Agriculex Inc.

Agriculex
ESC-2 Programmable Electronic
Seed Counter
Operator's Manual

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1. Introduction to ESC2 Seed Counter

The ESC2 seed counter is a high speed seed counter designed to accurately count at a speed of up to 100 seeds per second. Greater accuracy can be achieved at a lower speed. It uses a computerized control unit with conversational programming for easy set up. It is capable of totalize counting as well as counting batches of various sizes from a seed lot.

The counter consists of 6 units shown in figure 1.0. A feeder unit on the top of the counter feeds seed into 16 different channels, each with a sensor in it. The counts from all the sensors are added together. After sensing, the seed must pass a valve referred to as a main valve, which is controlled by the computer during batch counting. If this valve is closed, the seed is held in the top container. If it is open, seed flows into the second container and is stopped by a gate, referred to as the *'end valve'*. The end valve is opened by pushing up the slider on top of the discharge chute. In a *'batch mode'* the closing of the end valve signals the computer(s) that the last sample has been collected and opens the main valve. At the end of a batch the main valve closes but the counter continues counting seeds into it for the next sample. Both the main valve and the end valve must be open for seeds to flow through the counter.

We have tried to make the operation of the counter as user-friendly as possible, with the goal that it should be possible to use without even referring to this manual. We would encourage you to experiment with the control unit before using it. With many things there are several ways to do them. We have tried to present you with ways to do all the things that you might want to do at any point in the program. For example; when you set up a program for each batch counting you will be asked to enter a feed speed. Don't worry if you are not sure which speed should be set for counting. Just press the *'Enter'* key to select the default setting.

The only thing(s) you need to remember about the counter before counting are the following:

1. Sensitivity
The range of sensitivity is 0 to 10. 10 is the least sensitive and 0 is the most. This number roughly corresponds to the size of seed (in mm) for which that setting is appropriate. For example; Canola – the sensitivity can be set from 1 to 1.5. The sensitivity is controlled by the knob. However, if the setting is unnecessarily sensitive, it increases the possibility that the counter will count dust, chaff, or electrical noise.

2. Vertical and Horizontal Gate
The feeder unit has two gates that need to be manually and correctly set before counting. One is referred to *'Vertical Gate'* placed at the front of the feeder unit and another is referred to *'Horizontal Gate'* placed at the right side of feeder unit. The size setting of the gates depends on the crop size. The purpose is to ensure that the crop is feeding

continuously without jamming the feed turntable. You may need to experiment a bit to find the best setting.

3. Feed turntable Speed
The counting speed is controlled by the feed turntable speed and the size of gates. The speed range of the feed turntable is from 1 to 200. 1 is the lowest speed and 200 is the fastest. The feed turntable speed is controlled by software and can be pre-set and changed during counting.

2. The ESC-2 Quick Installation Guide

Thank you for choosing the ESC-2 Seed Counter. This Quick Installation Guide provides simple setup instructions. For more additional information refer to the operator's manual.

Step 1… Unpack

Box Contents:
- Control unit
- Feed unit
- detector unit
- seed distributor unit
- Base unit
- Large size seed spout
- Small size seed spout
- 9 pin RS232 cable
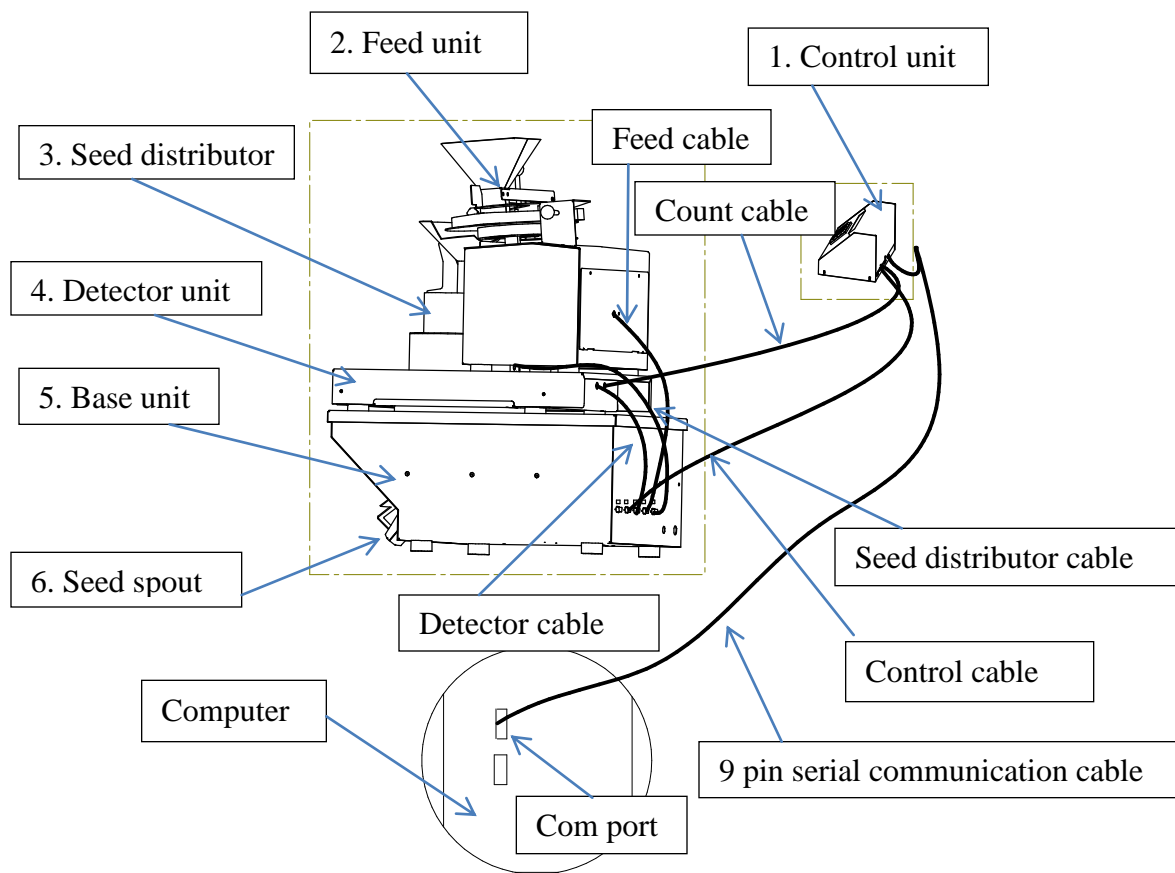- CD
- Operator's manual.
- Warranty Sheet

Figure 1   Esc-2 Seed Counter Setup Demo Figure

Step 2 … Get setup & Connected

- It is recommended to turn off the power before connecting or disconnecting the cables.
- Setup all parts of 'ESC-2 Seed Counter as shown in Figure 1 (page 6) and connect all cables to each respective port.
- Use the 9 pin null modem cable provided by Agriculex to connect a PC or laptop to the ESC-2 Seed Counter. The connect port of the counter is COM2 port located on the back of the control unit.
- If your computer or laptop does not have COM ports, you can use a COM to the USB adapter.
- Insert the CD into a CD ROM. Double click. The *'Setup'* software will automatically install itself on your computer to the default directory C:\home\setup if you do not specify a directory
- Turn on the ESC2 Seed Counter power. The Counter will take about 1 minute to boot up.

Once you have connected the computer to the ESC2 Seed Counter, you are ready to configure the *'Remote Mode'* software and the *'Independent Mode'* software.

After the counter boots up, a selected menu appeared on the display panel on the control unit looks like below:

1. Remote Mode

2. Independent Mode

3. <u>Remote Mode</u>

3.1 *ESC2 Seed Counter*

Turn on power of the ESC-2 Seed Counter and wait for the menu to appear on the display panel. Press number 1 button to select the Remote Mode. Double click ESC2_xv35 file to launch the program if the program has not been launched on your computer. The software will look like the figure 3.1 as shown below:
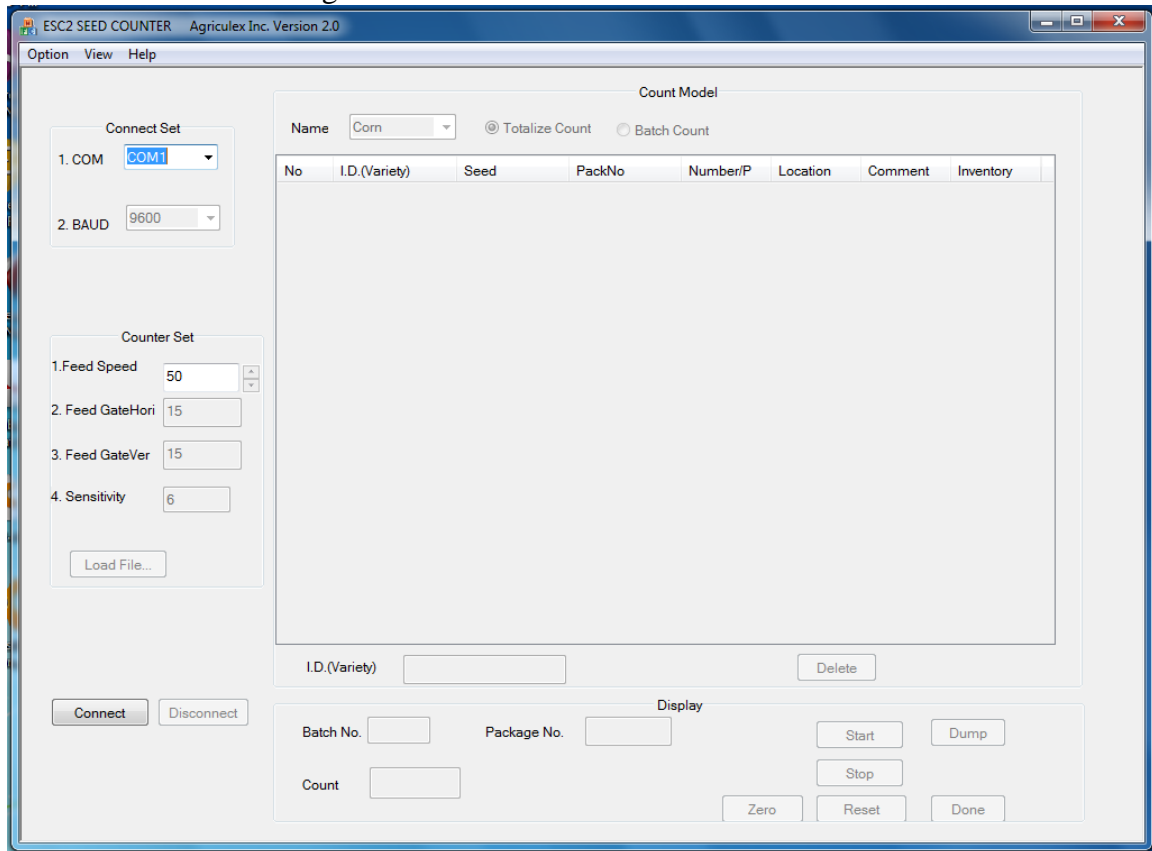
Figure 3.1

Explanation:
- Connect: send a Connect command to the counter. If sending success, connection with the counter will be established.
- Disconnect: send a Disconnect command to the counter. If sending success, the program will disconnect with the counter.
- Start: send Start command to the count. If sending success, the counter will start to count.
- Stop: send stop command to the counter, if sending success, the counter will pause counting.
- Dump: send Dump command to the counter. If sending success, the counter will clean out seeds remaining in the hopper.
- Zero: send clean kernel number command to the counter. If sending success, the kernel number will be clean to zero.
- Reset: send Reset command to the counter. If sending success, the counter will stop the current counting and back to waiting status.
- Done: send Done command to the counter, if sending success, the counter will recorder all

information demand by software.
- Load File…: Open prearranged excel file.

Above figure just is an overall view, the more detail function of each button, menu and the control items will be further explained in the follow paragraphs.

3.2 *Select Communication Port*
Click 'down arrow' from the Connect Set frame to select a COM port, see figure 3.2 as shown below. The *'Baud'* rate option is always inactive. Do not change the feed speed until the button of Connect to ESC2 has been clicked.
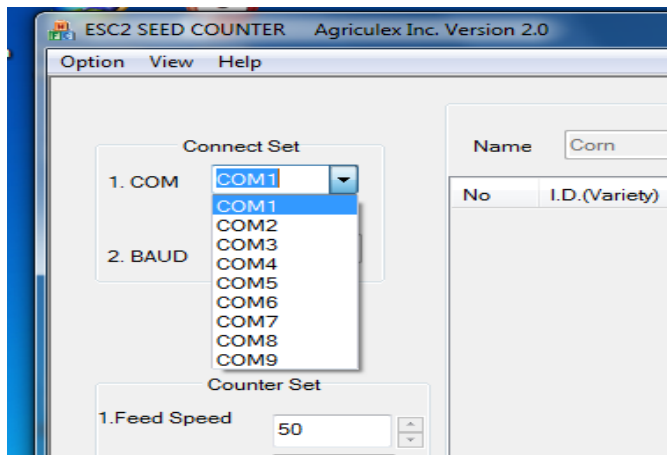

Figure 3.2

If you are not sure which COM port in the computer has been connected to the counter, follow below steps to find out.
- Click Start (at left bottom corn of screen) →Control Panrl, → Sytem → Device manager →Port (COM&LPT)
  In here, you will find which port is available or which port you are using.

3.3 *Connect to Counter*
Click the Connect button. You will hear two sounds of the main valve closing and opening from the counter. If you heard the sounds, it means that the connection has been established. Otherwise you should check COM port number and the counter to see whether Remote mode has been selected or not.

Do not click on the *'Load File…'* button at this moment. We will talk about it later (see page 14, Import prearranged excel file.)

3.4 *Prepare to Count*

Click the down arrow from the *'Seed List'* in the *'Count Mode'* frame to select seed name. See figure 3.4. When a selected seed name appeared on the top of name list, the parameters in the Count Set associating with this seed name will be automatically changed. The further information such as how to add *'seed name'* and change associated parameters, see page 13(3.8 add seed parameters) or go to the **HELP** menu.
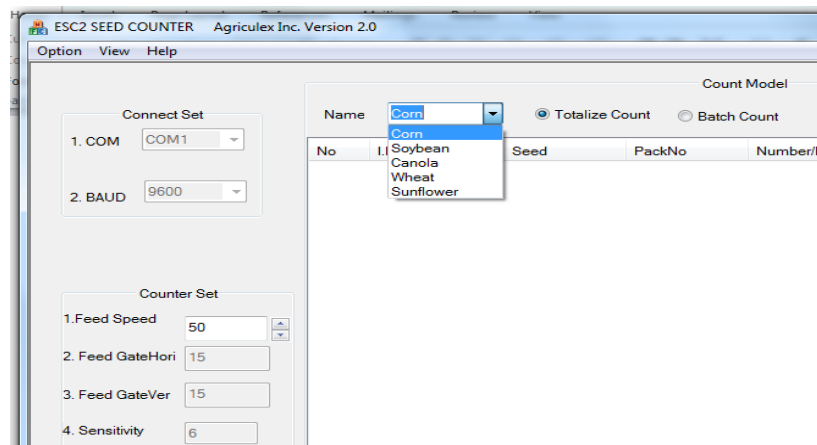

Figure 3.4

3.5 *Totalize Count*

Before clicking on the *'Start'* button you should select the count mode: Totalize count or Batch count. The default setting of count mode is Totalize.

- If count mode is not Totalize mode, select totalize mode.
- Enter ID at textbox of ID variety as shown on figure 3.5.
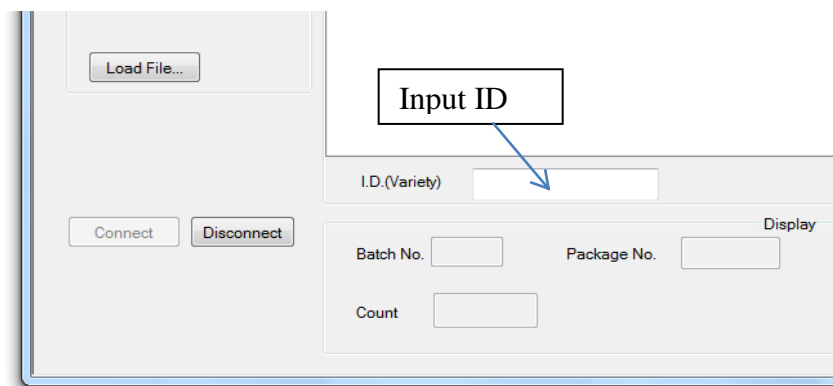
Figure 3.5.1

- If using keyboard to enter ID, 'Enter' key need be pressed after all ID have been entered
- If ID is entered by barcode scanner and your scanner not program with Enter key, you need press Enter key.

After ID is entered, the program will automatically start to count. If you want to enter information of location and comments before the counter start to count, you need go to menu Option→Set Counter to setup. After that, a dialog frame with count information

will pop up on the screen as shown at figure 3.5.2. In the Totalize mode only 5 and 6 items are allowed to enter information. After entering information, Click the *'**Done**'* button or press 'Enter' key, the counter will automatically start to count.
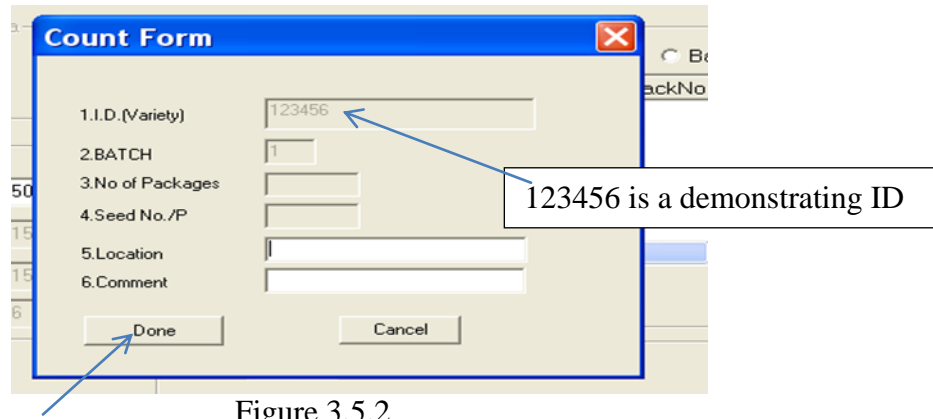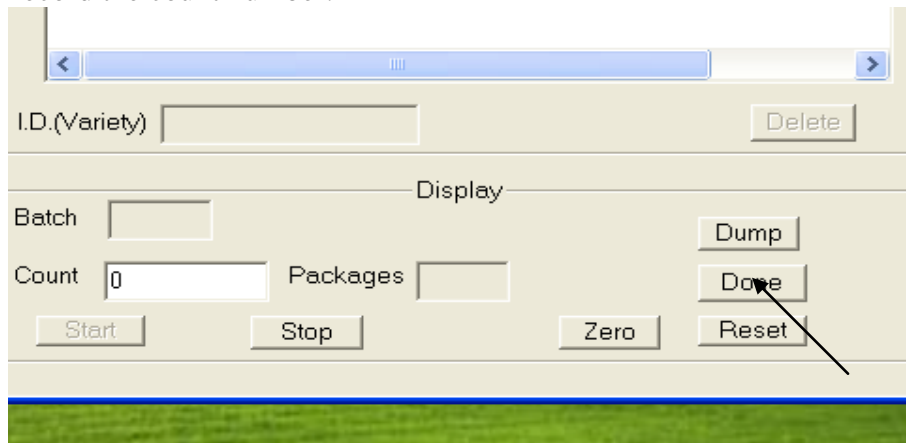

Figure 3.5.2

During the count period, you can click 'Stop' or 'Start' button on the computer or press correspond button represents 'Stop' or Start at control unit of the counter. After finishing totalize the count, click the 'Done' button as shown on figure 3.5.3 in order the program can record the count number.

Figure 3.5.3

3.6 Batch Count
Multiple batch count is available if you choose batch count mode.

Example 1:
2 batches
First batch: 2 packets   100 seeds per packet
Second batch: 5 packets   50 seeds per packet

Select *'Batch Count Mode'*.   If the cursor is not appeared at ID (Variety) textbox, move mouse over there and click.

Enter an ID following an Enter key or scan a barcode. A dialog frame will pop up as shown figure 3.6. If you do not setup Set Counter, the items of Location and Comments will not appear on the Frame.
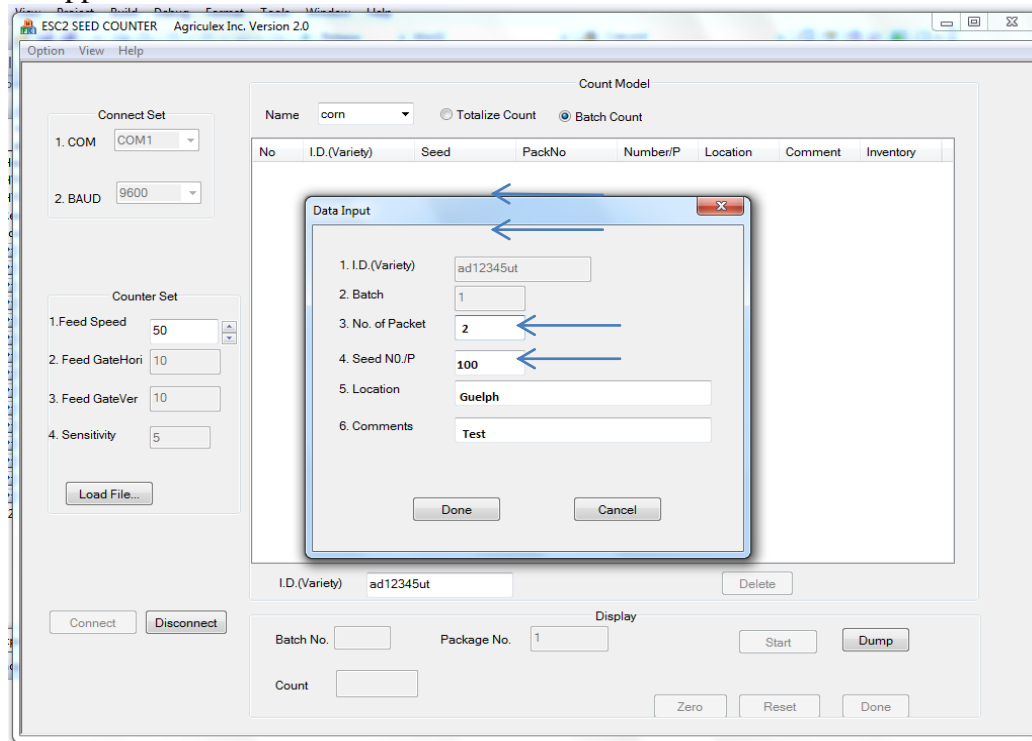
Figure 3.6

Note that Item 2, Batch number, is 1. It means that this is the first batch.
- Enter number 2 in item 3: No of Packets.
- Enter number 100 in item 4: Seed No/P.

Press the *'Enter'* key *(DO NOT click the Done Button).* Note that if you click Done button, the program will exit the Data Input dialog frame. If Done button has not been clicked, item 2, Batch number, has changed to 2. It means this is a second batch.
- Enter number 5 in item 3: No of Packets.
- Enter number 50 in item 4: Seed No/P.

Click on the *'Done'* button. Then click on the *'Start'* button. The counter will start counting.

Example 2:
      1 batch
      2 packets   100 seeds per packet

- Enter number 2 in item 3: No of Packets
- Enter number 100 in item 4: Seed No./P

Click on the *'Done'* button. Then click on the *'Start'* button. The counter will start counting.

NB: In the *'Batch Count Mode'* you can click on the *'Done'* button to end the Batch Count at any time when there are not enough seeds in the hopper or should you wish to quit counting.

3.7 Dump Seed and Sample Ready Dialog
You can select the setting of the *'auto-dump'* seed or *'manual dump'* seed as batch count has been completed. The default setting is auto-dump. Under this mode the residual seed in the hopper will be dumped out as the counter finishes the batch count. In the manual dumping mode you will have a chance to repeat the previous batch count before you click the **'Dump'** button to dump out the residual seed in the hopper.

You have also the option to set-up the *'sample ready dialog'* appearance should you wish to do so. The default setting is a dialog frame will pop up as the sample is ready for loading.
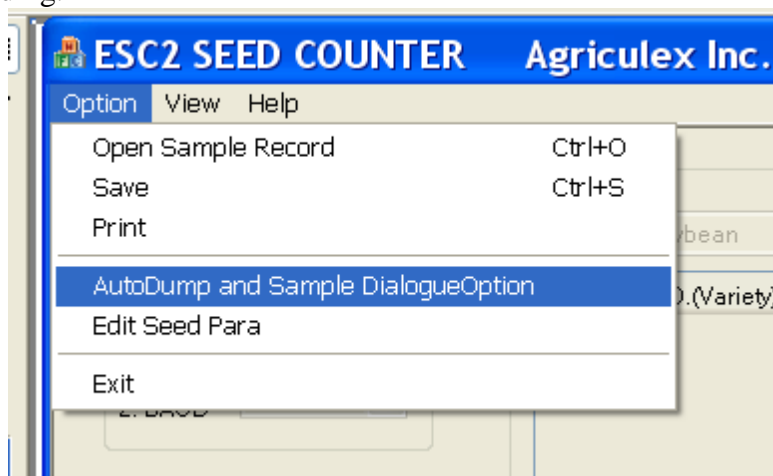

Figure 3.7

3.8 Add Seed Parameters
You can add the seed name and associated parameters into this program for future use. Click Option menu to select *'Edit Seed Para'*. See above Figure 3.8

Click *Edit Seed Para*, Edit Seed Dialog will pop up as figure 3.8 shown below
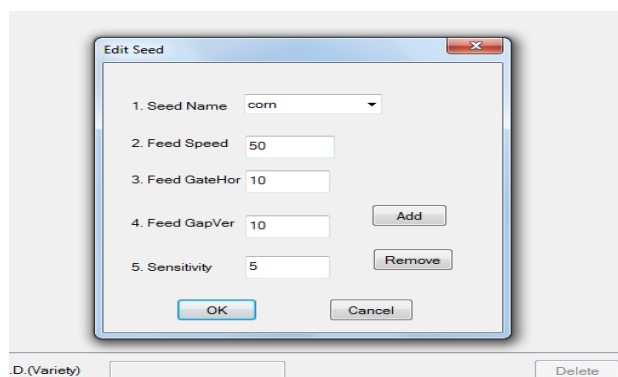
Figure 3.8

Click the 'Add' button to add seed name and associated parameters.

3.9 Set Feeding Speed of the turntable

You can set-up feeding speed of the turntable after the connection between PC and the counter has been established. This speed is referred to as '*Feed Speed'*. You can change the Feed Speed at any time during counting.

For batch counting, all seed samples will run at the Feed Speed until you specify a seed sample run at a specified speed. If you have placed a numeric value in the 'Comment column' cell, the sample in correspond row will run at this specified speed. For more information, see page 18 (4.5 Comment column),

3.10   Import Prearranged Excel File

Before loading a *'Prearranged Excel File'*, you will need to prepare a file for loading. The detailed information for prearrange excel file is chapter 4*: File Format'*.
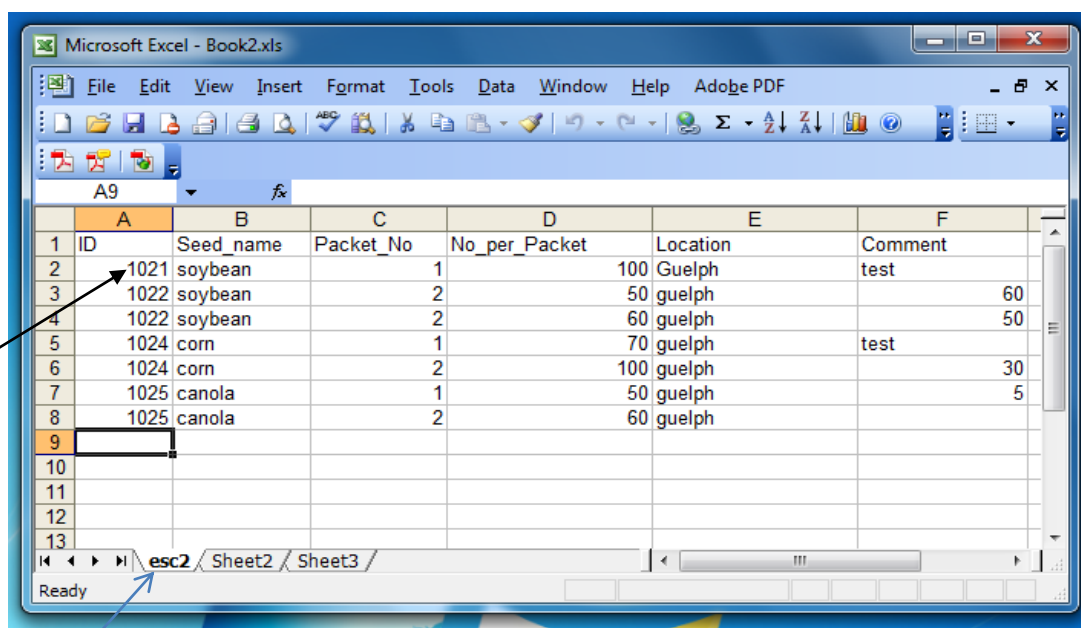
A simple prearranged excel file looks like the figure3.10.1 shown below:

NB: The format of the main title is important. ID must appear in the first cell in the main title.
NB: the Tag of Sheet must be esc2.
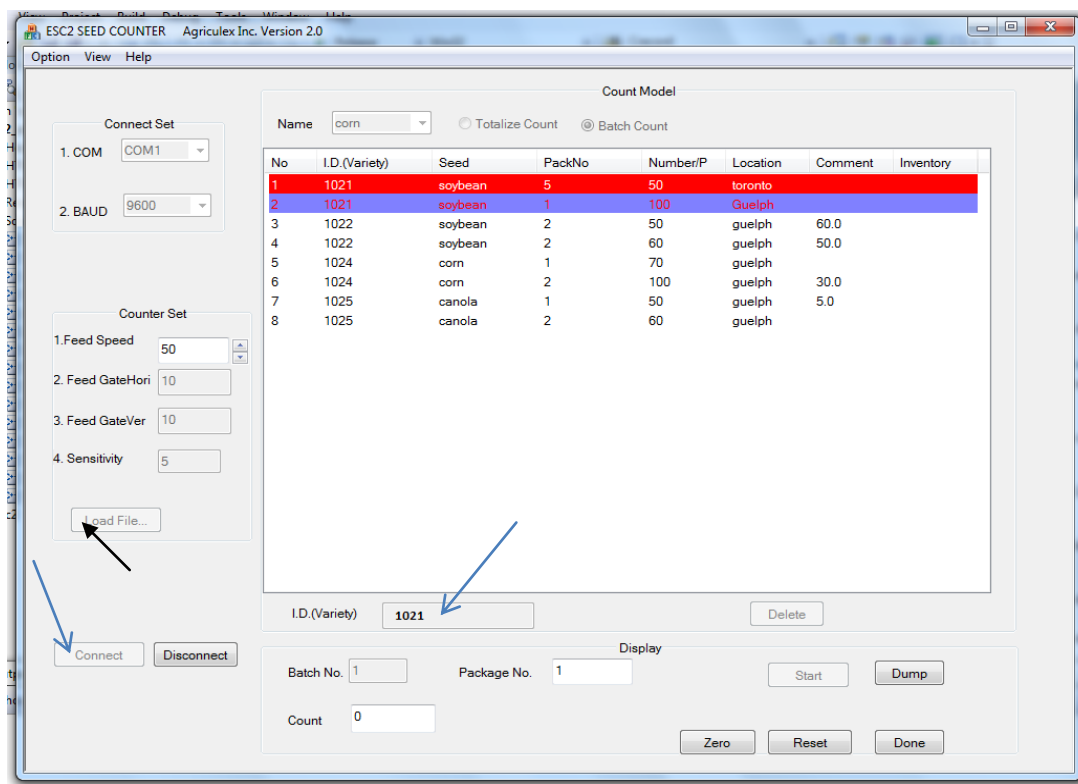
Figure 3.10.1

Click on the *'Load File…'* button in the *'Count Para frame'*, an open file dialog frame will pop up, select a prearranged excel file, then click ok. After that, the contents of the file will display on the list table in the Count Model frame as figure 3.10.2 shown below:

Figure 3.10.2

1-59 suburban Ave Guelph Ontario N1E 6B4

Enter an ID number or scan a Barcode into the textbox named as I.D. (Variety), the matched ID in the item list will be selected and colored. See above figure 3.11.
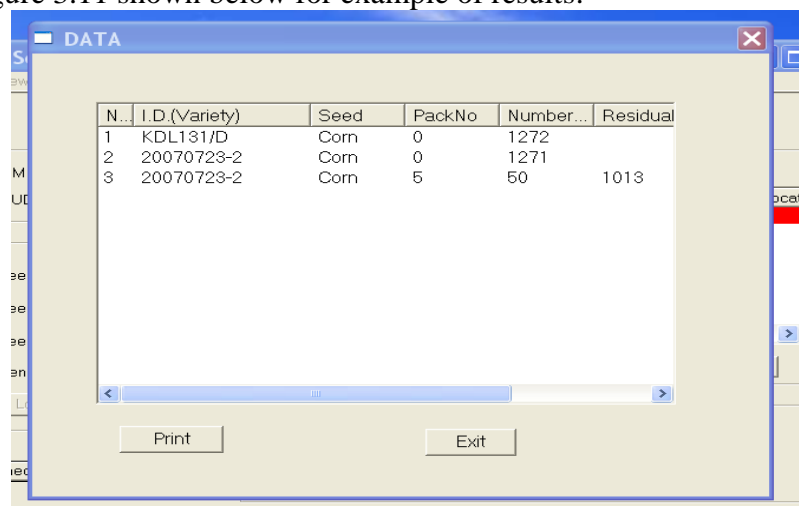
The red color represents the counter is counting this item. The black color represents this item has been counted (not appeared here). The purple color represents the item is waiting for count.

3.11   Open, Save & Print data files
In the Remote mode, you can open, save, and print counting information.
  -     Click Option menu. -Select Open sample record.
See figure 3.11 shown below for example of results:

Figure 3.11

Open file is only available to open a record file with ".txt" extension. After counting you can save the data. For more detail refer to the HELP menu.

3.12   Check Inventory number
  -     Click View in the menu.
  -     Choose I.D. (variety) and enter an ID number. Or to scan a barcode.
 The inventory number will display on the dialogue frame.

3.13   Check the status of the counting
  -     Click view in the menu
  -     Choose edit
A dialog frame will be pop-up on the screen to display all of the information.

4. File Format

4.1 Limit and Constraint

Before starting to prepare an *'EXCEL'* file, the *'Limit and Constraint'* should be understood.

- ID must be set in first column in header row.
- The tag of sheet must be esc2.
- For Totalize count, the value of Packet No must be set to 0; for Batch count, the values of Packet_No and No_per_Packet must be greater than 0.
- For batch count, the maximum number of batch is less than 200. The maximum number of Packet_ No in a batch is less than 32000.
- The maximum number of No_ per_ packet is less than 32000.

4.2 Standard Prearranged File

Figure 4.2

Note that the first row is the header. The first cell in the header must be an ID.

Comment column can also be used to specify the speed of the turntable for this row sample, which contains a numeric value in the *'Comment'* column. Only the numeric value in the cell of this column will be considered as a speed of the turntable

4.3 Simplified standard prearranged file

Figure 4.3

Note that the first row is the header. The first cell in the header must be ID.

4.4 Prearranged File Without the Header

Please format each cell in the first row to *'TEXT'* before typing any characters. If you retain each cell in the first row in general format, the software will omit the first row when it is imported into the software.

Figure 4.4

4.5 Comment column

You can place some comments, numeric value or blank in the cell of the *'Comment'* column. If this cell contains some comments or a blank, the turntable will ignore this comment or blank, and counter will run at Feed Speed to believe seed, otherwise it will at specified numeric value to run turntable.

Figure 4.5

For example; look at the row 2 and 3 at the above figure 4.5. If the Feed Speed is set to 50 speed level, the counter will run at 50 speed level for row 1 and 2 seed sample. The counter will run at 60 speed level for row 3 seed sample, and at 50 speed level for row 4 seed sample.

Note that the Packet_ No must be equal or greater than 0. The No_ per_ packet must be greater than 0.

5. Independent Mode

If you want to integrate data from the counter to your database and you have a third party software such as *'Winwedge'*. Or you have developed your own software, which is capable of RS232 communication; you will need to connect to a PC or laptop to the counter.

If you have selected *'Independent mode'* the new menu will display on the panel as figure shown below:

```
What do you want to do?
1- Totalize count;
2- New program for batch count;
3- Run stored program;
4- Last program;
5- Other.
```

5.1 Totalizing
Press number 1 button to select *'totalize count'.* A new selection menu will appear on the display panel. See below:

```
Select Crop
     1.  Corn
     2.  Soybean
     3.  Canola
     4.  Wheat
     5.  Sunflower
     6.  More Crops
     7.  Add, edit or delete crop
```

Select a crop. If no crops appear on the menu, please see page Add crop to the counter. For example; if soybean is selected

```
Set Gate at 10
Set Sensitivity at 5
     1-  Ok
     2-  Edit gate or sensitivity setting
```

Since the *'sensitivity'* setting and gate setting have to be done manually the above number is only recommended for setting soybean if you press 1.

> Enter feed turntable speed
> 1-lowest   200-fastest
> 50

Number 50 is a default setting; you can enter a practicable number according to your situation.

5.2 Batch counting
In the *'batch mode'* the counter first creates a program to follow for each lot of seeds. At the end of the program, it automatically cleans itself out. A program may have all the envelopes with the same number of seeds. For example; you can program it to count 10 packets with 1,000 seeds each. After counting the 10 packets the machine will clean itself out for another seed lot. You can also program different sized samples from the same seed lot. For example; you can have 4 packets of 1,000 seeds each followed by 6 packets of 1,500 seeds. This will also be followed by a clean out. Follow the prompts on the screen to set up the programs.

Example   - Count 4 packages of seed from each seed lot, 500 seeds in each package.

Suppose you have a large number of different seed lines and wish to set up a yield trial. You will need to count out 4 packages of seeds from each line with each package containing 500 seeds.

Select 2-. The crop selection will appear on your screen. When you see the crop you are using select it. If not, you can pick a similar crop or follow the instructions for adding a new crop.

When you select a crop the machine prompts you with the gate and sensitivity settings stored for that crop. The sensitivity control is on the front of the machine. In the case of the gate, there are 2 separate controls on the feed unit that need adjustment. When the machine is adjusted, type 1- OK.

The next screen is:

> Are all packages having the same number of seeds?
> 1- Yes;
> 2- No.

Because all packages have 500 seeds, select option 1.

The other option allows you to create the program where the packages from the same seed lot have a variable number of seeds. For example; you might want to count 4 packages of 100 seeds and 2 packages of 150 seeds from each seed lot.

The next screen is:

> Enter number of packages from each seed lot.
> 4

Type 4, press enter

> Enter number of seeds in each package.
> 500

Type 500, press enter.

> Enter a feed turntable high speed:
>   1- Slowest   200-fastest
>   50

When batch counting, the machine uses two counting speeds. The high speed is used most of the time. When the count is nearing the limit and the valve is about to close, low speed is used to increase the accuracy of the cut-off point.

There are a number of factors to take into consideration in selecting the speed. Lower speeds give more accurate counts, but of course may take longer. Also, if the speed is too high, you may not be able to change the packet fast enough to keep the machine running all the time. It will stop and wait for a packet change but this result in an interrupted flow which may actually take longer than if you used a lower flow rate. Generally, it is best to enter a low flow rate to start with and increase it later if desired.

Recommend high speed setting see below, you can adjust it to fit your desired speed

> High Speed setting List
>
> 1.   Corn : 50
> 2.   Soybean: 30
> 3.   Canola: 5
> 4.   Wheat: 10

After enter high speed, the program will go to next screen

> Enter feed turntable lower speed.
> Press enter to accept default.
> 16

The machine defaults to a low speed 1/3 that of the high speed. Accept this default.

> Select a method for cleaning out machine between seed lots.
> 1- Minimal automatic
> 2- Thorough automatic
> 3- Manual

In most cases the minimal automatic option should be fine. If you are counting very small seeds and want to be as sure as possible that there is no carry-over, the other options can be considered. The thorough automatic option opens and closes the valve an extra time between lots running the feeder for a longer time. This could release any seeds stuck to the internal surface. The manual option gives you the opportunity to do the same thing several times by hand. Select option 1.

> Program ready to save
> 1- Save program now
> 2- Run program *(You can save it later)*
> 3- Adjust count on first seed lot

Because this is just an example, you do not need to save the program. Select option2. The *'adjust count'* option is for use if you have a set of seed lots with poor germination and wish to increase the counts on a particular seed lot by a certain percentage.

> | Count: 0 | | limit: 500 | | %ADJ |
> |---|---|---|---|---|
> | Package: | 1 | limit: 4 | | 0 |
> | 1- Faster | | | | |
> | 2- Slower | | | | |
> | 3- More options | | | | |

You are now ready to start counting. The screen shows the current count and the count limit for the current packet. The second line shows the packet count and its limit. Options 1 and 2 are a quick way to change feed speeds. Each change both high and low feed speeds by 10% at each press. Option 3 will halt the counter and allow you to make other changes. If you have a problem like a dropped envelope or two batches in the same envelope, use this option and follow the prompts.

Load your seeds into the hopper. Counting continues at high turntable speed until the limit is close. The turntable then slows. When the limit is reached the main valve closes, the turntable returns to high speed, and a *'sample ready'* message appears. Seeds for the second packet are now accumulating in the main valve.

At any time in the above sequence you can put a packet in place. The packet should push the slider up the discharge spout to the top of its travel. As soon as you hear the valve close and the *'sample ready'* appears, you can remove the packet. The main valve then re-opens and seeds accumulate in the end valve. This process continues until the last packet has been counted. The machine then automatically begins dumping out the leftover seeds into the main valve. Collect the seeds for the last packet. Then place a container to receive the leftover seeds and open the end valve again. If this does not happen quickly, the machine will halt dumping to avoid over-filling the main valve. Dumping continues until the machine has not observed any seed drop for 2 seconds. It then assumes that dumping is complete and automatically advances to the next stage.

```
Count:
Load seed lot to re-start program.
1- More cleaning.
2- Quit or change sittings.
3- Faster.
4- Slower.
5- Adjust count on next lot.
```

This screen gives you a chance to clean out the machine more thoroughly if you know or suspect that the automatic clean out was incomplete. You can change the feed speed or enter a compensation percentage to compensate for a bad seed lot (this will be in effect for one speed lot only. It defaults back to zero at the end.) If everything was satisfactory, simply load another seed lot into the hopper. When the machine counts 10% of its count limit, it assumes that the next seed lot has been loaded and begins repeating the counting program to count out 4 packets of the next lot.

When all seed lots have been counted, you can use option 2 of the above screen to quit counting. If the program was not saved or changed (e.g. you adjusted the feed speed) you will have another chance to save it.

5.2.1 Setting valve delay times
The machine is capable of closing the main valve faster than the seed get to it after passing the sensor. For this reason, there is a time delay in the operation of the valve to allow the last seed of a batch to reach it before it closes. In most cases the default delay should be adequate. However, different crops bounce differently, so the optimum time varies a bit from crop to crop. The machine can store a valve for each crop. If you wish optimum performance on your particular crop you may wish to set up the time delay using this procedure.

Set up a batch counting program to count just a packet of 10 seeds from a seed lot. Be sure that the sensitivity setting is correct. Run the program with a small amount of seeds in the hopper. The machine will count a lot of seeds and clean out. Count the number of seeds obtained by hand. Repeat this several times.

If the average count that you have is more than 10, the delay is too long. If it uses less than 10, the delay is too short. Adjust the delay (for example; by selecting *'quit of change setting'* followed by *'other'* and *'adjust valve delay for this crop'*). Repeat this process as necessary.

5.3 Setting valve delay times
The machine is capable of closing the main valve faster than the seed get to it after passing the sensor. For this reason, there is a time delay in the operation of the valve to allow the last seed of a batch to reach it before it closes. In most cases, the default delay should be adequate. However, different crops bounce differently, so the optimum time varies a bit from crop to crop. The machine can store a value of each crop. If you wish optimum performance on your particular crop, you may wish to set up the time delay using this procedure.

Set up a batch counting program to count just a packet of 10 seeds from a seed lot. Be sure that the sensitivity setting is correct. Run the program with a small amount of seed in the hopper. The machine will count a lot of seeds and clean out. Count the number of seeds obtained by hand. Repeat this several times.

If the average count that you obtain is more than 10, the delay is too long. If it is less than 10, the delay is too short.

5.4 Adjust the delay time.

```
 What do you want to do?
1-Totalize count;
2-New program for batch count;
3-Run stored program;
4-Last program;
5-Other.
```

Select number 5 to adjust the delay time. After pressing 5, the program will go to the next screen

```
1-edit crop list
2-edit program list
3-Clean out
4-Startup Screen
5-Halt program
```

Select option 1, the program will go to next screen

```
1. Add a Crop
2. Delete a Crop
3. Edit Value Delay, Gate or Sensitivity setting
4. Done editing
```

Select option 3, then select crop name which you want change delay time on the next appear screen, the program will go to the delay time setting screen

```
Enter Valve delay. 250
(Press enter to accept the default, which should be adequate in most case,
or see manual, current value:250)
```

Enter desired value of the delay time.

5.5 Add crop into the counter
If no crop name appear on the menu or you want to add a new crop in the counter you have to select item *'5-Other'.*

```
What do you want to do?
    1- Totalize count
    2- New program for batch count
    3- Run stored program
    4- Last program
    5- Other
```

If item 5-Other has been selected

```
1- edit crop list
2- edit program list
3- Clean out
4- Startup Screen
5- Halt program
```

Select item1-edit crop list. Enter new crop name and parameters that is associated with the crop.

```
1. Add a Crop
2. Delete a Crop
3. Edit Value Delay, Gate or Sensitivity setting
4. Done editing
```

After that, you can enter new crop name and parameters which associated with the crop

5.6 Collect data by pressing button 6 or 7

Press button 7 for *'totalizes count mode'* or press button 6 for *'batch count mode'* on the control unit to send out a sequence of data to your PC. The data format sees the file of ESC2 data format.

5.7 Collect data by send a query from your own software

In this case, you need to send out "CQY" to get data and send out "CLR" to clear data. the detail information see next chapter

6. Collect data from ESC2

The document is intended to provide customers who have a third party software (is capable of collecting data from the serial port device) and is able to collect the data from the seed counter in his/her own application. The data format is only applied on the '*Independent Mode*'.

6.1   Output data sequences

6.1.1 Format of the output data

Output data consists of a specific code and desired data. The specific codes include   '*End Code*' and '*Delimiter Code*'. The End Code consists of two ASCII codes: '*Line Feed*' and '*Carriage Return*'. The Delimiter Code is '*Character Comma*'. The desired data has some count number and setting number. These numbers are called '*data fields*' in the output data.

6.1.2 Totalize mode

The output data in the totalize mode consists of the packet number '*Delimiter Code*' the count number and '*End Code*'. The packet number is designated to zero in the output data.

The following is the sequence of the output data:
- Packet Number
- Delimiter Code
- Count Number
- Line Feed
- Carriage Return

Example1: *(there is no space between specific code and the data)*
        Hex code mode:

Delimiter Code   End Code

30 2C 32 30 0A 0D

Packet Number (0)   Count Number (20)
Character code mode:
0, 20
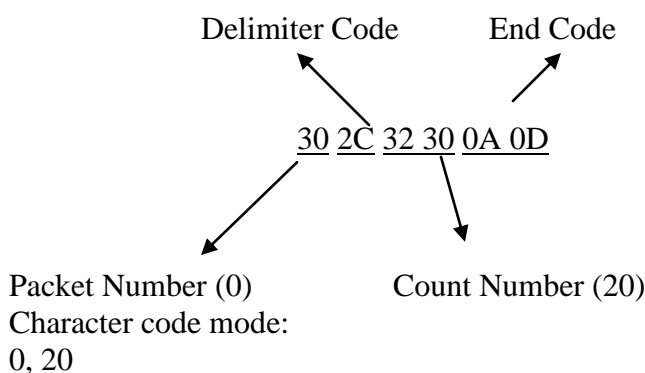
Explanation for example 1: this is a totalizing mode since Packet Number is 0, Count Number is 20. The sign "," is delimiter. The Line Feed and Carriage Return codes are invisible in character code mode. The number of the data field is 2.
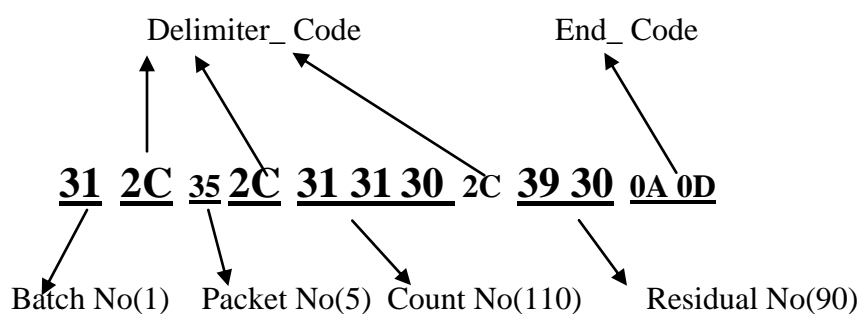
6.1.3 Batch Mode
The output data in the batch mode consist of Batch Number, Delimiter Code, Packet Number, Count Number, Residual Number, and End Code. The number of data field in output data varies depending on the batch number.

The following is the sequence of the output data at varied batch count mode. Batch Number, Delimiter Code, Packet Number, Delimiter Code, Count Number, Delimiter Code, Residual_ Number, Line Feed, Carriage Return

Example 2:
    Hex code mode:

Delimiter_ Code   End_ Code

31 2C 35 **2C 31 31 30** 2C **39 30** 0A 0D

Batch No(1)   Packet No(5) Count No(110)   Residual No(90)

    Character mode:
        1,5,110,90

Explanation for example 2:
1 batch, 5 packets, 110 seeds/packet, residual number is 90.

Example 2 indicates the number of data field. The output data is 4.
The following is the data sequence of output data in 3 batches.

Example 3:
Hex code mode:

Delimiter_ Code   Packet No(9)   Count No(66)   End_ Code

33 2C **32** 2C **35 30** 2C **38** 2C **33 39** 2C **39** 2C **36 36** 2C **35 35** 0A 0D

Batch No(3) Packet No(2) Count No(50)   Packet No(8) Count No(39)

                                        Residual No (55)
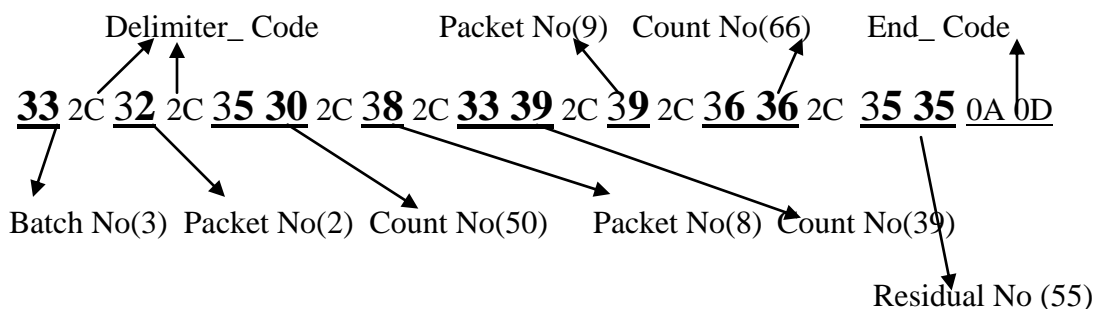
Character code mode:
3, 2, 50, 8, 39, 9, 66, 55
Explanation for example 3:

3 Batch count:
- First batch is 2 packets and 50 seed/packet
- Second batch is 8 packets and 39 seed/packet
- Last batch is 9 packets and 66 seeds/packet

The residual number is 55. If the batch number increases to 1 the number of data field in the output data will increase to 2. The number of the data fields in the example3 is 8

6.1.4 Specific codes (ASCII code)

End Code: ASCII Decimal 10 (Line Feed), 12(Carriage Return)
            ASCII Hex 0A(Line Feed), 0D(Carriage Return)

Delimiter Code: ASCII decimal 44 (,)
            ASCII Hex 2C (,)

6.2 Communication setup

Set-up COM port
- Baud rate: 9600.
- Odd parity
- Parity on
- 1 stop bit
- 7 data bits
- None flow control
- Set default mode for the size of input buffer or output buffer

6.3 Collect data from ESC2 *(without a query)*

If a laptop or mobile device is connected to ESC2 counter and a third party software is properly setup, you can send data out from the counter by just pressing *'button 7'* in the counter's control box in totalize mode and by pressing *'button 6'* in batch count mode.

6.4 Collect data from ESC2 *(with a query)*

In this case the assumption is that you have your own software or a third party software that can send a query to the counter.

The only thing that you need to do is to send *'CQY'* to *'ESC2'* then you can get data required from ESC2. If you want to clear the count number that appeared on the Control Box display panel, you can send it to *'CLR'* to clear it. See example below:
- Data format: CQY
- Clear Data: CLR

6.5 Configure WinWedge (without sending out a query)

Step 1: Start and End of Record Events

Press the button on the control box to send out data from the counter to your software.
The configuration steps are shown below to run WinWedge:

    a. Click new item from File menu
    b. Click Send Keystrokes to… from Mode menu
    c. Enter Excel in the field of Application title bar text
    d. Click Brower button to find where Excel is located
    e. Click OK button
    f. Click Setting… from Port menu

<div align="center">Set-up as follow:</div>

    - COM port 1 or 2 depend which port you use
    - Baud rate: 9600.
    - Odd parity
    - Parity on
    - 1 stop bit
    - 7 data bits Step
    - Flow Control: None

    g. Click Input Data Record Structure… from Define menu.
        - Select any character received item from the frame of the *'Start Record Event'*.
    h. Click Input Data Record Structure… from Define menu.

    - Select Any Character Received
    - Select Special Char Received
    - move cursor to the blank textbox at right of Special Char Received … then click the left button of mouse, the inactive ASCI Char… button will become to active as shown at above figure

Step 2: Click ASCII Char… button
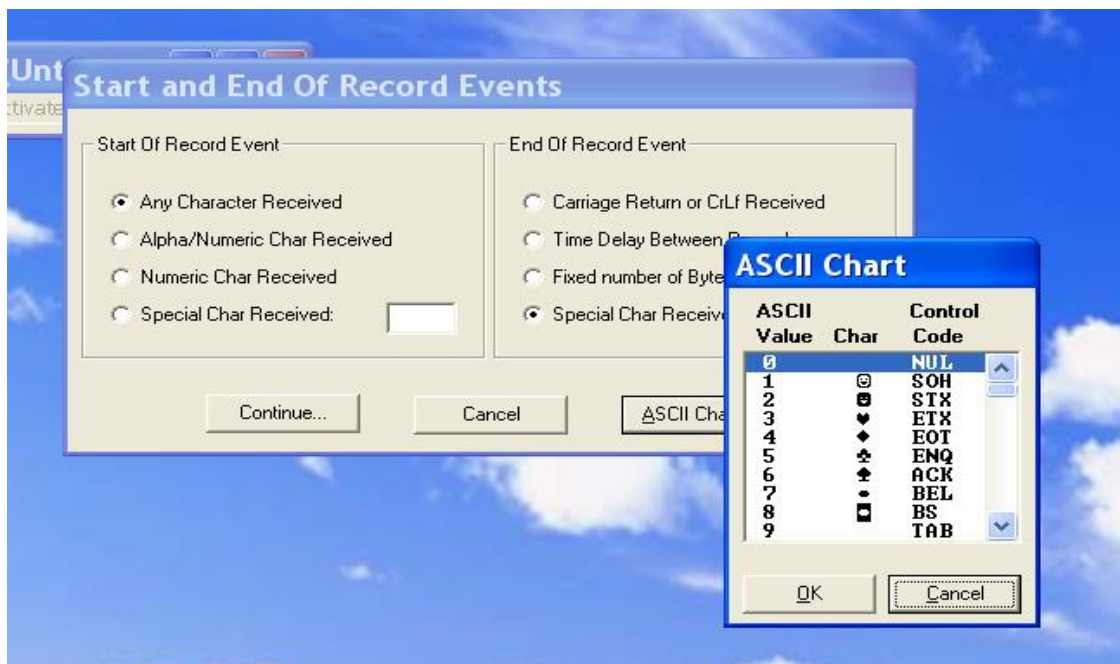
- select ASCII value 0, and then click OK

Click on the *'Continue'* button

- Select each data record contains multiple delimited data field item then Click Continue button on the bottom from the frame of Input Record Structure.
- Select 44 then enter 3 in Maximum number of data filed for Totalize mode; entry 4 in Maximum number of data field for batch count mode as the batch number is 1. The number entered in Maximum number of data field depends on how many batches you are going to count.
- Then click continue button on the frame of the Delimiter Record
- Focus on Field post amble key strike then click Keystroke list button on the frame of Input record definition record.
- Select TAB, click Next button until all maximum number is finished
- Then click OK button

j. Click Save item from File menu to save your configuration.

k. Click Normal mode from Active menu and then minimize the Win Wedge.

l. After the above set up, you can press Key button 7 in totalize mode or press 6 in batch mode from the control mode to retrieve data from the counter.
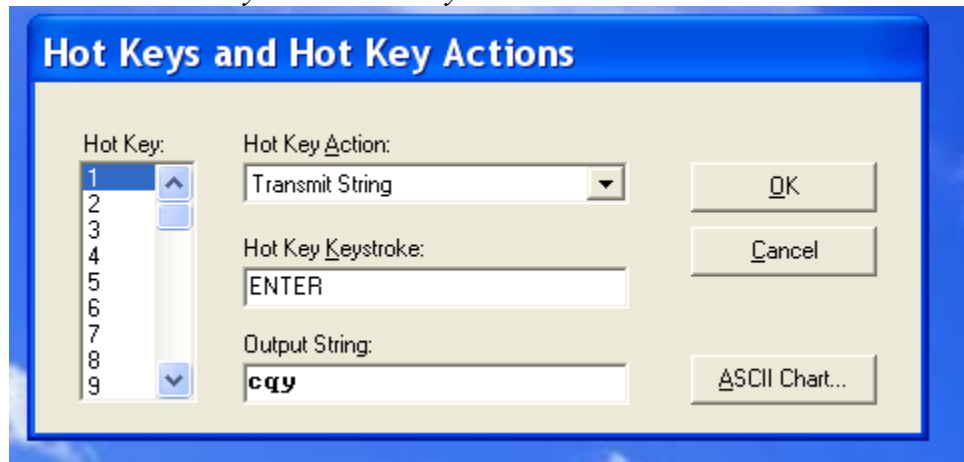
6.6 Configure WinWedge *(sending a query)*

Press any key you have found in your keyboard to retrieve data from the counter. The configuration step is shown below:

The configuration steps from *'a'* to *'i'* is the same as above.

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- Select *'Hot Keys'* and *'Hot Key Action'* from the Define menu

1. Select "Transmit String" from "Hot Key Action" textbox,
2. Move the cursor into "Hot Key Keystroke" textbox and click. ASCII Char.. button on right bottom corner of dialog frame will change to KeyStroke List
3. Move cursor to "KeyStroke List" on right bottom corner of dialog frame. Click then select a key which you want to press on your computer to retrieve a data from the counter. Here is 'ENTER' for illustrating purpose.
4. Move the cursor to Output String textbox, enter character string 'cqy'.
5. Click Ok.

j. Click Save item from File menu to save your configuration.

 l. Click Normal mode from Active menu and then minimize the WinWedge.
 m. After above set up, you can press ENTER key in your keyboard to retrieve data.

7. <u>Maintenance</u>

Maintenance of the counter includes:
- clean detecting unit
- clean the main valve
- clean feeder

7.1 Clean detecting unit
The seed counter should be periodically cleaned to ensure the precision and accuracy of the counter. The chemical powder or dust accumulated on the *'windows'* through where the sensor sees will affect the accuracy and precision of the counter.   It is imperative to clean the chemical powder rested on the inside of the detecting unit and containers to prevent the untreated seed from contamination.

## *7.1.1 Clean the dust throughout each channel*
- Use an air gun to blow each channel while simultaneously opening the end valve so that the dust, beeswing, powder or any trash can be blown out.
- After cleaning, drop a seed into each channel for testing. The control box should respond to each channel accordingly.

If you are still not satisfied with the accuracy or you are going to count untreated seed after counting the treated seed, you need to first clean the chemical powder out from the detecting unit.

7.1.2   Clean acrylic window tubes
- Unplug or disconnect the seed counter from power source.
- Unplug the number 2, 3, 4 and 5 cables at the back of the base unit.
- Remove the feeder unit from the top and place it at a secure table top.
- Remove 4 screws which anchored the distributor and pull out the seed distributor from the detector unit.
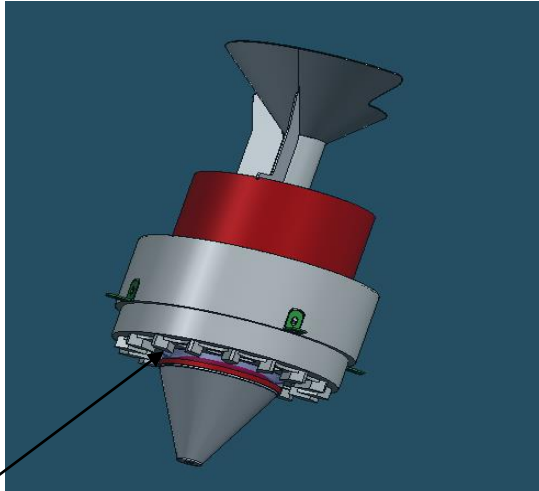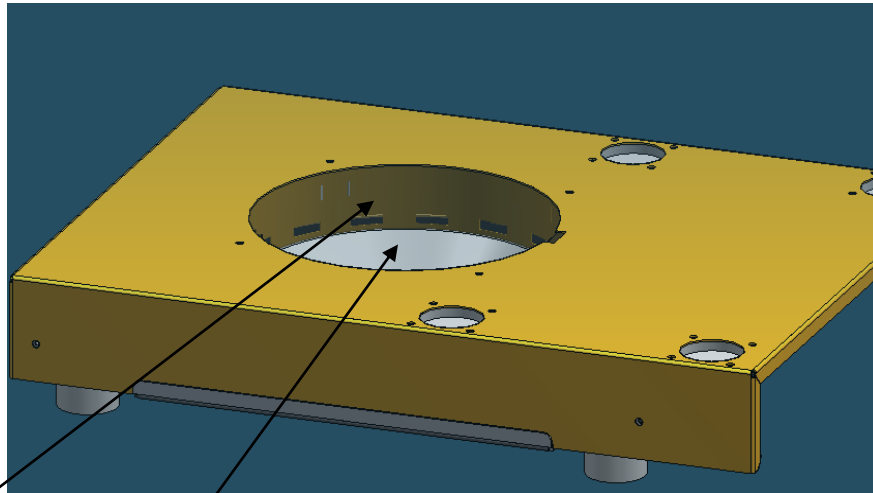
Seed distributor   detecting unit
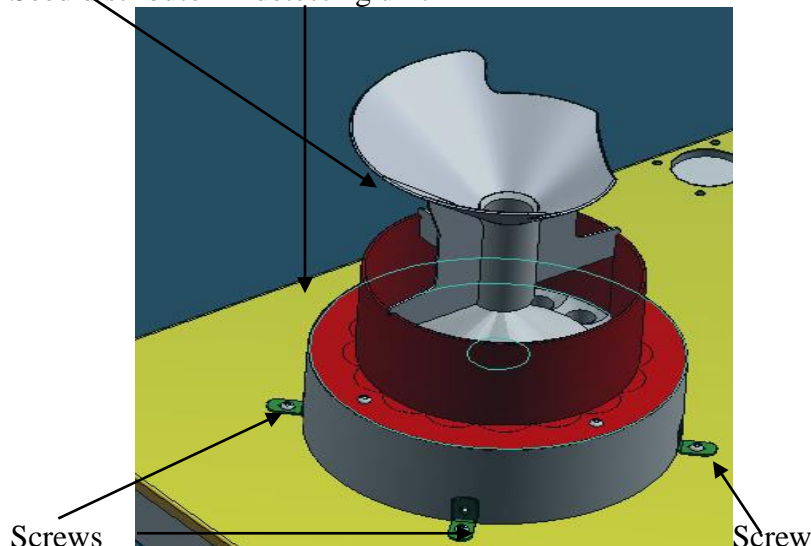
Screws

Screw

- Use a soft paper towel or rag to clean the exterior surface of small size acrylic window tube as shown below:
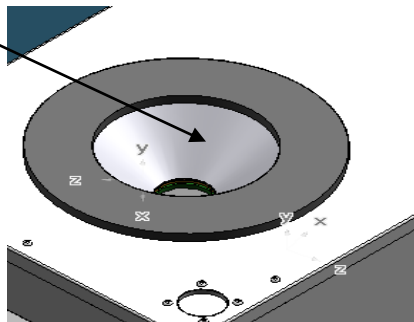
Small size acrylic tube

- Use a soft paper towel or rag to clean the inside surface of the large size acrylic window tube unit as shown below:

Larger size acrylic tube unit

- Clean valve funnel

7.1.3   *After cleaning*

If the count is still not accurate, the sensors may have a problem and the counter should be sent back to Agriculex Inc. for maintenance

7.2   *Clean the valve plate*

- When the main valve cannot be properly opened or closed you will need to clean the valve plate. See procedure below to clean the main valve plate:
- Remove the feeder unit from the top counter and place it at a secure table top;
- Remove the detector unit from the base top and place it in a secure position.
- Remove 6 screws, spout and open the cover as shown below :

Screw1   cover   screw2   screw3

Spout   screw6   screw5   screw4
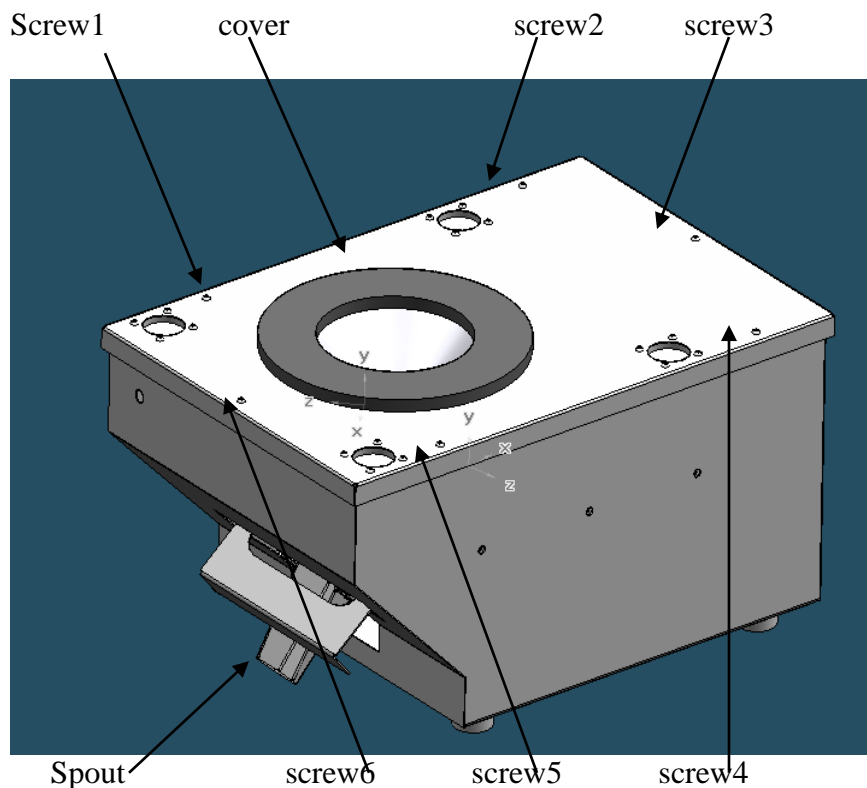
- After opening the cover use an air gun with dry compressed air to blow the main valve and the crossing way of the main valve.   Sometime you may need to use a *'WD-40'* to clean some accumulated dust.
- Use your finger to open and close the valve.
- If you feel that the action of the valve close and open is free running, you can connect the control box to the base unit and turn on the power to test it.
- Clean the rest of the machine.
- Do not allow excessive amounts of spilled seed or dust collect anywhere in the unit.
- You can use a dry compressed air in *'hard-to-reach spots'*.
- Do not use amounts of liquid that could drip inside, and do not use flammable solvents.

7.3 *The valve can not open or close*

If the precede cleaning procedure action of the valve's open or close still has problem, you will need to clean the dust on the crossing way of the valve.

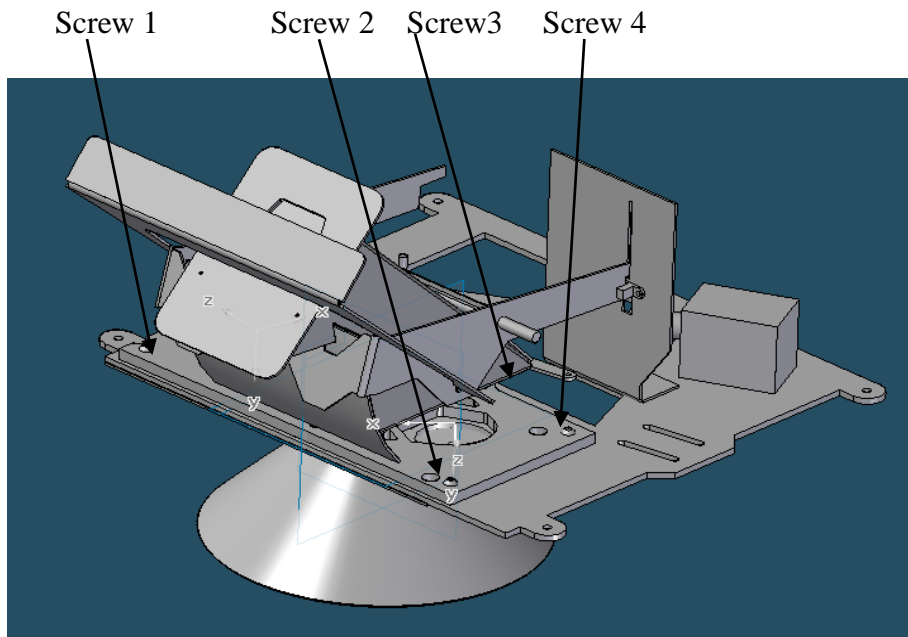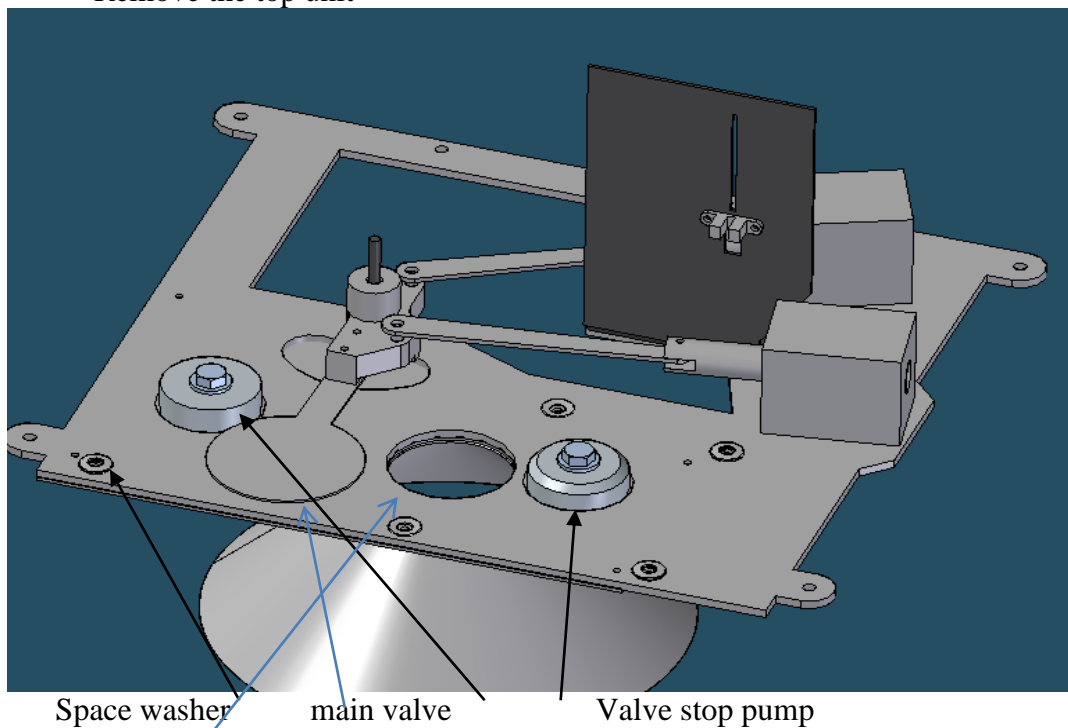- Unplug the sensor and valve terminals.
- Remove four screws

Screw1   screw2

Screw 4   screw 4   sensor terminal

Valve terminal
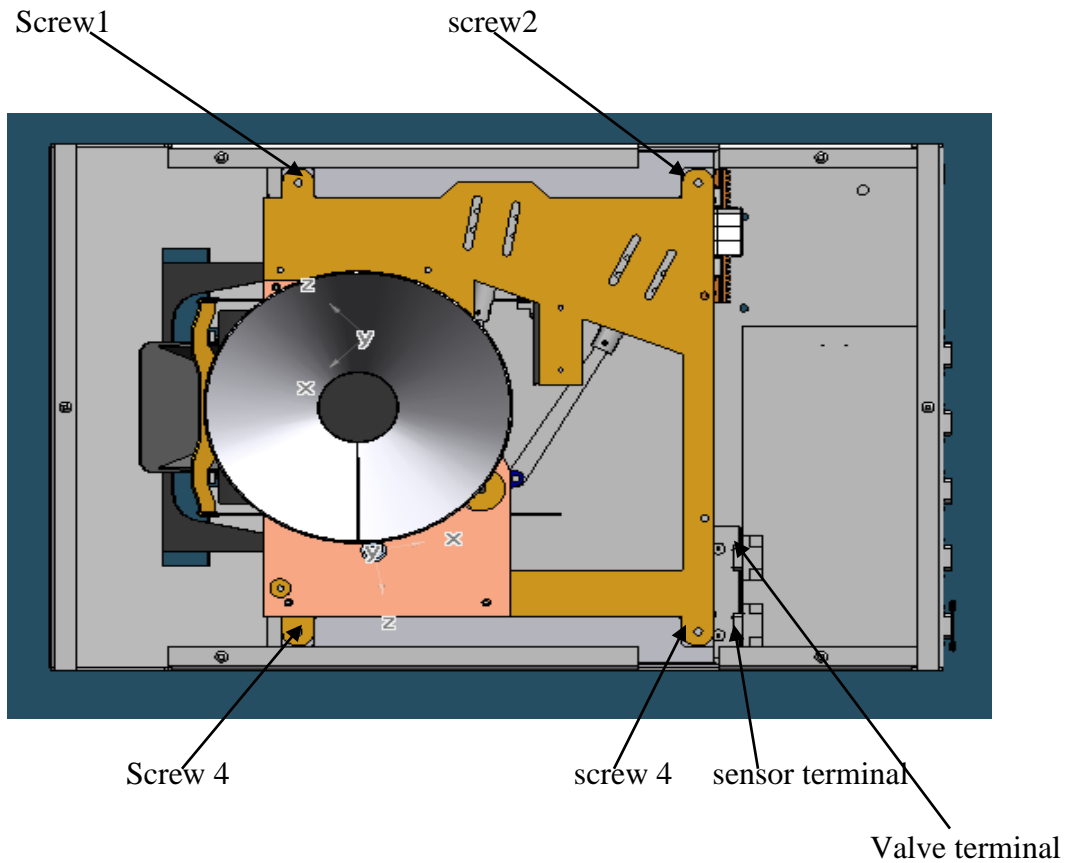
- Take Base Integration from the base unit and place it as shown below:
  - o Remove the 4 screws

Screw 1   Screw 2   Screw3   Screw 4

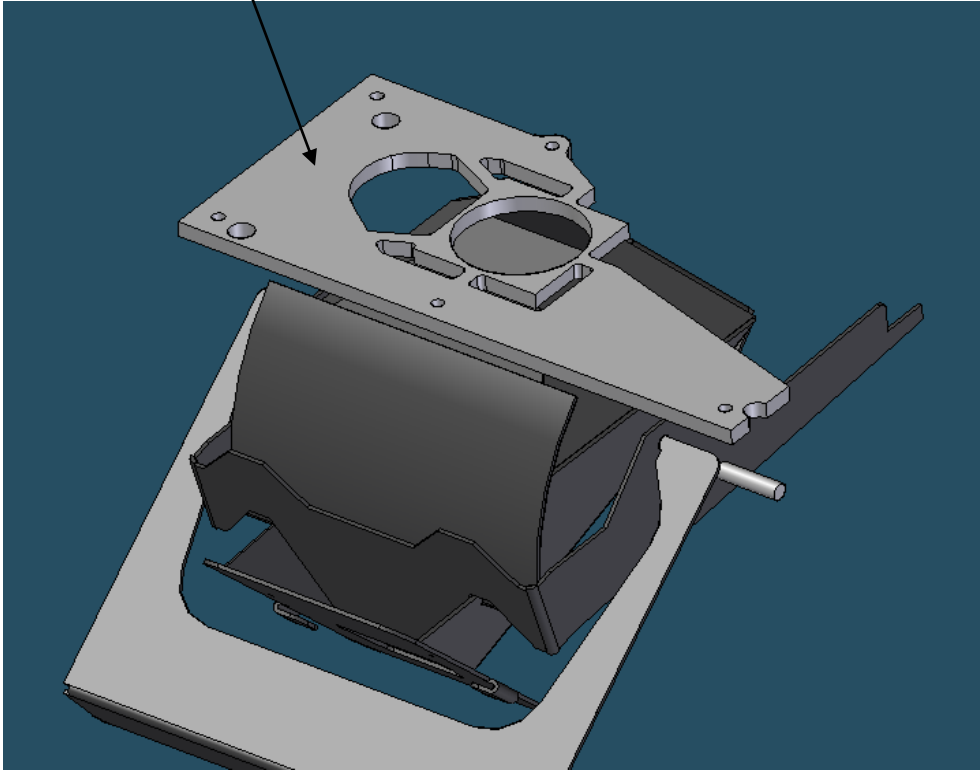- Remove the top unit

Space washer   main valve   Valve stop pump
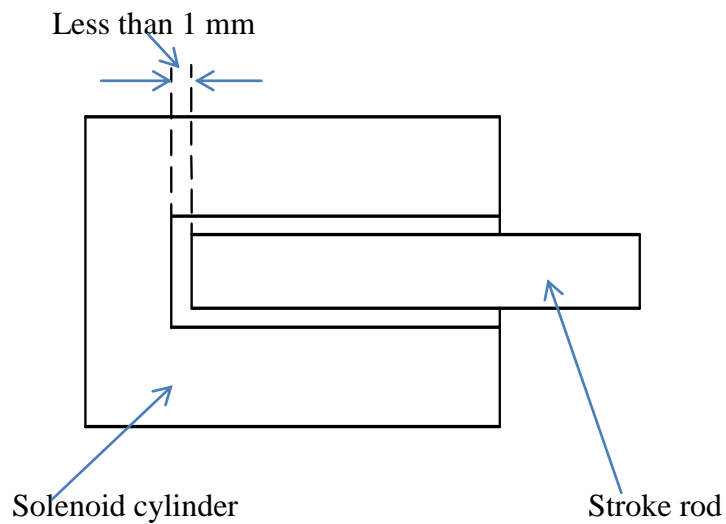
Clean the surface.
Do not lose these washers.
Check bumper condition

Clean the surface

- After cleaning re-assemble the unit.

7.4 Sometimes you may need to reset the position between the stroke rod and the solenoid cylinder body.

Less than 1 mm

Solenoid cylinder   Stroke rod

8 Setup Recommendations

ESC-2 Programmable Electronic Seed Counter for counting Soybean:
1. Vertical gate set at # 8 to 10
2. Horizontal gate set at # 12
3. Sensitivity set at #5 to 6
4. Feed turntable speed at 35 to 45
5. Batch counting, the feed turntable high speed and low speed use default values

ESC-2 Programmable Electronic Seed Counter for counting Corn:
1. Vertical gate set at # 10 to15
2. Horizontal gate set at # 15
3. Sensitivity set at # 6 to7
4. Feed turntable speed at 40 to 55
5. Batch counting, the feed turntable high speed and low speed use default values

ESC-2 Programmable Electronic Seed Counter for counting Canola:
1. Vertical gate set at # 0 to1
2. Horizontal gate set at # 1 to 2
3. Sensitivity set at # approximate 1.5
4. Feed turntable speed at 10 to 20
5. Batch counting, the feed turntable high speed and low speed use default values