Hawk 6E – Custom Display / Admixture Controller
Operators Manual

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INTRODUCTION

The Hawk 6E is a microprocessor based display/control unit, engineered to provide the Mobile operator with meaningful discharge information, printout and logging capability, as well as accurate closed loop control of the admixture injection system. It is designed to meet the unique requirements of the mobile volumetric mixer operator.

The display unit allows for the programming of up to 30 mix presets. The selected mix preset will cause the display to show the following:

1. The volume of product discharged in engineering units; cubic yards or meters
2. The weight of Sand and Stone discharged
3. The amount of water being added per yard of concrete and the water/cement ratio. (if optional water meter is installed)
4. The correct stone and sand gate settings
5. The specified strength of the concrete being poured
6. Admixture injection pump status
7. Raw conveyor pulse counts – for calibration / maintenance purposes

The Hawk 6E will send a RS232 serial communication stream to a printer, serial cell modem, computer or other hardware, if equipped, providing a hard copy or download of:

1. Company information
2. Date and time
3. Automatically incrementing ticket number
4. Conveyor pulse counts
5. Volume of concrete delivered in cubic meters or yards
6. Weight of stone and sand
7. Weight of cement
8. Total amount of water in the batch
9. Water / Cement ratio
10. Amount of admixtures added to the batch
11. Amount of admixtures per cubic yard or meter

On power up, the main “run” screen is displayed.

The Hawk 6E has two primary functions; 1) – a display / printout device and 2) control of the admixture injection pumps. The following instructions deal with each of these functions, but first we must understand what the various push keys do.

WHAT THE KEYS DO:

ADMIX: Displays a menu that shows current admix status and allows changes to the admixture injection system.

CURS: Causes a cursor to appear at the left side of the lines of display. When pressed and held, the cursor will scroll down through the lines of display. To program or change a line of display, the cursor must be showing beside the line.

DISP⇑ and DISP⇓:
Scroll between the lines of the various display and programming menus available. The cursor must be showing beside the line to be changed when the DISP keys are pressed.

ENTER: For future development

INC/ON and DEC/OFF:
Increase and decrease values when programming
Turn admixture pumps on or off when in admixture set up menu

MIX⇑ and MIX⇓:
Scroll between mixes in run and program mode

PRG: Program
Shows programming menus

PNT: Print, sends data to the printer or other download device

RST: Reset, zeros the job pulse counter and other values that accumulate with conveyor operation.

NOTE:

- **CURS – always causes the cursor to appear and to scroll**
- **DISP – Always moves to the next menu line**
- **INC/ON and DEC/OFF always changes a value or turns a function on or off**
- **PRG always causes the programming menus to show – and backs out of the programming menu.**

RUN DISPLAY (shows on power up)

MIX # - - (CONCRETE TYPE)
LINE SELECTED BY **DISP ⇑ and DISP ⇓**
LINE SELECTED BY **DISP ⇑ and DISP ⇓**
LINE SELECTED BY **DISP ⇑ and DISP ⇓**

SETTING UP THE RUN DISPLAY

The bottom 3 lines of the run display can be set to show any of the "user set display lines" as shown below. To cause the desired information line to show:

- Press and hold the cursor key. The cursor will scroll down the left side of the display lines.
- Stop the cursor beside the line that you wish to set.
- While the cursor is still showing, press the DISP up key to scroll through the menu.
- Select the desired information line.

Top line – Shows strength or user defined classification – as programmed for each mix
User set display lines – The following menu lines are selected by DISP⇑ and DISP⇓

- Total Pulses – accumulated pulses – not reset with "reset" key press.
- Job Pulses: Job pulses are zeroed on Reset
- Volume of concrete discharged: cubic yards or meters, zeroed on Reset
- Sand and Stone gate setting: show required gate settings for the selected mix, gate settings are established at calibration and set in programming mode.
- Sand weight: shows the weight of sand discharged after last reset.
- Stone weight: shows the weight of stone discharged after last reset.
- Water volume: calculated water volume in litres or US gallons; zeroed on Reset
- Admix 1: status and rate: shows whether admix1 is on or off, and the percentage of maximum flow of the admixtures. Press PRG – when cursor is showing - for admix 1 setup routine.
- Admix 2: status and rate: shows whether admix1 is on or off, and the percentage of maximum flow of the admixtures. Press PRG – when cursor is showing - for admix 2 setup routine. Detailed instructions on page 8.
- If your system has custom features such as additional admixtures, they will be added to this menu. Detailed instructions on page 8.

PROGRAMMING MIXES

Programming of the Hawk 6E is based on information from the data acquired during mixer calibration and from the concrete mix design being used. Before you begin to program the unit, the following data should be available:

- The conveyor pulse count per unit (Yard or Meter) of concrete for each mix.
- The correct Stone and Sand gate settings for each mix.
- The amount of Stone, Sand, and Cement per unit of concrete for each mix – taken from the mix design.

Programming the mixes:

The Hawk 6E allows for the programming of up to 30 mixes.

When the Run Display screen is showing, go into the **program mode** by first pressing the **CURS** key. Stop the cursor at the top line of the display and while the cursor is still showing, press the **PRG** key. The mix programming menu will appear.
Select the mix # to program by pressing MIX⇑ or MIX⇓.
Select the menu line to be set by DISP⇑ or DISP⇓.
Change values by pressing INC or DEC keys

Detailed programming steps

1. Using the DISP⇑ key, scroll to Units. Using INC and DEC, select PSI, MPA, or N - the engineering units of the strength of the concrete.
2. Using the DISP⇑ key, scroll to Name. (Optional) The INC or DEC keys are used to scroll through the Alpha / Numberic character set. This allows for a mix definition other than strength - ie. "C25" Strenght PSI or MPA must be set to zero for user defined mixes to appear on the display.
3. Using the DISP⇑ key, scroll to Strength, and using INC or DEC change the value displayed to the specified mix strength. Using the DISP⇑ key, scroll to Conveyor Pulses, and using INC or DEC change the value displayed to the number of pulses of the conveyor for one yard or cubic meter of concrete.
4. Using the DISP⇑ key, scroll to Sand and set the sand gate setting for the mix.
5. Using the DISP⇑ key, scroll to Sand WT and set the weight of sand per unit – from the mix design
6. Using the DISP⇑ key, scroll to Stone and set the stone gate setting for the mix.
7. Using the DISP⇑ key, scroll to Stone WT and set the weight of stone per unit – from the mix design.

Programming menu summary:

Mix 1 - 30

Units -	PSI, MPA, or N (Newtons) – note – It metric units are selected (MPA or N) all references to weight and water will be metric values
Name -	Alpha / numeric character set allows for a mix definition other than strength – i.e. "C25" Note: Strength PSI or MPA must be set to zero for user defined mixes to appear on the display
Strength -	XX00 PSI or XX.X MPa
Pulses -	XXXX
Sand -	XX.X
Sand Wt. -	XXXX
Stone -	XX.X
Stone Wt. -	XXXX
Cement Wt. -	XXXX

Time:

Year -	**00 - 99**
Month -	1 - 12
Date-	1 - 31

Hour -	0 - 23
Minute -	0 - 59

To exit the programming mode and return to the run mode, press the PRG key.

Master Reset – to reset the totalized pulse count, press the RST key while powering up the unit.

General Hawk 6 Set-up Menu

When the default run screen is showing (appearing on power up), press and hold the **PRG** key until the general set-up menu appears (about 5 seconds). This menu allows for the setting of the time, printed ticket information, and user configuration of the Hawk 6. As you press the DISP up key, the following menu will be accessed.

- Rounding

The printing of Meters or Yards can be set to round to 1 unit, ½ unit, ¼ unit, or 1/10 unit. Use INC or DEC to change value. Other that "raw 1/10", volumes are rounded up, meaning that if the display shows 1.5 units, the actual amount of concrete delivered is between 1.4 and 1.5 . The Yards or Meters displayed on the Hawk unit always shows "raw 1/10" with no rounding up.

- **Program Lock**

To prevent unwanted programming changes, activate the program lock. To enable programming, press and hold the PRG during power-up.

- REM Display

An optional high visibility display is available. This parameter must be turned on for the high vis display to work.

- VOL Adjust

If the "Volume adjust" parameter is turned on, the volume of concrete printed on the ticket can be adjusted by pressing Inc or Dec before the ticket is printed.

- Save User Config

User programmed data can be saved and used as a back up in the event of an unauthorized person entering the program mode and changing the entered data.

- Load User Config

Loads the saved "User Configuration"

- Load Fact CFG

Loads Factory default data

- **Company Info lines**

INC or DEC scrolls through the alpha numeric character set
DISP up or down moves to the next character
To exit the line being edited, press PRG

- To exit the general programming mode and return to the run mode press PRG.

PRINT FUNCTION

The print function allows for the selection of the following data to be sent to the printer:

- Delivery ticket
- Log of mixer usage
- Mix data

- To print a ticket press the PNT key. The default cursor indication is to "Print Ticket" Press the PNT key to send data to the printer.
- To print the Log or Mix data, move the cursor using the CURS key to that line and press PNT.

PRINT FUNCTION PROGRAMMING – Press the PNT key to display the print menu

Delivery ticket – To specify which information is to be printed on the ticket, press the PRG key when the cursor is showing beside the Print Ticket line. DISP ⇑ shows the next menu line and INC or DEC turns the function on or off.

Print Log – Press PRG when the cursor is showing beside the Print Log function. Using the INC or DEC keys, select the number log entries desired on the print out.

WATER METER CALIBRATION

- The Water G (or L) line must appear on the run display. Follow instructions for "Setting up Run Display" on page 4. If you are using US measure, have a 5 US gallon container available. If metric, use a 20 litre container, to capture the mix water. If your mixer has a spray bar in the mix bowl, remove the rubber hose to direct all of the water into the measuring container.
- With the cursor showing beside "Water gallons (or litres)", press PRG.
- The first of 2 programming screens will appear.
- The first screen allows for manual entry of pulses per 5 gallons (or 20 litres). Press INC or DEC to change the pulse value.
- Press DISP up to enter the "Auto Calibrate" routine.
    - Press INC (ON) to zero the water pulse counter and activate the routine.
    - Turn on water to the mix bowl and capture the 5 gallon (20 litres) container full.
    - Press DEC (OFF) to deactivate the routine and save the pulse count.
- The water meter is now calibrated.

ADMIXTURE INJECTION CONTROL

Press the ADMIX key to make changes to the injection rates and to check the admixture injection pump status.

The Admix Control Menu permits you to turn the admix pumps on or off and to adjust their operating flow rate. The admix system calibration and set-up **cannot** be accessed from this admixture control menu.

- To establish the correct injection rate setting, you must run the conveyor, simulating the discharge of a known amount of concrete (½ yard or meter, or 1 yard or meter), while capturing the fluid in a measuring container. Increase or decrease the injection percentage until the amount captured matches the amount required per yard or meter of concrete discharged.

Summary:
Use the CURS key to highlight the line you wish to change
Turn On or Off by using INC / ON or DEC / OFF
Change injection rate using INC / ON or DEC / OFF
The screen will revert back to the default run screen 3 seconds after the last key press

Note: Set up and calibration of the admixture injection system is NOT available from this control screen. This is to prevent the operator from inadvertently making calibration changes. Follow instructions below for admix system set up.

ADMIX SYSTEM CALIBRATION AND SET UP

The control system for the Hawk 6 admixture injection unit requires that certain parameters or settings be programmed into its memory. In other words, when you set a desired injection rate – 45% for example – the computer asks – "45% of what?". The auto-calibration routine sets those parameters.

The paddle wheel flow meters used are sensitive to the viscosity of the fluids being pumped and metered, so it is important to calibrate the system using the actual admixture to be used.

Note - Before running the calibration routine, run a return line from the pump to the correct admix tank, ensure that the tank valve is turned on, and prime the pump. **The admixture control switch (Auto-Off-Prime) must be in the ON position during admixture calibration.**

Set Up and Calibration of the Admix system:

The admixture injection system is designed for low flow and high flow liquid injection.
Low flow is pump1 - - - 300 ml. - 1.3 liters per minute range
High flow is pump2 - - 1.3 liter to 6 liters per minute range

If the required admixture injection rate falls below the 300 ml. per minute minimum for low flow, or 1.3 liters per minute for high flow, the admixture fluid must be diluted until those minimums can be attained.

Set up –
Set up and calibration must be accessed from one of the lines on the main "run" screen menu.

- Press and hold the CURS key to move the cursor to the display line that you want to use.
- When the cursor is still showing, press and hold the DISP ⇑ key until the desired Admix (1 or 2) appears on that line
- While the cursor is still showing, press the PRG key.

Use the DISP up key to scroll through the lines of the admix set up menu

- Admix ON or OFF - the admixture can be turned on or off (When the mixer is equipped with separate control switches, leave ON.
- Run Percentage – the operational admixture injection rate can be set
- Cal Max – During auto-calibrate, the pump is run at maximum power and the pulse count from the flow meter is recorded. Cal Max is the percentage of that pulse count and will establish what the "100%" operational injection rate will be.
- Auto-Setup - Calibrates admixture injection system. The routine is described below.
- Prime – The admixture pump set up menu includes a "Prime" function. A counter in the lower part of the screen records incoming pulses from that admixture flow meter and can be used to confirm that the flow meter is working correctly. When Prime is selected, press the INC/ON key to start the admixture pump and DEC/OFF to shut it off. In most situations, the separate control switches (Auto-Off-Prime) are used.
- Adjust conveyor pulses
  Provides for adjustment of the maximum conveyor pulse setting required by the admix injection system. It is the number of pulses counted in each 5 second interval - with the conveyor running at full speed. The Hawk unit uses this number to establish the flow required to keep admixture rates proportional to the conveyor speed when it is changed. Once the admixture system is calibrated, this number should not be changed.
- Auto set conveyor pulses
  Provides a set up routine for maximum conveyor pulses described above. Run conveyor at full speed to set. When the conveyor is running at full speed, press the INC/ON key to activate counting cycle. Allow the conveyor to run until the display reverts back.
  Take care when using this routine. If the conveyor is not running when the INC/ON key is pressed, a pulse count of 0 will be recorded and the admix system will not work!

Auto-Setup –

- Access the auto-setup routine by following the steps described in "Set up" above.
- Press INC to start – the pump will run automatically set and record the flow meter pulse count at 100% of the injection adjustment scale.
- After the maximum pump speed has been set, the screen will indicate that a 1 liter or 1 quart container be filled. This must be done to tell the Hawk 6 how many flow meter pulses make up a litre or quart of admixture. It uses this info to calculate admixture usage and injection rates as recorded on the printed ticket.
- When ready, press INC/ON to start filling the container. Press DEC/OFF when the correct amount of fluid has been captured.
- Return the discharge hose to the admix tank and press INC to start the "training" of the pump. This takes 10 to 15 minutes.
- When training is complete, the "run" screen will appear. The "run" screen can be then be changed to show desired display lines. The admixture lines do not need to show during normal operation.

USING THE HAWK 6 FOR MIXER CALIBRATION:

The display features of the Hawk 6 unit can be used to assist in calibration as well as for a "quick check" of the calibration of the mixer unit.
Before calibration, the following data for each mix or concrete type must be entered:

- The required amount of rock, sand and cement per cubic meter or yard – from the engineered mix design.
- The number of conveyor pulses per cubic meter or yard for each concrete type, as determined at step 1 of the calibration work sheet.

The programming procedure is outlined in the Hawk 6 manual.

When the conveyor is operated, the Hawk unit will use the entered programming data to calculate the correct amount of rock or sand discharged. The mix calibration process requires the operator to adjust the control gates and take samples until the actual weight delivered matches the weight displayed.

- Using the MIX key, select the mix to calibrate
- Press CURS to move the cursor to any of the bottom 3 display lines.
- Press DISP⇑ or DISP⇓ key and scroll to Stone WT or Sand WT
- Ensure that the belt is charged with aggregate to the discharge point
- Press reset to zero the display
- Discharge, capture and weigh an amount of material using a wheel barrow or other container
- Compare the discharged amount with the amount recorded on the display

- Set the control gate and take samples until the actual weight is the same as the recorded weight

Hawk 6E System

Connector Pin Out

1	+12 or 24 VDC	Red
2	Conveyor pulses - in	Grey
3	Water meter pulses – in	Yellow
4	Pump 1 Flow meter pulses – in	White
5	Pump 2 Flow meter pulses – in	Green
6	Conveyor on/off switch	Purple
7	NC	
8	NC	
9	NC	
10	Printer serial – data out	Orange
11	NC	
12	NC	
13	NC	
14	Pump 1 Ground	Blue
15	Pump 2 Ground	Black
16	System Ground	Dark Blue (16 gauge)