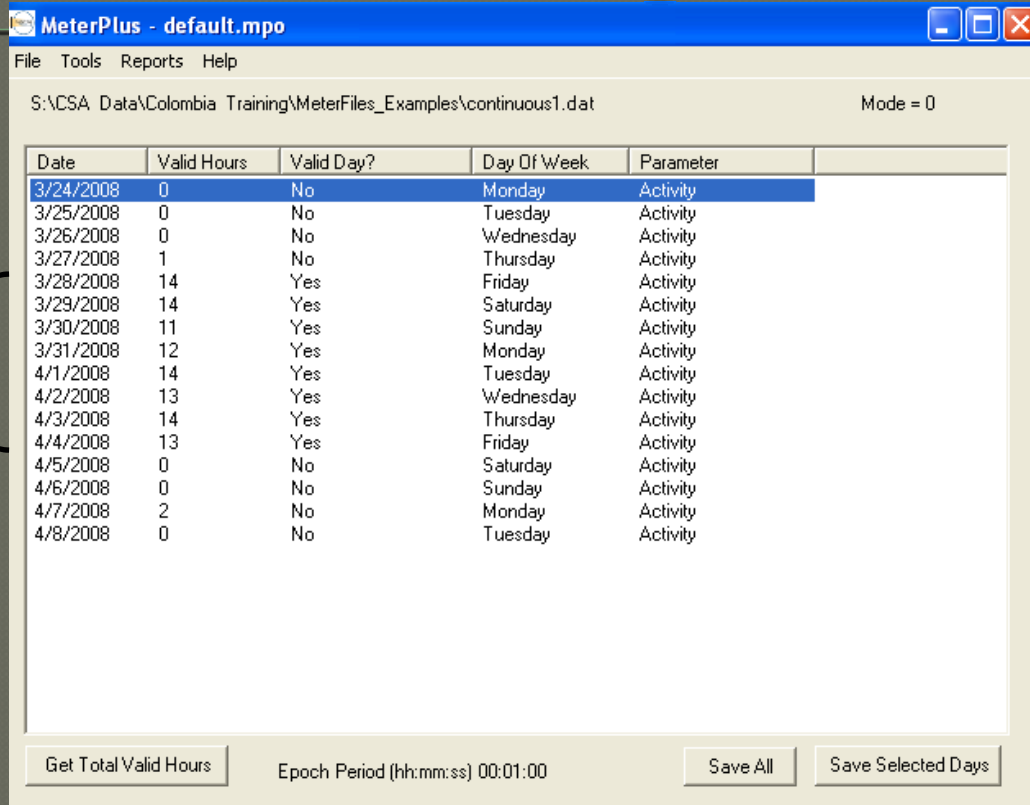
- 1 min epoch: 60 data points per hour (per case)
- 30s epoch: 120 data points/hr
- 15s epoch: 240 data points/hr
- 1s epochs: 3600 data points/hr

Examples of data

- ◉ Wearing time
- ◉ Non-wearing time that may look like wearing time on the surface
- ◉ Shift worker
- ◉ Overnight wearing
- ◉ Red flags
- ◉ Types of malfunction/Invalid data

Wearing time, continuous

Wearing days



The screenshot shows the MeterPlus software interface. The title bar reads "MeterPlus - default.mpo". The menu bar includes "File", "Tools", "Reports", and "Help". The status bar shows the file path "S:\CSA Data\Colombia Training\MeterFiles_Examples\continuous1.dat" and "Mode = 0". The main area contains a table with the following data:

Date	Valid Hours	Valid Day?	Day Of Week	Parameter
3/24/2008	0	No	Monday	Activity
3/25/2008	0	No	Tuesday	Activity
3/26/2008	0	No	Wednesday	Activity
3/27/2008	1	No	Thursday	Activity
3/28/2008	14	Yes	Friday	Activity
3/29/2008	14	Yes	Saturday	Activity
3/30/2008	11	Yes	Sunday	Activity
3/31/2008	12	Yes	Monday	Activity
4/1/2008	14	Yes	Tuesday	Activity
4/2/2008	13	Yes	Wednesday	Activity
4/3/2008	14	Yes	Thursday	Activity
4/4/2008	13	Yes	Friday	Activity
4/5/2008	0	No	Saturday	Activity
4/6/2008	0	No	Sunday	Activity
4/7/2008	2	No	Monday	Activity
4/8/2008	0	No	Tuesday	Activity

At the bottom of the window, there are buttons for "Get Total Valid Hours", "Epoch Period (hh:mm:ss) 00:01:00", "Save All", and "Save Selected Days".

Wearing time looks straight forward. Use log to match up days AND do a manual check of the first, the last, and a few middle wearing days to validate wearing time. What you see in the data supersedes what is reported on log (e.g., 7 days may be reported on the log but you see 8 days so it is "8").

Wearing time - intermittent

MeterPlus - default.mpo

File Tools Reports Help

S:\CSA Data\Colombia Training\MeterFiles_Examples\intermittent1.dat Mode = 0

Date	Valid Hours	Valid Day?	Day Of Week	Parameter
9/19/2008	0	No	Friday	Activity
9/20/2008	5	No	Saturday	Activity
9/21/2008	12	Yes	Sunday	Activity
9/22/2008	14	Yes	Monday	Activity
9/23/2008	0	No	Tuesday	Activity
9/24/2008	0	No	Wednesday	Activity
9/25/2008	12	Yes	Thursday	Activity
9/26/2008	12	Yes	Friday	Activity
9/27/2008	0	No	Saturday	Activity
9/28/2008	12	Yes	Sunday	Activity
9/29/2008	12	Yes	Monday	Activity
9/30/2008	2	No	Tuesday	Activity
10/1/2008	11	Yes	Wednesday	Activity
10/2/2008	0	No	Thursday	Activity
10/3/2008	11	Yes	Friday	Activity
10/4/2008	7	No	Saturday	Activity
10/5/2008	12	Yes	Sunday	Activity
10/6/2008	0	No	Monday	Activity
10/7/2008	13	Yes	Tuesday	Activity
10/8/2008	0	No	Wednesday	Activity
10/9/2008	0	No	Thursday	Activity
10/10/2008	0	No	Friday	Activity
10/11/2008	0	No	Saturday	Activity
10/12/2008	0	No	Sunday	Activity

Get Total Valid Hours Epoch Period (hh:mm:ss) 00:01:00 Save All Save Selected Days

MeterPlus - default.mpo

File Tools Reports Help

S:\CSA Data\Colombia Training\MeterFiles_Examples\intermittent4.dat Mode = 0

Date	Valid Hours	Valid Day?	Day Of Week	Parameter
8/14/2008	1	No	Thursday	Activity
8/15/2008	12	Yes	Friday	Activity
8/16/2008	2	No	Saturday	Activity
8/17/2008	0	No	Sunday	Activity
8/18/2008	15	Yes	Monday	Activity
8/19/2008	0	No	Tuesday	Activity
8/20/2008	14	Yes	Wednesday	Activity
8/21/2008	12	Yes	Thursday	Activity
8/22/2008	4	No	Friday	Activity
8/23/2008	7	No	Saturday	Activity
8/24/2008	6	No	Sunday	Activity
8/25/2008	0	No	Monday	Activity
8/26/2008	1	No	Tuesday	Activity
8/27/2008	3	No	Wednesday	Activity
8/28/2008	0	No	Thursday	Activity

Get Total Valid Hours Epoch Period (hh:mm:ss) 00:01:00 Save All Save Selected Days

Wearing time is NOT straight forward. Use log to match up days AND do a manual check of each day to determine wearing time (double click to open every day with any valid hours). What you see in the data supersedes what is reported on log. It is possible that 7 consecutive days would be reported on the log but obviously this is not the case.

Typical wearing day

Daily Info for Thursday, August 22, 2002

Number of Data Points each Hour: 60

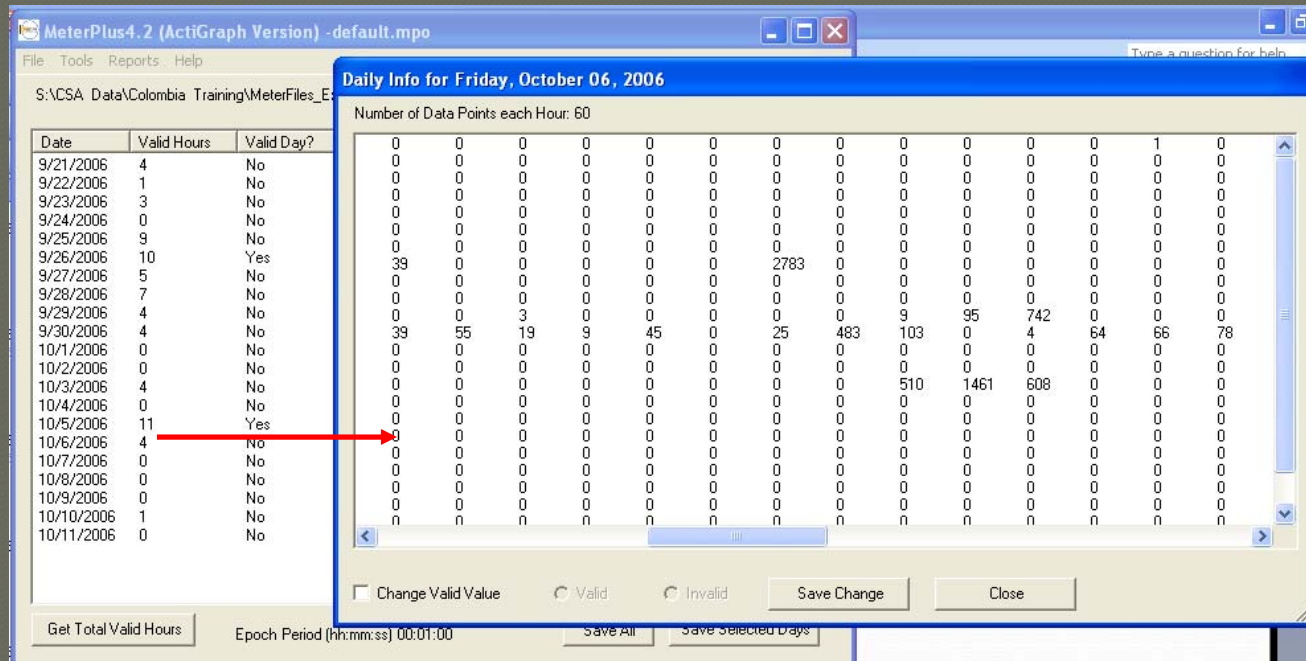
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
198	164	344	148	311	108	207	76	14	86	25	68	127	260	95			
20	37	77	211	12	24	0	10	0	4	11	0	0	0	0			
6	4	0	5	0	0	8	8	2	0	0	0	0	0	0			
87	2	0	195	315	0	11	15	20	19	13	71	49	4	6			
5	0	253	1131	951	182	251	6	1480	831	90	11	0	162	269			
83	0	280	76	86	194	138	28	150	426	12	513	173	246	39			
202	15	195	132	223	382	196	45	101	782	1239	757	1213	3832	704			
0	0	0	0	0	0	0	12	423	469	1133	488	392	197	816			
894	1063	900	386	760	208	537	90	160	265	1079	558	1332	1090	862			
469	873	1338	1963	2133	1079	684	1093	1347	2070	662	334	531	846	1231			
768	159	385	1634	1898	2009	539	2076	2167	2225	310	321	3136	2675	616			
525	772	639	132	149	125	33	49	99	98	490	638	261	126	34			
544	1022	319	239	310	0	15	0	1	26	83	38	0	43	7			
0	0	1	4	0	0	0	0	0	0	127	0	0	0	9			
0	0	28	2	0	0	1	104	0	0	0	0	0	6	0			
0	0	0	0	0	0	236	314	894	584	342	35	419	291	159			

Change Valid Value Valid Invalid

OK Cancel

This is a typical wearing day. There are rows of zero counts during sleep and the activity starts at the 7th row, or 7am. There are low counts throughout but they are sporadic and they're not consecutive. This is a very typical pattern and would likely have 13 or 14 valid hours of wear time.

Non-wearing day



This day has 4 valid hours but is NOT wearing time. There are a lot of zero counts and low values. The counts are sporadic and do not follow the typical wear time pattern.

Non-wearing day

The screenshot shows the 'MeterPlus4.2 (ActiGraph Version) - default.mpo' application. A 'Daily Info for Tuesday, August 27, 2002' window is open, displaying a grid of data points for each hour. The grid is titled 'Number of Data Points each Hour: 60'. The data points are arranged in a grid with 15 columns and 24 rows. A red arrow points to the 'Valid Day?' column for 8/27/2002, which is marked 'Yes'. The 'Valid Hours' column for 8/27/2002 is 10. The 'Valid Day?' column for 8/27/2002 is 'Yes'. The 'Valid Hours' column for 8/28/2002 is 5. The 'Valid Day?' column for 8/28/2002 is 'No'. The data points for 8/27/2002 are mostly zero, indicating a non-wearing day.

Date	Valid Hours	Valid Day?
8/15/2002	11	Yes
8/16/2002	0	No
8/17/2002	0	No
8/18/2002	12	Yes
8/19/2002	17	Yes
8/20/2002	13	Yes
8/21/2002	15	Yes
8/22/2002	17	Yes
8/23/2002	12	Yes
8/24/2002	2	No
8/25/2002	10	Yes
8/26/2002	6	No
8/27/2002	10	Yes
8/28/2002	5	No

This day has 10 valid hours but is NOT wearing time. There are a lot of zero counts and low values. The counts are sporadic and do not follow the typical wear time pattern.

Shift worker

MeterPlus - default.mpo

File Tools Reports Help

S:\CSA Data\Colombia Training\MeterFiles_Example

Daily Info for Monday, September 18, 2006

Before Time Zone Adjustment

Number of Data Points each Hour: 60

Date	Valid Hours	Valid Day?	1173	1367	923	1707	2180	3214	2643	2604	2195	2643	2001	1746	2094	2895	2174
9/15/2006	7	No	649	28	47	145	108	447	764	1042	361	835	383	397	852	1052	1364
9/16/2006	10	Yes	0	114	739	190	562	224	423	0	0	0	2	0	0	22	0
9/17/2006	11	Yes	13	151	1	18	137	143	28	135	355	17	21	103	67	0	4
9/18/2006	11	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/19/2006	7	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/20/2006	10	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/21/2006	9	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/22/2006	2	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/23/2006	0	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/24/2006	0	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/25/2006	8	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/26/2006	4	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/27/2006	1	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/28/2006	0	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/29/2006	0	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			178	166	454	133	0	0	0	0	0	0	241	58	358	291	699
			16	128	41	84	75	8	37	102	27	646	3588	5051	3511	3061	2795
			327	145	726	3070	933	1213	735	638	202	241	304	411	231	92	71
			498	25	0	43	31	11	17	31	69	2885	3411	2113	40	452	1185
			2199	1324	3842	2168	588	82	0	0	0	0	0	0	0	0	0
			569	681	908	434	66	650	209	272	551	210	340	471	514	623	385

Change Valid Value Valid Invalid

Tools -> Options -> Meter Start Time ...adjust start time until days look 'normal'

MeterPlus Options

View Data | Score Data | Categories | Filename | Bouts | kCals | Filters

Hours required for a valid day:

Number of consecutive zeros to make an hour invalid:

Meter Start Time for Participant's Time Zone

HH [actual meter start hour in 24 hour time; start minutes are read from the file header]

Same Day Next Day Previous Day

S:\CSA Data\Colombia Training\MeterFiles_Example

Daily Info for Monday, September 18, 2006

After Time Zone Adjustment

Number of Data Points each Hour: 60

Date	Valid Hours	Valid Day?	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/14/2006	0	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/15/2006	11	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/16/2006	10	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/17/2006	12	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/18/2006	12	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/19/2006	4	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/20/2006	9	No	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/21/2006	10	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9/22/2006	0	No	166	454	133	0	0	0	0	0	0	0	241	58	358	291	699
9/23/2006	0	No	128	41	84	75	8	37	102	27	646	3588	5051	3511	3061	2795	1960
9/24/2006	0	No	145	726	3070	933	1213	735	638	202	241	304	411	231	92	71	432
9/25/2006	9	No	25	0	43	31	11	17	31	69	2885	3411	2113	40	452	1185	128
9/26/2006	3	No	1324	3842	2168	588	82	0	0	0	0	0	0	0	0	0	0
9/27/2006	1	No	681	908	434	66	650	209	272	551	210	340	471	514	623	385	48
9/28/2006	0	No	644	691	167	134	577	794	1087	305	1042	1200	325	637	518	2269	2002
9/29/2006	0	No	218	391	327	1678	1597	1985	284	815	3617	3676	3859	2458	2631	3100	3671
			35	704	434	402	997	53	124	472	203	225	172	165	19	97	804
			610	682	167	197	5	0	1	476	447	92	44	18	130	36	253
			0	0	0	0	0	0	350	72	40	11	55	28	77	401	4
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Change Valid Value Valid Invalid

Overnight wearing

meterplus - desktop.mpl

File Tools Reports Help

S:\CSA Data\Colombia Training\MeterFiles

Daily Info for Friday, March 09, 2007

Number of Data Points each Hour: 60

Date	Valid Hours	Valid Day?	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3/5/2007	2	No	0	0	0	0	7	0	7	69	7	0	128	674	0	215	620	0	0	0	0	0	0	0	0	0	0
3/6/2007	13	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/7/2007	14	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/8/2007	13	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/9/2007	18	Yes	0	0	0	0	0	0	0	668	0	0	2	37	0	3	2	0	0	0	0	0	0	0	0	0	0
3/10/2007	14	Yes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/11/2007	9	No	131	232	170	9	30	172	137	3123	2612	445	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3/12/2007	8	No	0	0	8	17	0	0	21	107	348	19	52	55	0	188	371	0	0	0	0	0	0	0	0	0	0
3/13/2007	1	No	259	854	23	310	1497	917	174	448	821	1206	436	124	81	3	10	0	0	0	0	0	0	0	0	0	0
3/14/2007	4	No	16	19	66	78	128	47	125	489	786	867	603	1039	1638	2399	1822	0	0	0	0	0	0	0	0	0	0
3/15/2007	2	No	0	0	0	0	0	0	101	304	139	230	412	32	0	0	0	0	0	0	0	0	0	0	0	0	0
3/16/2007	3	No	149	204	312	499	287	354	205	47	337	302	231	314	168	46	82	0	0	0	0	0	0	0	0	0	0
			36	13	125	17	478	228	284	141	212	406	345	601	169	35	69	0	0	0	0	0	0	0	0	0	0
			515	505	400	32	0	38	23	358	147	14	1098	386	458	181	66	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	375	22	133	1355	1367	869	45	36	0	0	148	0	0	0	0	0	0	0	0	0	0
			0	384	80	96	276	0	0	0	0	0	11	0	0	112	84	0	0	0	0	0	0	0	0	0	0
			0	0	1	2	12	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			45	38	67	52	66	7	15	8	7	8	0	0	0	4	6	0	0	0	0	0	0	0	0	0	0
			196	0	33	212	222	7	95	463	419	146	137	50	48	156	40	0	0	0	0	0	0	0	0	0	0
			560	1362	958	682	646	1169	743	876	403	1507	1136	218	121	88	405	0	0	0	0	0	0	0	0	0	0
			1	7	42	49	40	382	0	0	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			218	4	0	8	8	19	2	193	37	0	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	149	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Get Total Valid Hours Epoch Period Change Valid Value Valid Invalid Save Change Close

Midnight

Low counts of activity (typically <500 per minute) recorded overnight indicating the meter was worn during sleep. Flag these files in the tracking database so they can be cleaned later. Could manually replace data collected during sleep with "0" values or use Time Filters to summarize activity during waking hours only.

Red flag – 24 valid hours

S:\CSA Data\NQLS CSA files\TEAN Files\bad data\314045013084_1.dat

Date	Valid Hours	Valid Day?	Day Of Week	Parameter
12/30/1899	24	Yes	Saturday	Activity
12/31/1899	24	Yes	Sunday	Activity
1/1/1900	24	Yes	Monday	Activity
1/2/1900	24			
1/3/1900	24			
1/4/1900	24			
1/5/1900	24			
1/6/1900	24			
1/7/1900	24			
1/8/1900	24			
1/9/1900	24			
1/10/1900	24			
1/11/1900	24			
1/12/1900	24			
1/13/1900	24			
1/14/1900	24			
1/15/1900	24			
1/16/1900	24			
1/17/1900	24			
1/18/1900	24			
1/19/1900	24			
1/20/1900	24			
1/21/1900	19			
1/22/1900	828			
1/23/1900	8146			
1/24/1900	2322			
1/25/1900	7759			
1/26/1900	7503			
1/27/1900	6977			
1/28/1900	28385			
1/29/1900				
1/30/1900				
1/31/1900				
2/1/1900				
2/2/1900				
2/3/1900				

Daily Info for Thursday, January 11, 1900

Number of Data Points each Hour: 60

0	14080	16	16	20704	15616	4320	16128	31966	16384	1706	16896	21690	17152	27326
17734	65	16963	17477	17991	18432	0	770	3	768	772	2	1280	520	2
0	9802	19	1024	4386	4	31572	26729	29472	26995	8289	8277	16722	21536	29810
5892	17	13532	0	0	272	0	0	0	528	0	0	0	769	7900
23688	15936	28160	12306	3299	12306	214	12306	6371	3602	3858	7756	1536	3678	16016
1810	1554	2066	2322	2578	2834	3346	3998	6184	3616	7580	1024	1024	4904	2336
15140	16272	8446	12332	3656	2121	2378	2635	2883	16208	2	12324	16272	8446	8492
12097	3935	12257	16304	128	22820	16099	7763	16205	3960	2127	16205	3961	2383	12109
544	8531	15932	2207	29999	14144	6	2888	2115	1887	2136	2409	2666	2923	3007
1060	6227	2403	2659	2915	3144	0	3145	512	3146	1024	3147	1536	15681	15169
579	18947	8002	20483	3971	2852	8067	3876	8067	6948	8067	13348	8067	21796	8067
18435	16963	22019	7231	14992	6144	800	21059	22019	5635	17043	22019	1060	15072	16384
572	17043	22275	4900	8002	18435	20042	20446	14339	16963	22275	8002	18435	8019	591
8067	8740	12163	8996	8067	11044	8067	14116	14396	12944	10496	20995	808	12306	5334
12866	19971	572	12866	19971	12946	19971	548	23619	316	19523	14913	12353	8579	12306
26684	4803	21507	8002	21507	16368	31231	12243	591	21507	12994	21507	13040	32766	21507
13010	21507	13040	32766	21507	10044	4819	21507	8002	21507	16368	31231	12243	591	21507
828	13008	2	21507	7491	3137	12306	10962	16787	0	548	24131	316	20035	24243
8146	28675	3987	1056	12867	28163	12867	28675	11587	15424	9475	12306	10962	15680	768
2322	1554	1810	1042	1298	12674	1612	1357	3141	3395	12306	16606	6726	17920	2650
7759	1024	8015	1536	12306	27868	2124	2381	2638	2895	7750	17920	3678	3678	3678
7503	512	7759	1024	8015	1536	12306	27868	332	0	333	512	334	1024	335
6977	1536	12306	5341	332	0	333	512	334	1024	335	1536	5971	18239	8006
28385	3219	3108	11329	7489	512	7745	1024	8001	1536	12306	9924	12306	25788	2876

Unlikely pattern

Valid Invalid

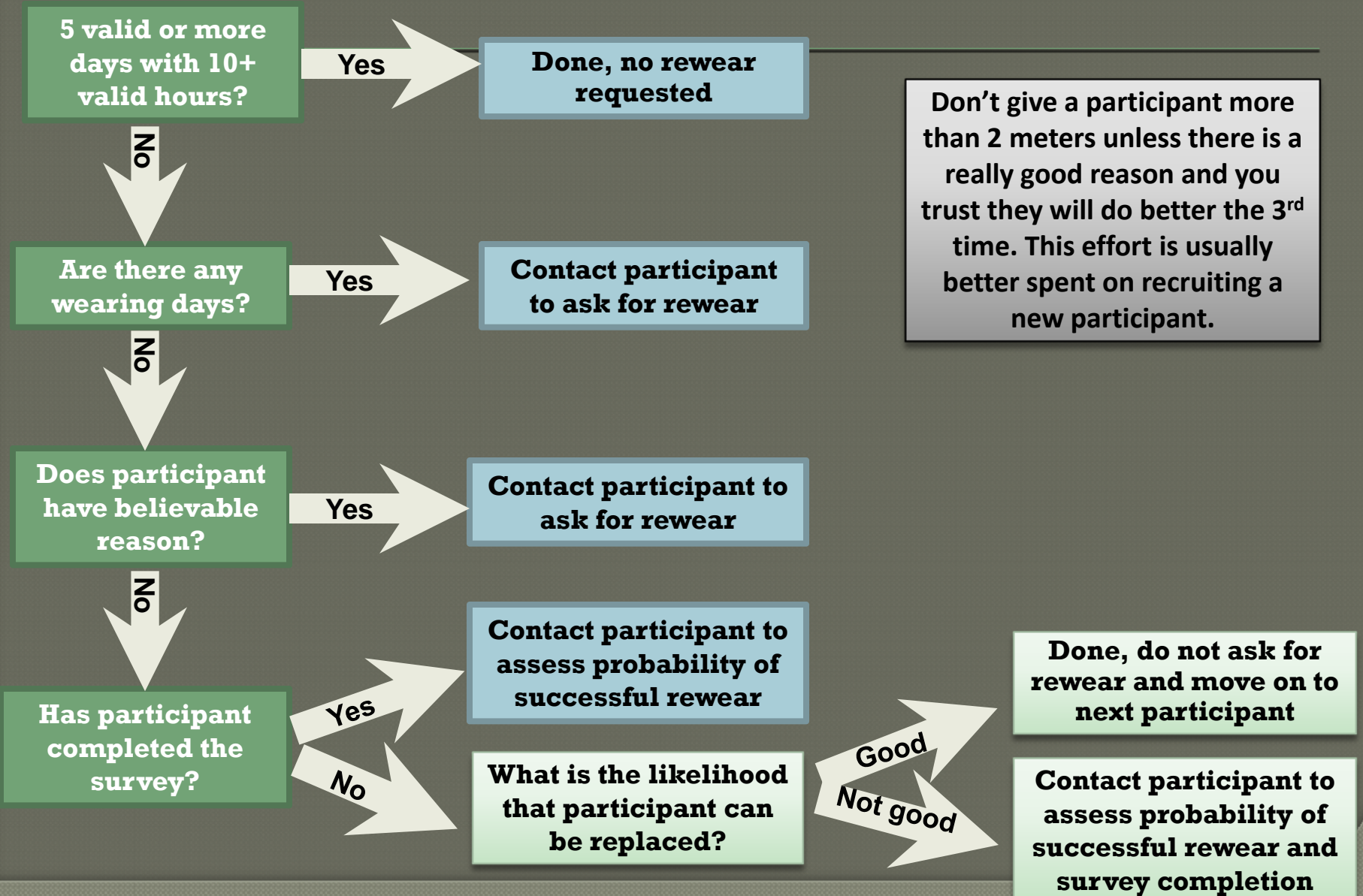
Save Change

Close

Day light savings

- Don't typically worry about this unless looking at hourly patterns or matching with other data (e.g., GPS or activity log)
- To clean files affected by time change, modify DAT file by either adding an hour of zero counts or deleting an hour of zero counts. Can send detailed protocol if needed.

Step 2: Rewear Decision



Tracking rewear

- Remember to add a new record to meter tracking database for all re-wears
 - Stage
 - Filename needs to reflect stage (1, 2, etc)

The image displays a complex data collection form titled "Data Collection" with a yellow background. The form is organized into several sections:

- Outgoing:** Fields for Meter serial number, Date meter delivered, Rewear serial number, and Date rewear meter delivered.
- Retrieval:** Fields for Date survey retrieved, Survey complete?, Date survey entered, Date Meter received, Meter valid days, Need rewear?, Date rewear meter received, Valid days rewear, and Valid days total.
- Incentive:** Fields for Date payment sent and Payment amount.
- Lost meter:** Fields for Meter lost and Meter serial number.
- Meter Follow-up Calls:** A grid of call logs for First, Second, Third, and Fourth calls, including fields for Date, Time, Outcome, and Comment.
- Rewear Meter Follow-up Calls:** A similar grid for rewear calls.
- Asking for rewear:** Fields for 1st and 2nd call dates, times, outcomes, and comments.

An inset window titled "Tracking Database" is overlaid on the bottom right. It features an "Add Record" button and a "Data Problems" section with checkboxes for "Bad data", "Not Downloaded", and "Never Worn". A "Comments" section is also present. The "Stage" field in the "Tracking Database" is circled in red. Below the "Tracking Database" is an "Outgoing" section with fields for Date Delivered, Date Activated, and Date Charts Prepared.

Step 3. Cleaning data

MeterPlus - default.mpo

File Tools Reports Help

G:\Options... 93023002_3CSV.csv Mode = 1

Date	Valid Hours	Valid Day?	Day Of Week	Parameter
3/9/2010	13	Yes	Tuesday	Activity
3/10/2010	14	Yes	Wednesday	Activity
3/11/2010	14	Yes	Thursday	Activity
3/12/2010	15	Yes	Friday	Activity
3/13/2010	14	Yes	Saturday	Activity
3/14/2010	10	Yes	Sunday	Activity
3/15/2010	15	Yes	Monday	Activity
3/16/2010	4	No	Tuesday	Activity
3/17/2010	5	No	Wednesday	Activity
3/18/2010	0	No	Thursday	Activity
3/9/2010	13	Yes	Tuesday	Steps
3/10/2010	14	Yes	Wednesday	Steps
3/11/2010	14	Yes	Thursday	Steps
3/12/2010	15	Yes	Friday	Steps
3/13/2010	14	Yes	Saturday	Steps
3/14/2010	10	Yes	Sunday	Steps
3/15/2010	15	Yes	Monday	Steps
3/16/2010	3	No	Tuesday	Steps
3/17/2010	5	No	Wednesday	Steps
3/18/2010	0	No	Thursday	Steps

Get Total Valid Hours Epoch Period (hh:mm:ss) 00:00:30 Save All Save Selected Days

Step 3. Cleaning data

MeterPlus Options

View Data | Score Data | Categories | Filename | Bouts | kCals | Filters

Hours required for a valid day:

Number of consecutive zeros to make an hour invalid:

Value to use for undefined field:

Replace strings of zeros with the following value:

(Zeros will only be replaced if there is a string that meets the criteria set above to make an hour invalid.)

Output:

Parameters:

Directory:

Save | Save and Close | Exit

The definition of “wearing” is controlled by the user to exclude periods of time when the device was removed.

Non-wearing time within valid days is coded as such during this cleaning process. We use -999.

Select level of output: Summary, Daily, Hourly, for valid days only or all days.

The type of data to be scored is selected here. Activity refers to single plane activity and be analyzed for IPEN.

Browse for location to save cleaned files (MPD)

Saving wear time

The user selects the days to be scored. We recommend saving ALL wearing time. DO NOT save “drop-off” or “pick-up” day.

MeterPlus - default.mpo

File Tools Reports Help

G:\dat to CSV\csv\1193023002_3CSV.csv Mode = 1

Date	Valid Hours	Valid Day?	Day Of Week	Parameter
3/9/2010	13	Yes	Tuesday	Activity
3/10/2010	14	Yes	Wednesday	Activity
3/11/2010	14	Yes	Thursday	Activity
3/12/2010	15	Yes	Friday	Activity
3/13/2010	14	Yes	Saturday	Activity
3/14/2010	10	Yes	Sunday	Activity
3/15/2010	15	Yes	Monday	Activity
3/16/2010	4	No	Tuesday	Activity
3/17/2010	5	No	Wednesday	Activity
3/18/2010	0	No	Thursday	Activity
3/9/2010	13	Yes	Tuesday	Steps
3/10/2010	14	Yes	Wednesday	Steps
3/11/2010	14	Yes	Thursday	Steps
3/12/2010	15	Yes	Friday	Steps
3/13/2010	14	Yes	Saturday	Steps
3/14/2010	10	Yes	Sunday	Steps
3/15/2010	15	Yes	Monday	Steps
3/16/2010	3	No	Tuesday	Steps
3/17/2010	5	No	Wednesday	Steps
3/18/2010	0	No	Thursday	Steps

Get Total Valid Hours Epoch Period (hh:mm:ss) 00:00:30 Save All Save Selected Days

MeterPlus

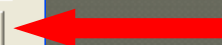
14 days were successfully saved to
S:\CSA Data\NQLS CSA files\TEAN Files\MPD files Seattle\1193023002_3CSV_Activity.mpd

OK

MeterPlus

14 days were successfully saved to
S:\CSA Data\NQLS CSA files\TEAN Files\MPD files Seattle\1193023002_3CSV_Steps.mpd

OK



Combining re-wear files

- Clean each wear file and save wear days
- Open each MPD file in Notepad
- Copy data from 2nd wearing to end of 1st wearing file
- Change number of days in the header
- Save combined file, rename and delete 2nd MPD file

Let's try it

Step 4. Scoring Data (MPD files)

- There are a few things to configure in MeterPlus before batch scoring your files
 - Cut-points
 - Filename variables
 - Energy Expenditure
 - Bouts
 - Time Filters

Programming cut-points (Tools/Options)

MeterPlus Options

View Data | Score Data | **Categories** | Variables | Bouts | kCals | Filters

Group/Category Name	Min Value	Max Value
+ NIK (age 6 to 11)		
+ TEAN (age 12 to 16)		
- Adult (age 18 to 64)		
not_wearing	-999	-999
sedentary	0	100
light	101	1952
moderate	1953	5724
hard	5725	9498
very_hard	9499	100000
+ Senior (age 65 to 100)		

Add Group Add Category Edit Delete

Create Groups

Edit Category Form

Name:

Age from: to

OK Cancel

Add/Edit Cut-

CutPointForm

Name:

Meter values from to

OK Cancel

Filename variables (Tools/options)

MeterPlus Options

View Data | Score Data | Categories | **Filename** | Bouts | kCals | Filters

Create variables from the file name

Begin parsing for variables after the last character.

Sample file name:

552583642001

Variables

Variable	Character Position
Country	0-2
Walkability	2-3
Tract	3-9
Participant	9-12

Enter sample file name (ADD)

Designate character positions

Name your variables

Settings for bouts (Tools/Options)

MeterPlus Options

View Data | Score Data | Categories | Filename | Bouts | kCals | Filters

Include Bouts in output

Bout length (minutes) 10

Lower limit (activity count) 1953

Upper limit (activity count) 5724

Tolerance (minutes) 2

Save Save and Close Exit

10 minute bout

Moderate activity lower threshold cut-point for adults (Freedson) for 60s epoch

Moderate activity upper threshold cut-point for adults (Freedson) for 60s epoch

2 minute interruption allowed (bout forgiveness)

Energy expenditure (Tools/Options)

MeterPlus Options

View Data | Score Data | Categories | Variables | Bouts | kCals | Filters

Include KCals/Day in output

Work Energy Theorem
 *$k\text{cals}/\text{min} = 0.0000191 * \text{counts}/\text{minute} * \text{body mass in kg}$*

Freedson Equation
 *$k\text{cals}/\text{min} = 0.00094 * \text{counts}/\text{minutes} + 0.1346 * \text{body mass in kg} - 7.37418$*

Combination
Use WET for counts less than 1952 and FE for counts greater than 1952

Choice of 3
algorithms

Time filters (Tools/Options)

Select days of the week & times per day (e.g., after-school hours) to summarize activity.

Sum data within these time periods

Start Time: 09:00 AM
End Time: 05:00 PM

Apply to Days

All Days
 Weekdays Only
 Weekends Only
 Specific Date: 5/16/2009

Save

May. 2009

Sun	Mon	Tue	Wed	Thu	Fri	Sat
26	27	28	29	30	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	1	2	3	4	5	6

Today: 5/16/2009

MeterPlus Options

View Data | Score Data | Categories | Filename | Bouts | kCals | Filters

Create Time Filter Output File

Start Time	End Time	Apply to Days
08:00 AM	12:00 PM	Weekends Only
03:00 PM	07:00 PM	Weekdays Only

Add Filter | Edit | Delete

Age and weight files (Reports/Scoring)

Link to subject age and body weight files to use age-defined cut-points within the same batch (i.e., age-specific scoring) and different body weights for energy expenditure calculations.

Participant Age Data for Scoring

Participant Age Data

Age file for participants: ...
Leave blank if you don't have an age file.

If a participant's age is unknown, use the following category group or specify an age:

Category Group:
Adult (age 18 to 64)
NIK (age 6 to 11)
TEAN (age 12 to 16)
Senior (age 65 to 100)

Participant Weight Data

You have specified to include Kcal in the output so you need to provide the participant's weight for scoring.

Weight file for participants: ...
Leave blank if you don't have a weight file.

If a participant's weight is unknown, use the following weight:

Weight: (in Kg)

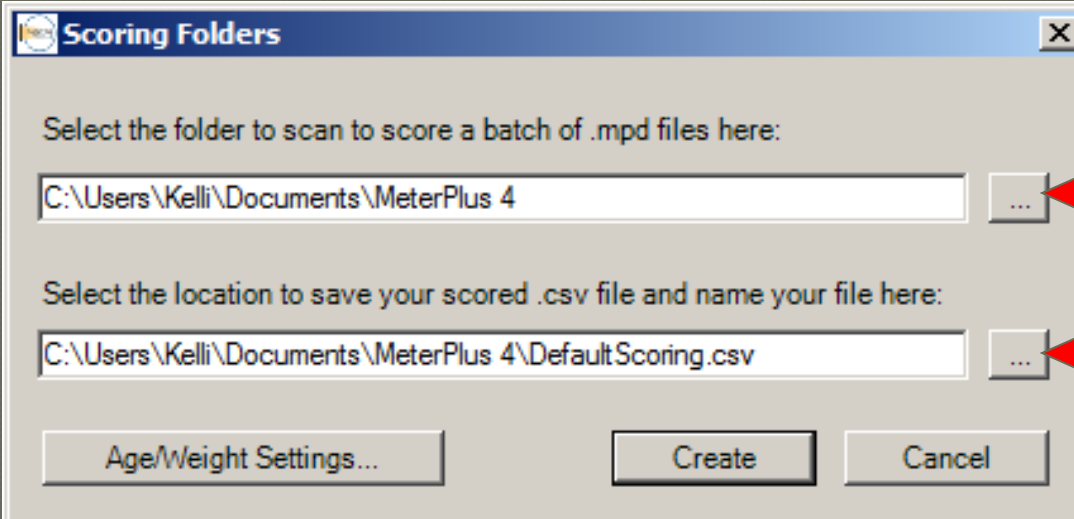
Use subject age to apply different cutpoints within the same batch

OR Select a group of cutpoints to use for your entire sample

Use subject body weight for energy expenditure calculations

OR Select a weight to be used for your entire sample

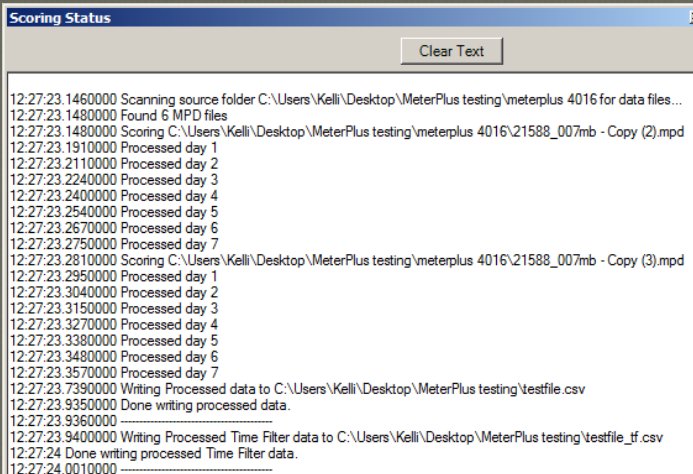
Step 4. Batch scoring (Reports/Scoring)



The 'Scoring Folders' dialog box contains two text input fields. The first field is labeled 'Select the folder to scan to score a batch of .mpd files here:' and contains the path 'C:\Users\Kelli\Documents\MeterPlus 4'. The second field is labeled 'Select the location to save your scored .csv file and name your file here:' and contains the path 'C:\Users\Kelli\Documents\MeterPlus 4\DefaultScoring.csv'. Both fields have a browse button ('...') to their right. At the bottom of the dialog are three buttons: 'Age/Weight Settings...', 'Create', and 'Cancel'.

Where to find individual files to process

Where to save processed CSV file for entire sample



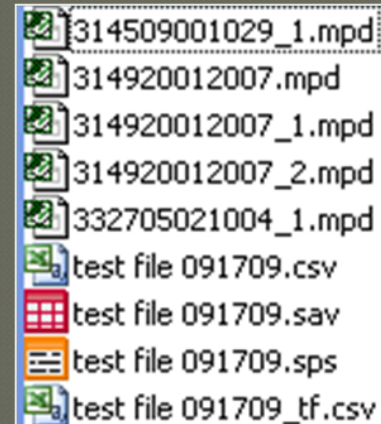
The 'Scoring Status' window displays a log of operations. It includes a 'Clear Text' button at the top. The log shows the following sequence of events:

```
12:27:23.1460000 Scanning source folder C:\Users\Kelli\Desktop\MeterPlus testing\meterplus 4016 for data files...
12:27:23.1480000 Found 6 MPD files
12:27:23.1480000 Scoring C:\Users\Kelli\Desktop\MeterPlus testing\meterplus 4016\21588_007mb - Copy (2).mpd
12:27:23.1910000 Processed day 1
12:27:23.2110000 Processed day 2
12:27:23.2240000 Processed day 3
12:27:23.2400000 Processed day 4
12:27:23.2540000 Processed day 5
12:27:23.2670000 Processed day 6
12:27:23.2750000 Processed day 7
12:27:23.2810000 Scoring C:\Users\Kelli\Desktop\MeterPlus testing\meterplus 4016\21588_007mb - Copy (3).mpd
12:27:23.2950000 Processed day 1
12:27:23.3040000 Processed day 2
12:27:23.3150000 Processed day 3
12:27:23.3270000 Processed day 4
12:27:23.3380000 Processed day 5
12:27:23.3480000 Processed day 6
12:27:23.3570000 Processed day 7
12:27:23.7390000 Writing Processed data to C:\Users\Kelli\Desktop\MeterPlus testing\testfile.csv
12:27:23.9350000 Done writing processed data.
12:27:23.9360000 -----
12:27:23.9400000 Writing Processed Time Filter data to C:\Users\Kelli\Desktop\MeterPlus testing\testfile_tf.csv
12:27:24.0010000 Done writing processed Time Filter data.
12:27:24.0010000 -----
```

One step  Create

Output

File type	Description
CSV	Comma-delimited file containing the results of the batch scoring including activity counts, step counts, bouts and energy expenditure.
TF.CSV	Comma-delimited file containing the time-filtered activity variables only
SPS	Syntax file that will import data into SPSS
SAV	SPSS file created after running the SPS syntax or importing into SPSS directly



Activity, Bouts, EE variables

Activity

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	SN	city	neighbo	walka	group	id	Filename	Date	TotDays	VldDays	VldHours	TotVdnot_wearin	TotVdsedent	TotVdligh	TotVdmod
2	50168	1	1	1	0	7310	101107310.DAT	11/12/2003	8	8	102	5434	3585	2404	93
3	51165	5	33	1	0	0210	533100210.dat	11/24/2005	8	8	97	5915	4510	1087	8
4	50293	6	15	4	0	0120	6154100120.dat	1/22/2008	7	7	89	4808	3438	1720	114
5															

Serial number, start date, # valid days & hours, number of epochs in each activity category across all valid days.

Bouts

	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ
1	D1_bout_num	D1_bout_lenqft	D1_bout_avg	D1B1_st_time	D1B1_end_time	D1B2_st_time	D1B2_end_time	D1B3_st_time	D1B3_end_time	D1B4_st_time
2	1	14	14	11/12/2003 13:47	11/12/2003 14:01	NULL	NULL	NULL	NULL	NULL
3	1	10	10	11/24/2005 9:00	11/24/2005 9:10	NULL	NULL	NULL	NULL	NULL
4	4	119	29.75	1/22/2008 0:00	1/22/2008 0:17	1/22/2008 6:59	1/22/2008 8:07	1/22/2008 8:32	1/22/2008 8:55	1/22/2008 9:53
5										
6										

Number of bouts, total and average length of bouts, start and end times of each bout.

Energy Expenditure

	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
1	Tot_kcal	KCal_mean	KCal_peak	KCal_not_w	KCal_sedentary	KCal_light	KCal_moderate	KCal_hard	KCal_very_hard	D1Date	D1Day	D1vday	D1vh
2	1195.47	149.43	224.58	0	49.81	1145.66	0	0	0	11/12/2003	Wednesday	1	8
3	463.31	57.91	95.95	0	31.55	431.76	0	0	0	11/24/2005	Thursday	1	14
4	863.27	123.32	167.77	0	33.68	829.59	0	0	0	1/22/2008	Tuesday	1	8
5													

Total, mean & peak caloric expenditure, caloric expenditure in each activity category.

Output: Activity variables

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	SN	city	neighbo	walka	group	id	Filename	Date	TotDays	VldDays	VldHours	TotVdnot_wearin	TotVdsedent	TotVdligh	TotVdmod	Tc
2	50168	1	1	1	0	7310	101107310.DAT	11/12/2003	8	8	102	5434	3585	2404	93	
3	51165	5	33	1	0	0210	533100210.dat	11/24/2005	8	8	97	5915	4518	1887	8	
4	50293	6	15	4	0	0120	6154100120.dat	1/22/2008	7	7	89	4808	3438	1720	114	
5																

Start date, number of valid days, number of valid hours, and number of epochs in each activity category across all valid days.

- A. *Date* = 1/22/2008 is first day of wearing time that was saved
- B. *VldDays* = 7 valid days in file
- C. *VldHours* = 89 valid hours
- D. *TotVdNot_wearing* = 4808 epochs of not wearing time across the 7 valid days
- E. *TotVdsedentary* = 3438 epochs of sedentary activity across the 7 valid days
- F. *TotVdlight* = 1720 epochs of light activity across the 7 valid days
- G. *TotVdmoderate* = 114 epochs of moderate activity across the 7 valid days

Output: Bouts variables

	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ
1	D1_bout_num	D1_bout_length	D1_bout_avg	D1B1_st_time	D1B1_end_time	D1B2_st_time	D1B2_end_time	D1B3_st_time	D1B3_end_time	D1B4_st_time
2	A 1	B 14	C 14	D 11/12/2003 13:47	E 11/12/2003 14:01	NULL	NULL	NULL	NULL	NULL
3	1	10	10	11/24/2005 9:00	11/24/2005 9:10	NULL	NULL	NULL	NULL	NULL
4	4	119	29.75	1/22/2008 0:00	1/22/2008 0:17	1/22/2008 6:59	1/22/2008 8:07	1/22/2008 8:32	1/22/2008 8:55	1/22/2008 9:53
5										
6										

Number of bouts, total and average length of bouts, start and end times of each bout.

A. *D1_bout_num* = 1 bout of activity in Day 1 for this subject

B. *D1_bout_length* = Total bout length in Day 1 is 14 minutes

C. *D1_bout_avg* = Average bout length in Day 1 is 14 minutes

D. *D1B1_st_time* = The 1st bout in Day 1 started on 11/12/03 at 13:47

E. *D1B1_end_time* = The 1st bout in Day 1 ended on 11/12/03 at 14:01

Output: Energy expenditure variables

	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS
1	Tot kcal	KCal_mean	KCal_peak	KCal_not_w	KCal_sedentary	KCal_light	KCal_moderate	KCal_hard	KCal_very_hard	D1Date	D1Day	D1vday
2	1195.47	149.43	224.58	0	49.81	1145.66	0	0	0	11/12/2003	Wednesday	1
3	A 463.31	B 57.91	C 95.95	0	D 31.55	E 431.76	F 0	0	0	11/24/2005	Thursday	1
4	863.27	123.32	167.77	0	33.68	829.59	0	0	0	1/22/2008	Tuesday	1
5												

Total caloric expenditure, mean caloric expenditure, peak caloric expenditure and caloric expenditure in each activity category.

- A. *Tot_kcal* = 1195.47 calories spent in activity across all valid days
- B. *KCal_mean* = 149.43 calories spent on average across all valid days
- C. *KCal_peak* = 224.58 peak calories spent on a day
- D. *KCal_sedentary* = 49.81 calories spent in sedentary activities across all valid days
- E. *KCal_light* = 1145.66 calories spent in light activities across all valid days
- F. *KCal_moderate* = 0 calories spent in moderate activities across all valid days

Output: Time-filtered variables

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Filename	1Day	1Date	D1T1_st_t	D1T1_end	D1T1_epo	D1T1_not	D1T1_sed	D1T1_ligh	D1T1_mor	D1T1_har	D1T1_very	D1T2_st_t	D1T2_end	D1T2_
2	101107310	Wednesd	11-12-200	07:00 AM	11:00 PM	960	301	609	45	6	NULL	NULL	NULL	NULL	NULL
3	533100210	Thursday	11-24-200	07:00 AM	11:00 PM	960	120	722	118	1	NULL	NULL	NULL	NULL	NULL
4	615410012	Tuesday	01-22-200	07:00 AM	11:00 PM	960	361	427	167	A 6	NULL	NULL	NULL	NULL	NULL
5															
6															
7															
8															

Activity counts during each defined time period, within each activity category, for each day of data.

A. *D1T1_moderate* = 6 epochs of moderate activity occurring during 7am & 11pm on day 1, Tuesday Jan. 22nd

Let's practice (example exercises)

- Downloading
- Data screening and compliance determinations
- Access tracking of meter
- Data scoring
- Log entry

End of Training 2

Data Manager/Supervisor Certification

- Downloading
- Data screening and compliance determinations
- Access tracking of meter
- Data scoring
- Log entry
- Quiz



Measurement Training

#3 of 3

TRAINING #3

(MANAGEMENT AND TRAINING)

1. Hiring
2. Delivery & Compliance Training
3. Checking (Quality Control)
4. Electronic tracking
5. Certification
6. Data transfer

Hiring

- ◎ Qualities to look for in Data Collectors
 - The obvious – reliable, trustworthy, hard-working
 - Personable, likeable, outgoing
 - Resilient—they can't take rejection personally
 - Come across as professional and knowledgeable
 - Ability to think on their feet
 - Not as easy as it may seem!

Hiring

- Qualities to look for in accelerometer data managers
 - Attention to detail!!!
 - Invested in getting quality data above all else
 - Comfortable looking at numbers, figuring out the puzzle...
 - Confident to make decisions based on training & experience, but not so confident that won't ask for a 2nd opinion
 - Organized – can manage incoming, outgoing, reweaves, screening, calls from participants, questions from data collectors... at the same time
 - We have a test exercise we use when hiring we can share

Delivery and Compliance Training

- Data collectors wear Actigraph for several days so they can speak from experience
- Role playing for delivery of Actigraph & compliance
- Provide checklist of talking points but not necessarily scripted
- Emphasize importance of the details (serial numbers, participant IDs, dates)
- Role playing for re-wear requests

Data Collection Checking

- Recruitment database checked weekly for cases that have fallen between the cracks (next action not coded, dates are mistyped, person not being contacted anymore, etc.)
- Query of outstanding units prepared weekly and each is reviewed to be sure that appropriate action is being taken to retrieve
- Survey completeness checks completed for all surveys before data entry – particular attention paid to correct ID numbers
- Data entry staff also trained to spot missed items, incorrect skip logic, over-reporting on IPAQ
- Data entry done in duplicate or all entry check by supervisor until person is 'certified' ($< .0125$ error rate; $\# \text{ errors} / \# \text{ keystrokes in survey}$)

Actigraph Data Screening Checking

- Ideally, same person would screen and score all the data
- Regular reliability checks should be conducted by managers and investigators
- IPEN-CC will also check a % of all files and encourage you to also send ambiguous files for consultation
- Nobody becomes an expert in a few months so we encourage and expect to be consulting you about ambiguous files and cases.

Rewear discussion points

- How many re-wears are feasible given staff & study timing?
- Build into projections of sample size...30% re-wear
- Data collection success in neighborhood
- Other parts of study e.g. is survey complete?

Electronic tracking

- ◎ Review of the Tracking Database
 - Different forms
 - Queries
 - Set-up for multiple users
 - Reports can be generated
 - Call lists
 - Visit schedules
 - Recruitment reports for IPEN-CC
- ◎ Training to use database

Certification

- Review certification results
- Re-train if necessary and try again
- Can give conditional certification, meaning you will check most of their work until it is acceptable
- For data collectors, role playing is most important piece – can they explain it well, remember all the key points, answer general questions.
- For data managers, technical proficiency, understanding of how to use tracking database and decision-making about valid wearing time are the most important.

Data Transfer

- Weekly transfer of all accelerometer files to IPEN-CC
 - Back-up
 - Quality control
- Kelli Cain will be contact (kcain@projects.sdsu.edu)
- Zip software
 - All DAT files in one folder and zipped using WinZip if possible
 - Name folder with “Date”
 - Also send copy of Tracking Database with meter logs entered
- SDSU FileX system
 - Kelli will send you an invitation to upload using this secure system
 - The invite will expire after 30 days but we will send you new ones as needed