

VI. ACCELEROMETER PROCEDURES

A. TRACKING/PREPARING ACCELEROMETER

- i. Create an Access database for the meters. Use the following categories:
 - i. Participant number, serial number, date sent, date activated, battery hours, recruiter number, stage, round, city, neighborhood, recruiter site, date received, date downloaded, date verified, valid days, valid hours, lost meters, comments.
- ii. Each time a meter is sent out create a new record in the database and enter the relevant information (participant #, serial #, date sent, date activated, battery hours, recruiter number, etc.). When the meter returns, enter the relevant information (date received, downloaded, valid days, etc).
- iii. If the meter is returned and there is no need to download it (person is a drop, didn't wear it, etc.), use 7/7/7 as the date downloaded and verified. Use -777 in the "valid days" field.
- iv. Use -999 in the valid days field if the meter had bad data. Use -888 if there is was a computer problem that affected the meter.

B. INITIALIZING THE ACCELEROMETER USING DOS PROGRAM

- i. Place the Accelerometer in the carriage, label side up, and serial number facing away from you (notch facing toward you).
- ii. Access local disk (C:)
- iii. Open the SWAM folder
- iv. Open program entitled "RIU256K".
- v. Choose the port number that the Accelerometer carriage is connected to (port #1)
- vi. Check the Accelerometer's battery first. Press "L" and the remaining battery life will appear. Do not send out an Accelerometer if it has less than 750 hours left.
- vii. Once the battery is checked, press F9 to initialize the Accelerometer.
- viii. Type "Y" in response to resetting and initializing the Accelerometer.
- ix. A prompt to change the epoch setting will appear. Set the epoch for 00:01:00 (hh:mm:ss). If it is already set for 00:01:00, select "N" to keep it that way. Once you've set the epoch for 00:01:00, it will default to it every time. *Do not change the epoch once it's been set.*
- x. Type "Y" in response to setting or changing the start time and date.
- xi. Enter start time in military time (hh:mm:ss), which should be 00:00:01 (1 second after midnight).
- xii. Enter start date (mm/dd/yy). This is the date we would like the Accelerometer to start recording. Set it to start two days after it is to be mailed to the participant.
- xiii. Verify information at the prompt and enter "Y" if it's correct. Enter "N" to go back and make a change.
- xiv. The screen will read "finished". Verify that the carriage is flashing the 1-2-3 sequence. Take the Accelerometer out of the carriage. When an Accelerometer is initialized, an .ini file will be created in the SWAM folder. Do not erase or remove this

file, as the Accelerometer will not download unless this file is kept in its initialized folder/location.

- xv. To exit, press “esc” pr “q”.

C. ATTACHING ACCELEROMETER TO BELT

- i. Choose the belt size that the participant requested. Attach the Accelerometer to the belt before mailing it to the participant.
- ii. Take off one half of the buckle from the belt.
- iii. Pull the belt through the two belt loops on the sides of the Accelerometer, so that the belt goes across the front of the Accelerometer (the label will be against the person’s body).
- iv. Attach the other half of the buckle once the Accelerometer is on the belt.

D. DOWNLOADING THE ACCELEROMETER USING DOS PROGRAM

When the Accelerometer is returned, wipe it with a sanitizing cloth to clean it. Put belt in designated ‘to be washed’ location. Record date Accelerometer received and date downloaded in participant’s Access form. Fill in the same information in the meter Access form. At this time, look at the date sent and date received and if more than 2 months has passed, make a note in the participant Access comment box to set SECPART date for 5.5 months from the middle day that the meter was actually worn. If the meter was out for less than 2 months, set the SECPART date for the normal period: 5.5 months from the date the meter was sent. Also, check that the battery life from the returned meter corresponds to the amount of time the meter has been in use. An increase in battery life signals a problem with the meter, see troubleshooting below.

- i. Place the Accelerometer in the carriage, label side facing up, and serial number facing away from you (notch facing toward you).
- ii. Access local disk (C:)
- iii. Open the SWAM folder
- iv. Open program entitled “RIU256K.”
- v. Press “E” to stop the Accelerometer.
- vi. Press F2 to download.
- vii. At the prompt, type “Y” to continue.
- viii. At the prompt, type “Y” to use the file.
- ix. When the screen reads “finished”, press Q or Esc to quit.
- x. After downloading, a .dat file will be created in the same SWAM folder as the original .ini file.

Moving and Renaming the Files

1. Select the .dat and .ini files and move them from the SWAM folder into a separate folder created for participant meter data.
2. Once the files have been moved, rename them as “Firstmeter#####” for each file where the #s represent the participant’s ID. (Firstmeter can also be “Firstmeterresend”, “Secondmeter”, or “Secondmetertresend” depending upon which stage of the study the participant is in).

E. EVALUATING THE .DAT FILE

- i. Right click on the participant's .dat file and select "Send to" followed by "Meter Plus" (Instructions on how to add Meter Plus to send to menu in Read Me file of program). It is helpful to have their meter log to look at simultaneously.
- ii. Meter Plus shows you the date range from when the meter was initialized to when it was downloaded and whether or not each day is valid. Write down the number of valid hours above each corresponding day on the meter log, using pencil. If you're unsure about whether or not the participant actually wore the meter on a given day, you can double click on the selected day and see the raw data for that day. The data patterns of wearing the meter and mail time are quite different. Often times, a mail day will be listed as being valid but when you look at the raw data it is clear that it was not worn.
- iii. For this study, we require that a participant have at least 5 valid days for each time they wear the meter. A valid day is defined as a day containing at least 10 valid hours. A valid hour is one that does not contain a string of 30 or more zeroes. The criteria for a valid day can be changed, see section VII.
- iv. A participant can have less than 5 valid days if they have at least 66 valid hours over the course of the time they wore it. To count the number of valid hours using Meter Plus, highlight the days the person wore the meter by selecting multiple days while holding down the control button. Once the desired days are highlighted, click on the "Get Total Hours" button at the bottom of the application. Write the number of valid hours in the top left corner of the meter log. There is also a field in the meter Access database that is labeled "valid hours." It is usually empty if the person has at least 5 valid days. However, in this situation, enter the number of valid days as well as the number of valid hours into the database.
- v. If you have to score the data using the raw data file, without the use of Meter Plus, follow the following directions:
 - a. Open the .dat file in Excel. Scroll down the file until you come to the first day of wearing the Accelerometer. Although there isn't a date listed, it is usually easy to see the first day because it is a block of rows with higher numbers (as opposed to rows and rows of zeroes). You can also determine from the meter log the number of days between initialization and the first day of wear, multiply by 24, and scroll down that many rows.
 - b. Slowly scroll down the first block of movement (one day) and count the valid hours. Each row of the Excel spreadsheet is one hour, and can be viewed in total in the preview field at the top of the Excel page. An hour is considered valid if there is not a continuous string of 30 or more zeroes. View an hour, decide if it's valid or not, and then scroll down to the next row, and so on.
 - c. When you get to the end of the day (when you see multiple rows of zeroes when the person is sleeping), write the total number of valid hours above the corresponding day on the meter log. Continue scoring the rest of the days.
- vi. Record the number of valid days or hours in the meter database as well as the participant database.

F. METER PLUS

CONFIGURING METER PLUS

This program has certain default settings based upon our criteria for a valid hour and day (see section VI #3 above) and our choices for dealing with missing data and invalid hour data.

- i. To change the criteria for **scoring data**, open Meter Plus, select Tools, and select Options. Under the View Data tab, you can change the criteria for a valid day and hour.
- ii. To change the criteria for **saving data**, open Meter Plus, select Tools, and select Options. Under the Score Data tab, you can change the criteria for a valid day and hour.
- iii. To change the **value used for undefined fields** and **replacing strings of zeros if an hour is invalid**, open Meter Plus, select Tools, and select Options. Under the Score Data tab, you can change these settings.
- iv. To adjust for **time zone differences** between location of initialization/download and location of wearing, open Meter Plus, select Tools, and select Options. Under View Data tab, you can adjust the start time to account for these differences. For example, if initialized in PST and worn in EST, adjust by +3 hours. If initialized in EST and worn in PST, adjust by -3 hours.
- v. Normally, you will be analyzing data that has been downloaded using the above instructions. However, you can also download the meter using the MTI Windows-based software. The only difference in these two methods of downloading is in the heading of the .dat file. When you run Meter Plus on the Windows downloaded file, the heading affects Meter Plus and you won't be able to analyze the data. In this case, open the .dat file USING NOTEPAD and copy the last line of the heading (right before the data begins). Then, open the Meter Plus program, go to Tools and then Options. Under the View Data tab, Header Delimiter will default to "Use the same characters defined on the first line of file." Change it to the second option, "Use user defined delimiter" and copy and paste the last line of the .dat file heading into the available space in the Meter Plus program. Indicate after how many occurrences Meter Plus should begin reading (should be "1"). Click OK to save the changes, then run Meter Plus on the .dat you wish to analyze.
- vi. This program has certain default settings for classifying categories of movement. The default settings in Meter Plus are as follows: -999 not wearing, 0-100 sedentary, 101-1952 light, 1953-5724 moderate, 5725-9498 hard, and 9499-10000 very hard. To set the "not wearing" category, set both the minimum and maximum to -999. To change these criteria or to add new categories, open Meter Plus, select Tools, and select Options. To edit, select the Categories tab and highlight the category you want to change. Select Edit and change the name and minimum and maximum count to your desired range. Click on OK to accept the changes. To add, select Add, choose the name, and set the minimum and maximum counts. You can also delete a category by selecting it and clicking delete.

SELECTING DAYS TO BE SCORED USING METER PLUS

- i. First, you need to set up a folder for Meter Plus to send the chosen data. Open Meter Plus and go to Tools, Options, and then File. Under File, it will say "Location to send new data files to:". Click on the button to the right of the text and select the folder you want the files to go to. This location will then be saved as the default place to store the files that are ready to be scored. If you try to save selected days and a location isn't specified, a box will pop up telling you to first select a location.
- ii. Run Meter Plus on a .dat file from which you wish to select days to score. It needs to be a participant file that starts with "Firstmeter..." or "Secondmeter..." in order for the selecting of days to work.
- iii. Select the days that the participant wore the meter, regardless of whether or not it's a valid day. When the days are selected, click on the "Save Selected Days" button at the bottom of the application. A box will pop up that says 'The file "nameoffile" was saved successfully'.
- iv. The file is saved as "first_1_MP_#####" if first part 1st meter, "first_2_MP_#####" if first part 2nd meter, "second_1_MP_#####" if second part 1st meter, or "second_2_MP_#####" if second part 2nd meter in the location specified above.
- v. If the participant did not have 5 valid days, but did have enough data according to the 66 hour rule (see section VI. #4 above), you can manually change any non-valid days to valid days. This change needs to be made so that when the file is scored all of the days that are considered valid will be coded as such. To manually make this change, run Meter Plus on the desired file. Double click on the desired day (the day that has less than 10 valid hours and therefore marked invalid but that is part of the 66 hour data set). The raw data for that day will then pop up in a new window. At the bottom of this window, there will be a box that says "Change Valid Day." Check that box and then select "Valid." Click on Close to save the changes. Now, the Meter Plus report will indicate that that day is valid.

PREPARING RESEND FILES FOR SCORING

If a participant has more than one file in the first or second part, such as a rewear meter file, the data for each part need to be combined prior to scoring.

- i. Open the rewear file, indicated by a "2" in the second text position (first_2_MP_106100920) in notepad. Make a note of the number of days selected for scoring in this file (Header: NumberOfDays,).
- ii. Copy all of the data after the header which starts with a date (DATE, 08-18-2003). Close file.
- iii. Open the original file, indicated by a "1" in the second text position (first_1_MP_106100920) in notepad.
- iv. Paste the data from the rewear file to the end of this file.
- v. Change the NumberOfDays in the header to reflect the data added from the rewear file. For example, if 3 days of rewear data are added to 4 days in the original file, change the NumberOfDays, 4 to NumberOfDays, 7.
- vi. Save and delete the rewear file.

SCORING USING METER PLUS

First, you need to specify the location of the files to be scored. Open Meter Plus, select Report, and select Scoring. You will be prompted to select the folder to scan to create scored file. Browse for the location of the folder where the selected days files were saved by clicking on the button to the right of the text. Next, create the location where you would like to save the scored file. Browse for the location by clicking on the button to the right of the text and then name the file.

Click on "Create". All files saved in section VIII. whose location was specified in step 1 above are scored as a batch.

Go to the folder specified as the location to save the scored file and open the SPSS syntax file. Run the syntax.

G. TROUBLESHOOTING

Various problems can arise during all stages of accelerometer use. Below are some of the more common occurrences.

Downloading the Accelerometer results in the error "**STOP in line 9000 of module RUI256K6 at address 056B:678F.**" This error indicates that the .ini file created when the Accelerometer was initialized is not located within the SWAM folder. If the .ini file isn't located in the same file as the downloading program, the downloading will not work.

- a. Move the .ini file into the SWAM folder and then download.
- b. If the .ini file was erased or you cannot find it, you can still download the Accelerometer. Take a different .ini file and rename it with the serial number of the Accelerometer you're downloading. Resume downloading.

Checking the battery, initializing, downloading: performing any of these functions results in the error "**activity monitor did not respond.**" Escape out of the program and then try it again. The Accelerometers are sensitive, so sometimes the carriage cannot read the information on the first try. If the problems persist, wiggle the wires connected to the carriage to ensure they haven't come loose. Also, you can blow gently on the carriage and try it again; sometimes, dust or dirt will stop the meter from being read.

When you place a meter in the carriage to download, the red light is not rapidly flashing like it should be if it's still recording data.

- a. If it's still flashing the 1-2-3 sequence, it means the meter never started in the first place. Check the .ini file to verify the meter was initialized correctly and for the correct date and time. If the .ini file is correct, this could indicate a serious problem with the computer or software. Contact MTI and your office computer person to help troubleshoot the problem.
- b. If the meter is flashing the slow 1-1-1 sequence, it means the meter was either never initialized (check .ini file) or it means the meter is full of data and is no longer recording. The short-term meters record for 22 days, and the long-term meters for 91 days. If the meter has been recording for longer than the maximum time, the data will not be lost. Press F2 to download the meter.
 - i. If the meter is flashing the slow 1-1-1 sequence but the meter has not been out longer than its run time (22 or 91 days) and it did indeed get

initialized, something else may be wrong. Press F2 to download. An error saying the “**current memory address is zero**” may appear. Press “Y” to “force” the download anyway. You will then have to select the number of epochs to download. Calculate the number of epochs by multiplying the number of days it has been running by 1440 (the number of minutes in one day). Enter that number into the program and hit “return” to begin downloading.

- ii. Whenever you have to “force” a download, check the battery life. If the **battery life has increased** from the time the meter was sent out to the time it was received, the meter needs to be sent to MTI for repair. Score the data as you normally would. There is a good chance the data is fine in spite of being forced. Regardless of whether the data is good or not, send the meter back to MTI for repairs because a jump in the battery life could indicate a more serious problem with the meter.

People will occasionally go to sleep with the accelerometer on. There will be movement between the two days and it is hard to determine where one day ends and another begins. Just be aware that this data looks confusing and consult the meter log.

Discrepancies between the meter log and the scored data: Although most participants fill out the logs accurately, there are some who do not. There may be days where the log reflects 12 hours of movement, but you counted 14. The downloaded data is more accurate than the log, so don’t worry if there is some variation.

Other problems will occur when dealing with the accelerometer. The Actigraph Operation Manual is sometimes helpful. It has detailed instructions on changing the battery, for example. For problems that you cannot resolve, e-mail John Schneider at john.Schneider@mtifwb.com (our Actigraph representative). Or, visit their website at <http://www.mtiaccelerometer.com>.

H. DELINQUENT ACCELEROMETERS

Accelerometers that have been out for more than two months are considered delinquent. Following is the procedure for dealing with these participants:

Type of Call	Length of Time to Set Next Call
1. Make your first CSAP call (CSA prompt call) one week after the CSAC call.	Set the next call for 1 week later , regardless of if you speak with them or leave a message.
2. Make your second CSAP call and mail them another return envelope (#1).	Set the next call for 2 weeks later .
3. Make your third CSAP call.	Set the next call for 1 week later .
4. Make your fourth CSAP call and mail another return envelope (#2).	Set the next call for 2 weeks later .
5. Make your fifth CSAP call.	Set the next call for 1 week later .
6. Make you sixth CSAP call and mail another return envelope (#3).	Set the next call for 2 weeks later .
7. Make your seventh CSAP call. Talk to supervisor about sending a reward letter.	Set the next call for 1 week later .
8. At this point, the meter has been out for over 3 months. Send the reward letter and/or continue talking with supervisor.	Case by case at this point, but keep making regular calls.

DEAD LETTER OFFICE

For participants who either never received the Accelerometer, or for those who insist they mailed it but we never received it, write a letter to the Mail Recover Center (Dead Letter Office). See the example at the end of this section. All suspicious packages, packages missing labels, etc. are sent to this office (there are three in the United States), and the office tries to find the sender or receiver. Letters can be mailed every 2-3 months to encourage the return of lost Accelerometers.

Mail Recovery Center
P.O. Box 7872
San Francisco, CA 94120-7872

To Whom It May Concern:

The Neighborhood Quality of Life Study is a research study based in San Diego, CA and Cincinnati, OH, and we are currently studying neighborhoods in Seattle, WA (King County). Our study relies heavily upon the mail system, and we send and receive letters and packages

on a daily basis. One package that we mail to our participants, and that we later receive back from them, is particularly important to our study. We estimate that five packages have been lost in the mail in the past six months.

The missing packages have been mailed from Seattle in 7 ½" x 10 ½" padded envelopes, clearly labeled with either our Cincinnati or San Diego address. The packages contain an Accelerometer, a nylon belt, a log sheet (single sheet of paper), and a survey. The Accelerometer is approximately half the size of a pager and is either off-white or blue, has no visible buttons or knobs, and should have a label on one side with the name of the project, address (either Cincinnati or San Diego), and a contact phone number.

It is also possible that the Accelerometer never reached its destination when originally mailed to Seattle. In that case, the package would be a 9" x 12" flat manila envelope addressed to an individual in Seattle, with the Neighborhood Quality of Life Study's return address clearly labeled on the package. The package contains the Accelerometer, the nylon belt, the log sheet, instructions on how to wear the device properly, and a 7 ½" x 10 ½" padded envelope for the recipient to use as the return envelope later.

Again, these Accelerometers are essential to our study, and any help your office can provide in locating the lost packages will be greatly appreciated. Enclosed please find samples of the two envelopes, as well as a photocopied picture of the Accelerometer. Please contact Carrie Franklin at (619) 260-5546 for any further information, or if these packages have been recovered. Our mailing address is:

The Neighborhood Quality of Life Study
ATTN: Carrie Franklin
3900 5th Avenue
Suite 310
San Diego, CA 92103

We look forward to hearing from you soon.