SFM <–> RPM

Programmer: Dr. Bill Hazelton

Date: January, 2012.

This equation relates the RPM and Diameter to the SFM value. This equation works to solve whichever of the values is unknown, given the other two values.

Entering the Equation

With the calculator switched on and in regular keyboard mode, press the $\boxed{\text{EQN}}$ key. This will take you to the Equation List. Scroll up and down the Equation List to a suitable place and key in the following:

$\boxed{\text{RCL}}$ **S** $\boxed{\text{RCL}}$ **F** $\boxed{\text{RCL}}$ **M** $\boxed{\rightarrow}$ **SPACE** $\boxed{()}$ $\boxed{-}$ $\boxed{-}$ $\boxed{>}$ $\boxed{\rightarrow}$ **SPACE** $\boxed{\text{RCL}}$ **R** $\boxed{\text{RCL}}$ **P** $\boxed{\text{RCL}}$ **M** $\boxed{\text{ENTER}}$

After pressing $\boxed{\text{ENTER}}$, the line should look something like this:

> SFM (— —) RPM

The purpose of this line is to give a reminder of the actual equation (the (– –) is the closest I can get to a double-ended arrow on the calculator screen), which is now entered immediately, and so appears on the next line, below.

$\boxed{\text{RCL}}$ **S** $\boxed{\leftarrow}$ $\boxed{=}$ $\boxed{\text{RCL}}$ **R** $\boxed{\times}$ $\boxed{\text{RCL}}$ **D** $\boxed{\div}$ 3.82 $\boxed{\text{ENTER}}$

After pressing $\boxed{\text{ENTER}}$, the line should look something like this:

> $S = R \times D \div 3.82$

You can now leave Equation mode by pressing $\boxed{\text{EQN}}$ or pressing the $\boxed{\text{C}}$ key.

Running the Equation

To calculate SFM, RPM (or even the diameter), go to the Equation List by pressing the $\boxed{\text{EQN}}$ key.

Scroll up or down the Equation List until the following appears in the display:

> SFM (– –) RPM
> $S = R \times D \div 3.82$

(N.B. The $S = R \times D \div 3.82$ MUST be in the lower line of the display. The upper line is simply to show what the equation is supposed to do.)

Press [→] **SOLVE**

The calculator displays:

SOLVE _

1.   To solve for the SFM, press the **S** letter key.

The calculator will then prompt for the RPM value, displaying:

R ?
123.456

(The value on the bottom line is what's in the R storage register, but you can key in any RPM value. If the correct value is there, just press R/S)

Key in the RPM value you want, e.g., 150.5 and press the R/S key.

The calculator will prompt for the Diameter value, displaying:

D ?
987.456

(The value on the bottom line is what's in the D storage register, but you can key in any Diameter value. If the correct value is there, just press R/S)

Key in the Diameter value you want, e.g., 6.5 and press the R/S key.

The calculator briefly displays the word SOLVING in the display, and then shows the solution:

S =
256.086

(This value is what you will get if you use RPM = 150.5 and Diameter = 6.5.)

Press ENTER or C to return to keyboard mode. The solution will be in the display.

2.   To solve for RPM when the calculator is showing SOLVE _ press the **R** key

The calculator will prompt for the SFM value, displaying:

S ?
256.086

(The value on the bottom line is what's in the S storage register, but you can key in any SFM value. If the correct value is there, just press R/S)

Key in the SFM value you want, e.g., 256.086 and press the R/S key.

The calculator will prompt for the Diameter value, displaying:

D ?
6.500

(The value on the bottom line is what's in the D storage register, but you can key in any Diameter value. If the correct value is there, just press R/S)

Key in the Diameter value you want, e.g., 6.5 and press the R/S key.

The calculator briefly displays the word SOLVING in the display, and then shows the solution:

R =
150.500

(This value is what you will get if you use SFM = 256.086 and Diameter = 6.5.)

Press ENTER or C to return to keyboard mode. The solution will be in the display.

3.   To solve for the Diameter when the calculator is showing SOLVE _ press the **D** key

The calculator will prompt for the SFM value, displaying:

S ?
256.086

(The value on the bottom line is what's in the S storage register, but you can key in any SFM value. If the correct value is there, just press R/S)

Key in the SFM value you want, e.g., 256.086 and press the R/S key.

The calculator will then prompt for the RPM value, displaying:

R ?
150.500

(The value on the bottom line is what's in the R storage register, but you can key in any RPM value. If the correct value is there, just press R/S)

Key in the RPM value you want, e.g., 150.5 and press the R/S key.

The calculator briefly displays the word SOLVING in the display, and then shows the solution:

D =

6.500

(This value is what you will get if you use SFM = 256.086 and RPM = 150.5.)

Press ENTER or C to return to keyboard mode. The solution will be in the display.

Storage Registers Used

D Diameter value

R RPM value

S SFM value

These values can be examined by using RCL at any time, until they are overwritten.

Checks

Length: LN = 10   Checksum: CK = 2645

Use the length (LN=) and Checksum (CK=) values to check if equation was entered correctly. To do this, go to the Equation List and scroll to get the $S = R \times D \div 3.82$ equation on the bottom line of the display. Press ⬑ **SHOW** and hold it to display the LN and CK values in the display.

(Note that the Checksum value may be different for some calculators. If the value is different, check the equation carefully, but if it produces the correct results and looks the same, it will be OK.)

Notes

You only need to enter the equation once, but it can be run as many times as needed.

The SFM $(--)$ RPM equation is just a memo tag and should not be run (placed in the bottom line of the display and evaluated or SOLVEd). When the SFM $(--)$ RPM equation is in the top line of the display, the bottom line should contain the $S = R \times D \div 3.82$ equation and be ready to operate.

Try to avoid placing other equations between working equations and their memo tags.

SFM <-> RPM

Programmer: Dr. Bill Hazelton

Date: January, 2012.

This equation relates the IPT value to the IPM value, using the number of teeth and the RPM. This equation works to solve whichever of the values is unknown, given the other two values.

Entering the Equation

With the calculator switched on and in regular keyboard mode, press the EQN key. This will take you to the Equation List. Scroll up and down the Equation List to a suitable place and key in the following:

RCL **I** RCL **P** RCL **M** → **SPACE** () ☐ ☐ > → **SPACE** RCL **I** RCL **P** RCL **T** ENTER

After pressing ENTER, the line should look something like this:

> IPM (— —) IPT

The purpose of this line is to give a reminder of the actual equation (the (– –) is the closest I can get to a double-ended arrow on the calculator screen), which is now entered immediately, and so appears on the next line, below.

RCL **M** ← = RCL **T** × RCL **N** × RCL **R** ENTER

After pressing ENTER, the line should look something like this:

> $M = T \times N \times R$

You can now leave Equation mode by pressing EQN or pressing the C key.

Running the Equation

To calculate IPM, IPT (or even the number of teeth or RPM), go to the Equation List by pressing the EQN key.

Scroll up or down the Equation List until the following appears in the display:

> IPM (– –) IPT
> $M = T \times N \times R$

(N.B. The $M = T \times N \times R$ MUST be in the lower line of the display. The upper line is simply to show what the equation is supposed to do.)

Press ⭲ **SOLVE**

The calculator displays:

SOLVE _

1.   To solve for the IPM value, press the **M** letter key.

The calculator will then prompt for the IPT (T) value, displaying:

T ?
123.456

(The value on the bottom line is what's in the T storage register, but you can key in any IPT value. If the correct value is there, just press R/S)

Key in the IPT value you want, e.g., 150.5 and press the R/S key.

The calculator will prompt for the Number of Teeth (N) value, displaying:

N ?
35.000

(The value on the bottom line is what's in the N storage register, but you can key in any Diameter value. If the correct value is there, just press R/S)

Key in the Number of Teeth value you want, e.g., 35 and press the R/S key.

The calculator will prompt for the RPM (R) value, displaying:

R ?
35.000

(The value on the bottom line is what's in the R storage register, but you can key in any Diameter value. If the correct value is there, just press R/S)

Key in the RPM value you want, e.g., 30 and press the R/S key.

The calculator briefly displays the word SOLVING in the display, and then shows the solution:

M =
158,025.000

(This value is what you will get if you use IPT = 150.5, N = 35 and RPM = 30.)

Press ENTER or C to return to keyboard mode. The solution will be in the display.

2.   To solve for the IPT value, when the calculator is showing SOLVE _ press the $\boxed{\text{T}}$ key

The calculator will prompt for the IPM value, displaying:

M ?
1,564.000

(The value on the bottom line is what's in the M storage register, but you can key in any IPM value. If the correct value is there, just press $\boxed{\text{R/S}}$)

Key in the IPM value you want, e.g., 1564.0 and press the $\boxed{\text{R/S}}$ key.

The calculator will prompt for the Number of Teeth (N) value, displaying:

N ?
6.500

(The value on the bottom line is what's in the N storage register, but you can key in any Diameter value. If the correct value is there, just press $\boxed{\text{R/S}}$)

Key in the Number of Teeth value you want, e.g., 20 and press the $\boxed{\text{R/S}}$ key.

The calculator will prompt for the RPM (R) value, displaying:

R ?
25.000

(The value on the bottom line is what's in the R storage register, but you can key in any RPM value. If the correct value is there, just press $\boxed{\text{R/S}}$)

Key in the RPM value you want, e.g., 25 and press the $\boxed{\text{R/S}}$ key.

The calculator briefly displays the word SOLVING in the display, and then shows the solution:

T =
3.128

(This value is what you will get if you use IPM = 1,564.0, Number of Teeth = 20, and RPM = 25.)

Press $\boxed{\text{ENTER}}$ or $\boxed{\text{C}}$ to return to keyboard mode. The solution will be in the display.

Storage Registers Used

> **M**   IPM value
>
> **N**   Number of Teeth
>
> **R**   RPM value
>
> **T**   IPT value

These values can be examined by using RCL at any time, until they are overwritten.

Checks

> Length: LN = 7   Checksum: CK = FBAC

Use the length (LN=) and Checksum (CK=) values to check if equation was entered correctly. To do this, go to the Equation List and scroll to get the $M = T \times N \times R$ equation on the bottom line of the display. Press ⬅ **SHOW** and hold it to display the LN and CK values in the display.

(Note that the Checksum value may be different for some calculators. If the value is different, check the equation carefully, but if it produces the correct results and looks the same, it will be OK.)

Notes

You only need to enter the equation once, but it can be run as many times as needed.

The IPM $(--)$ IPT equation is just a memo tag and should not be run (placed in the bottom line of the display and evaluated or SOLVEd). When the IPM $(--)$ IPT equation is in the top line of the display, the bottom line should contain the $M = T \times N \times R$ equation and be ready to operate.

Try to avoid placing other equations between working equations and their memo tags.

The other variables in the equation, i.e., Number of Teeth (N) and RPM (R), can also be solved individually if the other three values are known. Simply key in that variable letter (**N** or **R**) at the SOLVE _ prompt and enter the values as requested.

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IPR = IPM / RPM

Programmer: Dr. Bill Hazelton

Date: January, 2012.

This equation relates the RPM and IPM values to the IPR value. This equation calculates the IPR value, given the IPM and RPM values.

Entering the Equation

With the calculator switched on and in regular keyboard mode, press the [EQN] key. This will take you to the Equation List. Scroll up and down the Equation List to a suitable place and key in the following:

[RCL] [I] [RCL] [P] [RCL] [R] [→] [SPACE] [←] [=] [→] [SPACE] [RCL] [I] [RCL] [P] [RCL] [M] [÷] [RCL] [R] [RCL] [P] [RCL] [M] [ENTER]

After pressing [ENTER], the line should look something like this:

$$IPR \ = \ IPM \div RPM$$

The purpose of this line is to give a reminder of the actual equation, which is now entered immediately, and so appears on the next line, below.

[RCL] [P] [←] [=] [RCL] [M] [÷] [RCL] [R] [ENTER]

After pressing [ENTER], the line should look something like this:

$$P = M \div R$$

You can now leave Equation mode by pressing [EQN] or pressing the [C] key.

Running the Equation

To calculate IPR value, go to the Equation List by pressing the [EQN] key.

Scroll up or down the Equation List until the following appears in the display:

$$IPR \ = \ IPM \div RPM$$
$$P \ = \ M \div R$$

(N.B. The P = M ÷ R   MUST be in the lower line of the display. The upper line is simply to show what the equation is supposed to do.)

Press ENTER . The calculator will prompt you for the IPM (M) value:

> M?
> 1,564.000

(The value on the bottom line is what's in the M storage register, but you can key in any IPM value. If the correct value is there, just press R/S .)

If you have just calculated the IPM value using the Machine Shop 2 Equation, that value will still be in the M storage register. This may help save time and reduce key entry errors.

Key in the IPM value you want, e.g., 1564.0 and press the R/S key.

The calculator will prompt for the RPM (R) value, displaying:

> R ?
> 25.000

(The value on the bottom line is what's in the R storage register, but you can key in any RPM value. If the correct value is there, just press R/S)

If you have just entered the RPM value in the Machine Shop 1 or 2 Equations, that value will still be in the M storage register. This may help save time and reduce key entry errors.

Key in the RPM value you want, e.g., 25 and press the R/S key.

The calculator displays the solution for the IPR value (P), as follows:

> P =
> 62.560

(This value is what you will get if you use IPM = 1,564.0 and RPM = 25.)

Press ENTER or C to return to keyboard mode. The solution will be in the display.

Storage Registers Used

> **M**   IPM value
>
> **P**   IPR value
>
> **R**   RPM value

These values can be examined by using RCL at any time, until they are overwritten.

Checks

Length: LN = 5   Checksum: CK = 0DBF

Use the length (LN=) and Checksum (CK=) values to check if equation was entered correctly. To do this, go to the Equation List and scroll to get the $P = M \div R$ equation on the bottom line of the display. Press ⬅️ **SHOW** and hold it to display the LN and CK values in the display.

(Note that the Checksum value may be different for some calculators. If the value is different, check the equation carefully, but if it produces the correct results and looks the same, it will be OK.)

Notes

You only need to enter the equation once, but it can be run as many times as needed.

The $IPR = IPM \div RPM$ equation is just a memo tag and should not be run (placed in the bottom line of the display and evaluated or SOLVEd). When the $IPR = IPM \div RPM$ equation is in the top line of the display, the bottom line should contain the $P = M \div R$ equation and be ready to operate.

Try to avoid placing other equations between working equations and their memo tags.

The other variables in the equation, i.e., IPM (M) and RPM (R), can also be solved individually if the other two values are known. Bring the $P = M \div R$ equation to the bottom line of the display, press ➡️ **SOLVE** and then press either the **M** or **R** letter key at the SOLVE _ prompt and enter the other values as requested.

CIM = FEED x WOC x DOC

Programmer: Dr. Bill Hazelton

Date: January, 2012.

This equation relates the Feed, WOC and DOC values to the CIM value. This equation calculates the CIM value, given the Feed, WOC and DOC values.

Entering the Equation

With the calculator switched on and in regular keyboard mode, press the `EQN` key. This will take you to the Equation List. Scroll up and down the Equation List to a suitable place and key in the following:

`RCL` **C** `RCL` **I** `RCL` **M** `⬅` `=` `RCL` **F** `RCL` **E** `RCL` **E** `RCL` **D** `×` `RCL` **W** `RCL` **O** `RCL` **C** `×` `RCL` **D** `RCL` **O** `RCL` **C** `ENTER`

After pressing `ENTER`, the line should look something like this:

$$CIM = FEED \times WOC \times D$$

or $CIM = FEED \times WOC \times \ldots$

(The last two or three letters of the equation are off-screen to the right (the … indicates this once the equation has been entered), but you can scroll over to see them, if needed. The screen can only display 13 characters at a time.)

The purpose of this line is to give a reminder of the actual equation, which is now entered immediately, and so appears on the next line, below.

`RCL` **C** `⬅` `=` `RCL` **F** `×` `RCL` **W** `×` `RCL` **D** `ENTER`

After pressing `ENTER`, the line should look something like this:

$$C = F \times W \times D$$

You can now leave Equation mode by pressing `EQN` or pressing the `C` key.

Running the Equation

To calculate CIM value, go to the Equation List by pressing the `EQN` key.

Scroll up or down the Equation List until the following appears in the display:

$$CIM = FEED \times WOC \times \ldots$$
$$C = F \times W \times D$$

(N.B. The C = F × W × D   MUST be in the lower line of the display. The upper line is simply to show what the equation is supposed to do.)

Press ENTER . The calculator will prompt you for the Feed value (F):

> F ?
> 123.456

(The value on the bottom line is what's in the F storage register, but you can key in any Feed value. If the correct value is there, just press R/S .)

Key in the Feed value you want, e.g., 20 and press the R/S key.

The calculator will prompt for the WOC (W) value, displaying:

> W ?
> 1.450

(The value on the bottom line is what's in the W storage register, but you can key in any WOC value. If the correct value is there, just press R/S)

Key in the WOC value you want, e.g., 15 and press the R/S key.

The calculator will prompt for the DOC (D) value, displaying:

> D ?
> 6.500

(The value on the bottom line is what's in the D storage register, but you can key in any DOC value. If the correct value is there, just press R/S)

Key in the DOC value you want, e.g., 8 and press the R/S key.

The calculator displays the solution for the CIM value (C), as follows:

> C =
> 2,400.00

(This value is what you will get if you use Feed = 20, WOC = 15 and DOC = 8.)

Press ENTER or C to return to keyboard mode. The solution will be in the display.

Storage Registers Used

C	CIM value
D	DOC value
F	Feed value
W	WOC value

These values can be examined by using RCL at any time, until they are overwritten.

Checks

Length: LN = 7   Checksum: CK = 26F8

Use the length (LN=) and Checksum (CK=) values to check if equation was entered correctly. To do this, go to the Equation List and scroll to get the $C = F \times W \times D$ equation on the bottom line of the display. Press ⬅ **SHOW** and hold it to display the LN and CK values in the display.

(Note that the Checksum value may be different for some calculators. If the value is different, check the equation carefully, but if it produces the correct results and looks the same, it will be OK.)

Notes

You only need to enter the equation once, but it can be run as many times as needed.

The $CIM = FEED \times WOC \times DOC$ equation is just a memo tag and should not be run (placed in the bottom line of the display and evaluated or SOLVEd). When the $CIM = FEED \times WOC \times DOC$ equation is in the top line of the display, the bottom line should contain the $C = F \times W \times D$ equation and be ready to operate.

Try to avoid placing other equations between working equations and their memo tags.

The other variables in the equation, i.e., Feed (F), WOC (W) and DOC (D), can also be solved individually if the other three values are known. Bring the $C = F \times W \times D$ equation to the bottom line of the display, press ➡ **SOLVE** and then press either the **F**, **W** or **D** letter key at the SOLVE _ prompt and enter the other values as requested.

HP = CIM x UHP

Programmer: Dr. Bill Hazelton

Date: January, 2012.

This equation relates the CIM and UHP values to the HP value. This equation calculates the HP value, given the CIM and UHP values.

Entering the Equation

With the calculator switched on and in regular keyboard mode, press the ⬚EQN⬚ key. This will take you to the Equation List. Scroll up and down the Equation List to a suitable place and key in the following:

RCL **H** RCL **P** ⬚→⬚ **SPACE** ⬚←⬚ ⬚=⬚ ⬚→⬚ **SPACE** RCL **C** RCL **I** RCL **M** ✕ RCL **U** RCL **H** RCL **P**   ENTER

After pressing ENTER, the line should look something like this:

    HP = CIM × UHP

The purpose of this line is to give a reminder of the actual equation, which is now entered immediately, and so appears on the next line, below.

RCL **H** ⬚←⬚ ⬚=⬚ RCL **C** ✕ RCL **U**   ENTER

After pressing ENTER, the line should look something like this:

    H = C × U

You can now leave Equation mode by pressing ⬚EQN⬚ or pressing the ⬚C⬚ key.

Running the Equation

To calculate CIM value, go to the Equation List by pressing the ⬚EQN⬚ key.

Scroll up or down the Equation List until the following appears in the display:

    HP = CIM × UHP
    H = C × U

(N.B. The   H = C × U   MUST be in the lower line of the display. The upper line is simply to show what the equation is supposed to do.)

Press ENTER . The calculator will prompt you for the CIM value (C):

    C ?
    2,400.000

(The value on the bottom line is what's in the C storage register, but you can key in any CIM value. If the correct value is there, just press R/S .)

If you have just calculated the CIM value using the Machine Shop 4 Equation, that value will still be in the C storage register. This may help save time and reduce key entry errors.

Key in the CIM value you want, e.g., 2400, and press the R/S key.

The calculator will prompt for the UHP (U) value, displaying:

    U ?
    123.456

(The value on the bottom line is what's in the U storage register, but you can key in any UHP value. If the correct value is there, just press R/S)

Key in the UHP value you want, e.g., 5 and press the R/S key.

The calculator displays the solution for the HP value (H), as follows:

    H =
    12,000.000

(This value is what you will get if you use CIM = 2,400 and UHP = 5.)

Press ENTER or C to return to keyboard mode. The solution will be in the display.

Storage Registers Used

    C   CIM value

    H   HP value

    U   UHP value

These values can be examined by using RCL at any time, until they are overwritten.

Checks

        Length: LN = 5   Checksum: CK = 357D

Use the length (LN=) and Checksum (CK=) values to check if equation was entered correctly. To do this, go to the Equation List and scroll to get the $H = C \times U$ equation on the bottom line of the display. Press ⬅ **SHOW** and hold it to display the LN and CK values in the display.

(Note that the Checksum value may be different for some calculators. If the value is different, check the equation carefully, but if it produces the correct results and looks the same, it will be OK.)

Notes

You only need to enter the equation once, but it can be run as many times as needed.

The $HP = CIM \times UHP$ equation is just a memo tag and should not be run (placed in the bottom line of the display and evaluated or SOLVEd). When the $HP = CIM \times UHP$ equation is in the top line of the display, the bottom line should contain the $H = C \times U$ equation and be ready to operate.

Try to avoid placing other equations between working equations and their memo tags.

The other variables in the equation, i.e., CIM (C) and UHP (U), can also be solved individually if the other two values are known. Bring the $H = C \times U$ equation to the bottom line of the display, press ➡ **SOLVE** and then press either the **C** or **U** letter key at the SOLVE _ prompt and enter the other values as requested.