GYRATORY 4140

(Read the Manual as soon as possible)

GyroPave   Trademark   Troxler
SuperPave   Trademark   Strategic Highway Research
Safety Warnings, Parameter Setup, System Troubleshooting & General Maintenance

Introduction:

→   Engineering Properties relate directly to compaction method.
→   Method for Specimen Compaction crucial so that it behaves like in construction and specimen obtains meaningful test results.
→   Gyratory Specimen = Actual Paving Conditions.
→   Exceeds (FHWA) SuperPave specifications. Given angle and pressure.
→   Safe – Sutrouds Off / Door open won't work.
→   Automatic or manual.
→   150 or 100 ∅ Number gyrit (or end height) and pressure.
→   Angle 0,5 – 2,0°   Default = 1,25°
→   Automatic Gyrations vs HT & or – Pressure vs HT – Computer or printer
→   Manual printing last 6 specimens. All output shows as per ASTME 380 – 90A. Standard for metric practice.
→   Heat mould & pick & asphalt. Predetermined amount (HMA)
→   Performance verification kit – verify pressure & angle Calib.
→   Height standard / rotations. Others

Getting Started (Keypad):

Emergency   :   Stops all to activate rotate clockwise.
<ESC>   :   Returns to ready
<CALIB>   :   Pressure – height – angle – rotspeed
<MENU>   :   Setting up – Printing – Number hours – Last service
<SELECT>   :   100 or 150mm
<START>   :   Being Auto comp.
<STOP>   :   Pause compaction - <START> to continue
<RAM DOWN>   :   RAM into Asphalt Specimen
<ANGLE ON>   :   Press to induce Angle
<GYRATION ON>   :   Beings gyration
<GYRATION OFF>   :   Stop gyrating before actual no gyrations
<ANGLE OFF>   :   Removes angle and does dwell rotations
<RAM UP>   :   Raises RAM
<YES>
<NO / CE>
1 – 9
4 ↓
.
ENTER
TURN ON   :   Head in home position and 300 second warm up.

:   Machine Idle – Access machine software.

Setup – Define Parameters:

Angle – No Gyrations and Pressure

◆   Download data automatically or manually (3 formats)
◆   Specimen Height for each gyration to printer / computer
◆   Graphic print available.   ***Must be in Machine Idle:***

\<MENU\>	1 -	Gyrations	Default = 230 / Dwellrot	Default = 10
\<CAL\>	2 -	Pressure	If change / 200 – 1000 Kpa. Re calib speciment Height	Default = 600 Kpa
	3 -	Output	(Next Page)	
	4 -	Auto Output Off	Always have device ready with Auto Output Comp / Printer	

        a)   Pressure vs Height   (Pressure printout)
        b)   Gyration vs Height
            i)   Gyratory Compactor Software Format for FHWA
            ii)   Table Form for GyroPave
            iii)   "Formatted" normally only to computer.
    (Enable – Disable)   (Formatted, Table, Graph)
    If Auto On - \<1\> Printer Port or \<2\> Serial Port   Number =

	5 -	Mode # 1 Set Gyrations of Specific Height # 2	Default # 1
	6 -	Height – Final Specimen Height	Min 50mm – 150mm
	7 -	**Clock / Calendar:**	Stores HT vs GYR for last 6 specimens using Date & Time. With Table or Calc 'bgmm Date/Time Downloaded. Last 3 specimens stored with Date/Time with Output Feature.
	9 -	Pressure Print Output. Pressure vs HT. After Auto Comp	

        1)   First GYR vs Height
        2)   Then Pressure vs Height (with Auto Output)

Printing:	Automatic Output options. **Pressure vs HT** using Pressure Printout. Compactor can Auto or Man download **gyrations vs height**. In FHWA or GyroPave (Table) Control unit can **manually** download data in **Calc %gmm** format When results are **%gmm vs number gy**. (N)
Computer:	**"Formatted"** only with computer
Output:	Manually download data stored in control unit Data sets include Sample HT (HT) vs Num Gyrations (Rev) Date & Time, The Pressure, Number Revs [Printed Table Format] include blank for Sample ID
\<3\>	**Formatted** Computer – **Output**
Table	First Try Table \<2\> Calc %gmm Printer \<1\> Serial \<2\>

Last 6 Data Sets   First is the latest
Calc %gmm   (Max Theory SG)
Enter Proj No – Not necessary   L & N
Enter Mix Design No.   L & N
Number of Samples to AV.   (1 – 6)
Enter GMM   (Maximum Theoretical S.G.)
Select First Data Set?   Prompts for Weight of Sample
Enter GMB   (Bulk Specific Gravity)

     If averaging, data sets must be same number Gyrations.

Output % GMM   1   -   Print Table
                      2   -   Graph & Table
                      3   -   Exit

Control Unit Print or **Download**   **Table** %GMM vs N Data
                                             Graph & Table also N Data

Time & Date refers to when you printed data   (Header)
Time & Date refers when sample completed.

Graph has Logarithmic X = Axis   -   Print Table
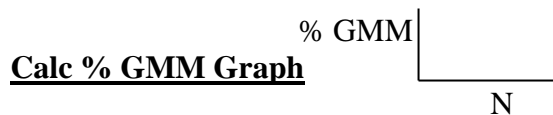Select the Output Type by   1 or 2   Graph & Table

Print Table   →   <1>   Printer Port   <2>   Serial Port
                 Returns to Output %GMM Screen
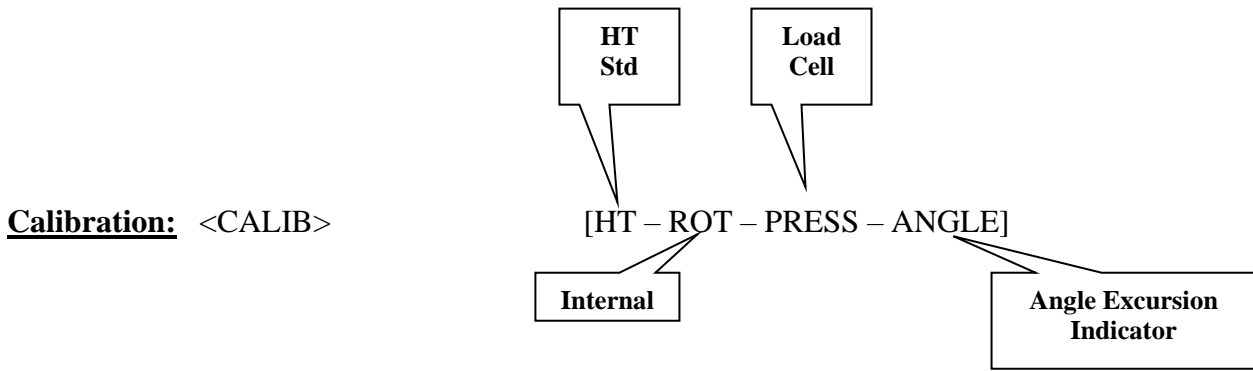

The %GMM vs Ngraph   -   NINI / Ndesign / Nmax
SuperPave volumetric mix prop.   89%   96%   98%   GMM
To change these: <MENU>   Edit Specs =   <.>   <0>   Enter New

                                        % GMM
                   Calc % GMM Graph
                                               N

Gyratory Compactor
Sample **Calc % GMM Table**

                              HT   **Load**
                             Std   **Cell**

Calibration: <CALIB>   [HT – ROT – PRESS – ANGLE]
                                 Internal   **Angle Excursion**
                                                              Indicator

Making a Specimen

Beeps twice before movement

Setting Up:

Making a Specimen:

-       Setup Gyratory
-       Prepare specimen
-       Clean turntable and load head with degreasing container
-       If <0,7∅ Angle Convert
-       Compact
-       Remove
-       Extrude

Check number gyrations and pressure

<4>   If Auto Output Gyrations vs Height – Connect Printer / Computer and Turn On Auto Output
<9>   If Print – Press – vs – Height : Turn on Pressure Printout

Prepare Specimen

Put in small face down.
Heat mould complete and specimen   Always <175°C

Specimen paper – load HMA – Top paper

*   Clean load head & turntable with degreasing cleaner.
→   Check angle removed and load head centre
       Notch in mould is at 6° Clock / Close Door

Compacting Specimen:

	i)	Automatic Comp	-	Single Button	-	Auto Output Data
OR	ii)	Manual	-	Guide it through	-	(More flexible)

Automatic Com:

<START>   Beep twice   Head down   If not align <STOP>   Align
<START>   If this mould displays error / recentre <START>

2 x LED's Show Display	Specimen HT and number your remarks Lights beside manual comp keys and control unit screen = Completion PR
With Auto Output	Output GYR vs HT Data Download & press printout Press vs N GYR at end

<u>Manual Comp.</u>   More flexibility

2 LED displays show specimen HT (updated each Rev)
                     Number GYR remaining

Lights beside man. Comp keys and control unit screen show comp. Progress.
After each phase the light beside next logical man (comp key bunks notch in mould is @ 6 o'clock

1.   <RAM down>   Press <STOP> if not aligned
        Beep twice
        <ANGLE ON>
        <GYRATION ON>
        <ANGLE OFF>
        <RAM UP>
        Manual Output [2 – 15] (Page 3)

        9600 – 8 Data Bits – 2 Stop Bits – No parity

Pressure	200 – 1000 kpa		
Number	0 – 999		
Angle	0,5° - 2,0°	± 0,02 in 0,02 inc.	1,215° factor
ROT	30 RPM		

About GyroPave   ____ GMM   Max theoretical / GMB Bulk S.G.
                          GyroPave   1 – 2 Windows 95 & 98
                          SuperPave   Mix Design & QC Software
                          Loading Tools to collect and process densification data from gyratory
                          Calcs:
                          Federal Highway Admin (FH WA) SuperPave (Superior Performing
                          Mix Design Props Asphalt Pavement)
                          Sample Worksmeters (Templates) and macros for Excel and visual basic
                          procedures.
                          To automate common tasks in SuperPave Mix Design and collects data
                          during or after.
                          Automatically performs Mix Design calcs.
                          View, Print, Graph, Properties
                          Manages multiple projects – from computer or from store data comp in
                          Each Proj File can contain up to 12 samples with vary mix design props.

                          Not only for design of mix
                          Performs field performance testing to ensure comprehensive with
                        SuperPave.
                        HT data can be copied to other spreadsheets.

GyroTalk	To load data from compactor
GyroPave 2000 N-Max	Calls Mix Design properties for Comp to N-Max.
GyroPave 2000 N-Des	Calls Mix Design properties for Comp to N-Design
Troxler Quick QC	Tool Quick volumetric analysis at N-Max and N-Des
GyroPave 2000 N-Max	**<u>Phase 1:</u>** Selection of Design and Structure (DAS)
& 2000 N-Des in two	**<u>Phase 2:</u>** Optimum Asphalt Content (OAC)
phases	

Use of: 2000 N-Max and N-Des to config GryoPave software. Chapter 3 Comp. Config.

Set Up:
- Open new Proj File & Open Existing
- + Saving Gryopave template file as diff file name – method volumetric design – storage location sample
- File names user defined with XPS Extension
- Comp data downloaded also user file name. You may enter. Dat or txt.
- If you don't save it you have to reinstall or remove original.
- Gpave xls is a **template** must save it under additional name before loading data
- At start up worksheet – file, save as **name file** save / back to start up
- Then DAS or OAC (clink) then worksheets / datasheets.
- Store up to 4 mix / blends with 3 samples – 1a, 1b, 1c
- Look in property worksheet
- Put cursor on 1c e.g calc kit. Now active. Data will ____ to it
- Check up download. Ch 4 & 5

Open an Existing Proj File

- File – Open – Go to desired Proj and Open – Extension xls
- Download files can be change to .dat or .txt
- If results displayed imm enter in property, specs, bulk and blend/mix
- All right to download without parameters

To Exit: File – Exit – Yes or No (Cancel)

GyroTalk (3 – 1)

- Loading data with Gyrotalk (from 4140 – computer)

- Manually enter or Gyrotalk Auto
- Open Gyrotalk and start load
- Enter **Real Time** or from **stored** data in comp.

- HT L compactor must be in **table** mode
- You can
  - Retrieve data from comp real time or stored.
  - Store data collected in user - file name and folder
  - Select com port
  - View HT vs GY
  - View Table Format HT vs GYR

Loading from Compactor:

1.	Com 1 or 2	[Select Gyrotalk]
2.	**Bulk Downloaded**	Save as Dialog Box Displayed
		Change Drive & Dir, Select Exist File **or** New File.
3.	Select Fole or Enter	Now Ready.
		Downloaded data can be name and Ext. .dat or .txt

4.   Set up Gyratory load Gyrotalk and lots data

| **Compactor Set Up:** | Only first time | Must be in | **Table Mode** |

Auto On – 4140:

1.		Cable		
2.		<MENU>	<4> (Auto Output Select)	<1> Table Output
		<2> To Serial Port	<ESC>	* Check comm. Port in Gyrotalk also 4140 details

Real Time Data

1.   <START> Test   →   Updated as it goes. HT vs GYR

Store Data:

2.   <STORED   <MENU>   <3> OUTPUT   <2> TABLE   <2> SEND
     DATA>
     Control unit shows Date – Time last 6 data sets
     Enter number of data set → downloaded
     Click on Exit

Gyropave 2000 N-Max   DAS – Design AGG Struct
                               OAC – Optimum Asphalt Cont

Used to call Mix Design properties for compaction **N-Mix**

(1) Specs :	N-Initial (NINI) Max Target Value % GMM @ N-Initial	(Default 89)
	N–Design (% GMM) @ N Design)	(Default 96)
	N–Max (% GMM 0 N-Max	(Default 98)
	% VMA (Min)	Min Value % Voids (All sizes)
	% VFA (Min)	Target range for % voids filled with asphalt
	(Max)	
	Total High Ave	Design Traffic Load
	Click On	View Side Sheets

(2) AGG Blend Worksheets

19,0mm   →   Design up to **4 potential** AGG Structures
Enter AGG Stockpile & Stockpile Graduation into cells.
Then Gravimetric and absorption of each stockpile.
Then target AGG mass in each sample   Shows : GSE, VBA, VBE, WS, PBL, AC, AGG
Checks   Invalid   OR   Warning
Data Can be transferred to property worksheet
Click

NB: Transfer Data to Property Sheet

AGG Blend Curve:
Character Shows graphically if blend is with control points and outside restricted zone.

Property Management
To enter raw data for Mix Design analysis. Enter data analyser downloaded from another location.
Max S.G. GMM (Rice) must be entered in.
B…. – HT vs GYR must be first downloaded from folder of Gyrotalk.
To property worksheet before any other data
PS & AGG – GSE effore SW – P0,075 8 IMSS PASS 0,075, GSB Bulk SF of AGG
GAM Rice. Max SG – Pb (%AC)   - | Weight – Fiwr 6 mb |
                                                       Transferred from Bulk Worksheet

Downloading Compaction Data
Download Compaction Data into **Property** Worksheet
1.   Select sample number where you store
2.   If new Mix Design – Existing to be deleted. Check Height Data.
3.   Click on **load data from file** then open file screen.
4.   Select File and click **open**. It will transfer.
5.   Repeat 1 – 4 for all data.

Additional Property Worksheet Data
Property worksheet – enter GMM (Rice) in Blue Cell
Remaining transferred to worksheet
1.   **Bulk** worksheet (4 – 7) enter GMB – Click **calculate**
        To calculate specimen and average bulk data and transfer sample weight and final EMB to property worksheet.
2.   **AGG Blend Worksheet** (4 – 4) **Transfer data to property site**
→   If preferred all property worksheet entered manually.

5.   **Bulk Worksheet:** (4 – 7) to call bulk S.G. value and transfer to property worksheet.
        Enter A, B, C & °C = Mass in grams in Air – Mass in grams of saturated
        Surface Dry Sample – Mass in grams in Water – Water temp
        Click **calculate**. It calls final GMB (NMAX) value for sample 1a/1b/1c ….
        Computes av GMS of 1 – 2 – 3 final GMB from GMB = (A/(B-C)) x K
        K Factor for temp default 25°C
        Calls Bulk SG – Nini – Ndes – transfers GMB (Nmax) and dry mass (weight to property worksheet)

6.   **Results Data Sheet** – (4 – 8) Av results for each trial AGG blend
        All results call by Gyropave – no values entered
        2nd Table: Suggest initial trial asphalt content for optimax ASP content
        Determinaton or trial asphalt contents for further tests
        AGG Blends – Design AGG structure

        ## EXT DAS
        Print results and AGG blend data sheets and blend of design AGG
        Important marked. Enter file saved under project name
        1.   Property worksheet
        2.   Record Start Menu   →   Start up Worksheet

Optimum Asphalt Content (OAC) 4 – 16 – 4 – 29

Click on OAC

Now you like to delete data in property sheet. (This is data from Max AGG D.A.S.)

If DAS property sales **OK** <YES>

Property (4), Specs, (1), Bulk (5), OAC Mix (2) – Not Auto Worksheets

Results : Data Sheets (6) and OAC NMS (3) Mix curve chart + 6 (7)

The OAC NMS mix and curve **designated by the selection nominal max size graduation of design** and 9,5mm (on spec worksheet)

1.   Specs worksheet 4 – 10 **OAC Phase**
        Enter and then click on **View Sieve Sheets**

2.   OAC Mix Worksheets and Mix Curve Chart – 4 Diff A.C – one AGG Blend sheet for DAS and table for all 4X A.C use DAS. 1st Phase. Filter AGG stockpile. Stockpile Grad and % of each stockpile. Target AGG mass and AC to be test.
        Enter in light blue cells
        Enter alternation green / grey
        Up to six stockpiles < is OK
        Enter target ACC Blend = % of each stockpile in AGG Blend
        * DAS in 1st phase is entered as AGG Blend in this phase? Which?
        All checks "invalid" and "warnings"

3   **Also OAC NMS MIX Curve**
        Data must be entered **manually** to property worksheet

4.   **Property Worksheet**
        To enter Raw Data for Mix Design Analysis
        Only Auto from **Bulk** worksheet and HT vs Gyrations from Gyrotalk
        1st from **Gyrotalk** then Bulk

        Downloading Data:
        1.   Select sample number where all data will be stored.
        2.   If not done clear Height Data (Button)
        3.   To load from computer click | Load Data from File |
                Open File Screen
        4.   Select file and click open   →   Property Worksheet
        5.   Repeat 1 – 4 for all Data

5.   **Bulk Worksheet**
        Specimen Weight and Final GMP. Can be transferred to property worksheet
        Click {Calibrate} and it will track sample weight and final GMB
        All data can be entered to Prop Sheet manually
        GMB Bulk S.G. and → Prop Sheet

6.   **Results Data Sheet**
        Displays average results of specimen compactions for each trial AGG Blend.

7.   **Graphs Sheets**
        Graphs report results on single page

        Exit OAC

All can be printed and Design Mix marked
Save Enter File under a Project Name
1.   Return to Prop Worksheet
2.   Reload Start Menu

Troxler Quick QC

Gyropave 2000 Nmax and Ndes for space Mix Design
Quick QC Quick Volumetrical Max Analysis
Helps ensure that Mix Lab or Plant meets specs
Superpave