Cleveland Equipment

CE-ME-109 SERIES
Linear Weigh Filler

OPERATIONAL MANUAL

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Using This Manual

Although this manual seems long and complex your scale is simple to use; see the **Quick Run Guide** on page 3. The instructions on that page illustrate the simplicity of running your scale after initial set-up. This manual allows you to familiarize yourself with all aspects of your new machine prior to first use.

This User Manual is intended as a resource and guide. You may find that some illustrations, diagrams and/or descriptions vary from the equipment with which you have been supplied. The concepts and operating systems discussed are universal with differences being primarily configurational. The information in this manual can be applied to any machine in the **109 Series** including those with more than one lane and/or equipped with a touchscreen.

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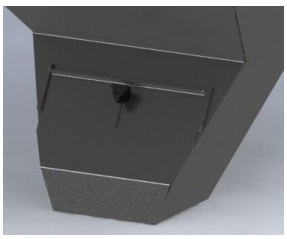
Getting Started, easy as 1, 2, 3, 4 !

1

Set Hopper Gate



2

Recall Program

3

Empty Bucket

4

Run

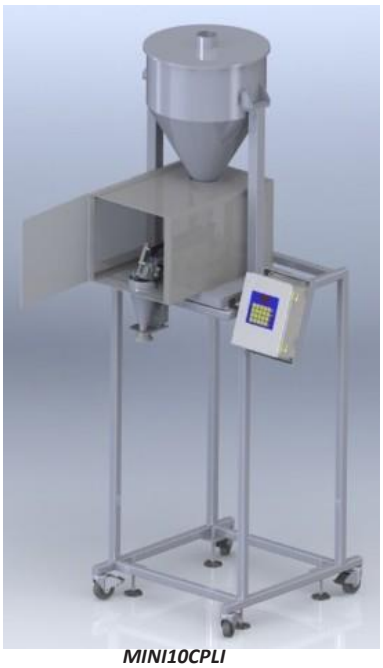
1.1 General System Info

109 Series machines are linear style, net-weigh scales designed to automatically weigh dry, free flowing particulates into bags, jars or similar containers supplied either manually or automatically.

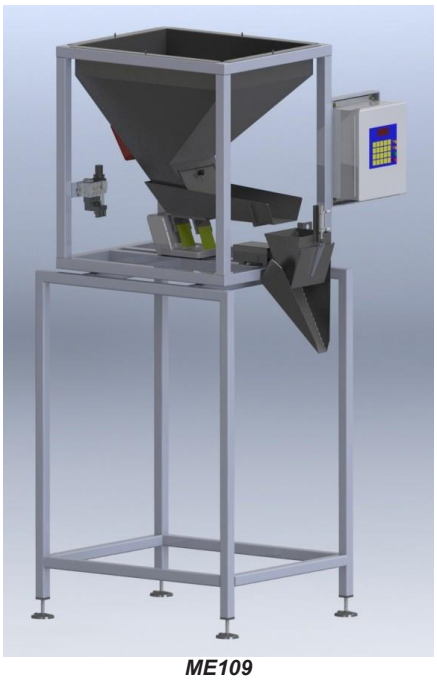
The **109 series** is comprised of five basic models, each appropriate for a specific weight range and accuracy parameters.

109 Series Models	
Model	*Standard Weight Ranges*
MICRO10	25 g - 500 g @ 1/100 g
MINI109	1 oz. to 18 oz. @ 1/10 g
ME109	1 oz. to 5 lbs. @ 1/100 oz.
MAX109	10 lbs. to 25 lbs. @ 1 g
MAX109CL	≥ 25 lbs. @ 1/100 lbs.

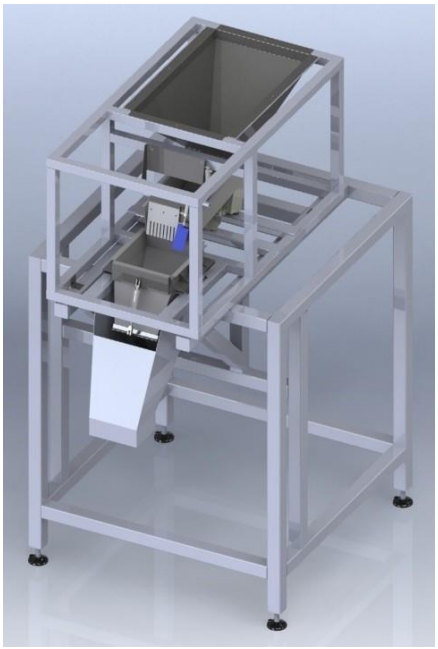
This manual primarily references the **ME109**, although you may have a different model the principles described still apply.



MINI10CPLI



ME109



MAX109CL

The **109 Series** is modularly designed for convenient upgrades and future expansion with "Quick Disconnect" bucket and funnel mounting systems engineered for maximum system utility.

The most important element of every automated packaging system are the controls. The **109 Series** utilizes sophisticated, proprietary controls, custom built in every system shipped. The hard work is being done by the system's microprocessor, as such we can offer economical replacement parts such as load cells. It is, in short, a computer with robotic capabilities.

The **109 Series** is user friendly, designed for decades of use and built to withstand the most demanding environments. All elements are thoughtfully incorporated to compliment every budget and application.

1.2 Utility Requirements

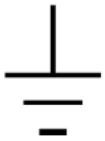
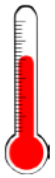
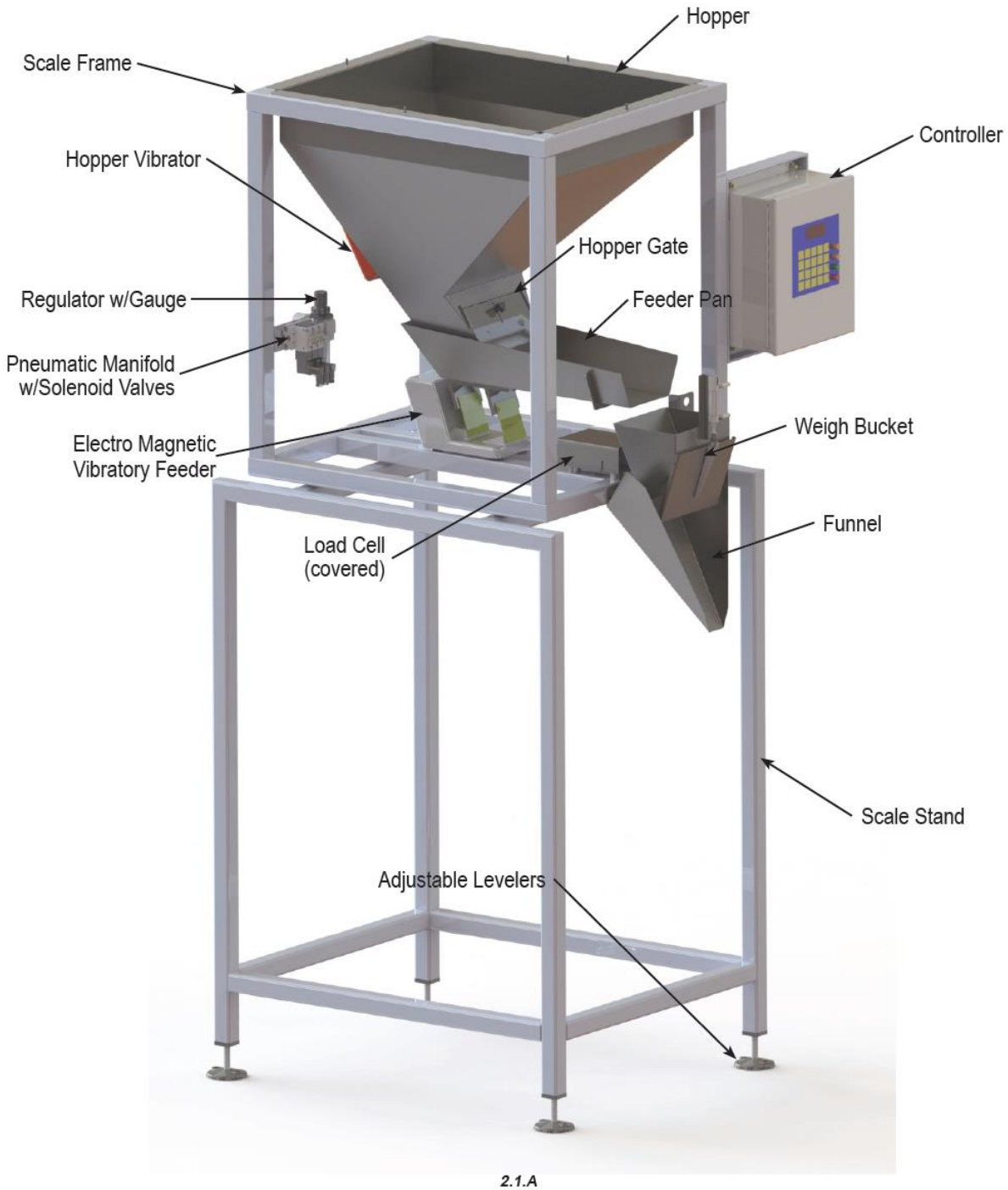
Utilities & Operating Ranges			
Always follow standard safety procedure or any industry regulations with which you must comply as jurisdictionally required.			
	**Power**	115 V AC 60 Hz @ 3 Amps Max 5 Amps	Ensure the grounded circuit supplying power is isolated and dedicated. We recommend you verify the quality of your facility's power supply by checking it with a voltmeter prior to plugging in your ME109 for the first time in order to avoid damage to the electronics.
	**Ground**	Third Wire	Make sure to ground your scale and all other conductive surface on or adjacent to the scale appropriately. Most dry products generate large amounts of static; if this cannot be dissipated it may interfere with your controls and/or do serious damage to the electronics.
	**Temperature**	32° F - 100° F 0° C - 40° C	Maintaining a moderate ambient temperature without extreme or drastic changes will ensure regular and consistent performance. Operating the equipment at high temperatures will put increased stress on the electronic components and may lead to overheating that could result in automatic, periodic shut downs or irreversible system melt down.
	**Relative Humidity**	≤ 50%	Every measure should be taken to prevent moisture from invading the electronic circuitry. Avoid exposure to atmospheric moisture and condensation. ⚠ *Avoid environments with heavy condensation or high dew points.*
	**Air**	1/2" Drop @ 60 PSI 1-2 CFM 1/4" NPT Female Scale Input	You will need to supply all pneumatic adapters and connectors compatible with your facility's pneumatic supply. Maintaining a clean air supply free of water and debris will extend the life of your ME109's pneumatics. ⚠ *You should refer to the manual supplied with your Air Compressor and follow all manufactuerer 's instructions.*

Table I

2.1 ME109 Scale Assembly

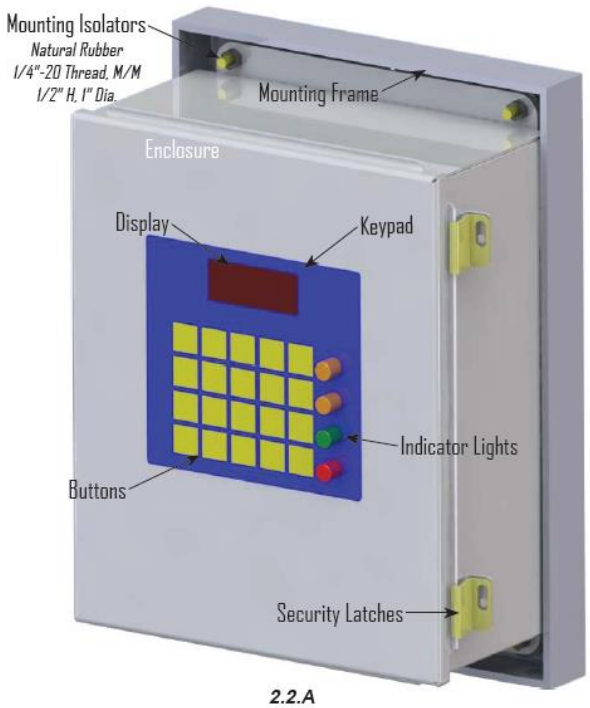
This section illustrates all major components and common configurations. Please refer to this section and relevant com- ponent names when discussing your system with technicians to avoid confusion.



2.1.A

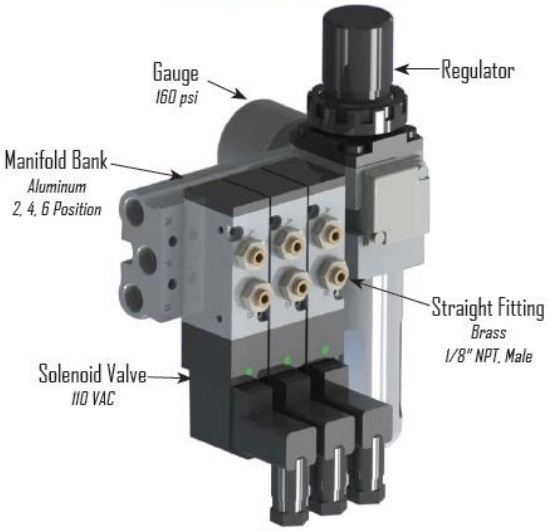
2.2 Sub-Assemblies

Standard Controller



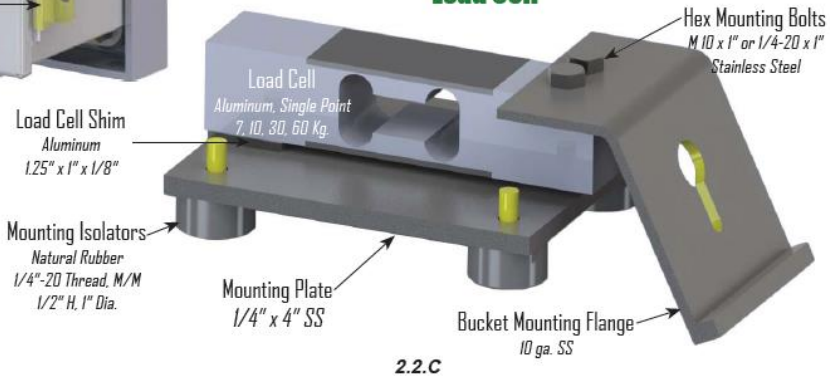
2.2.A

Pneumatic Manifold



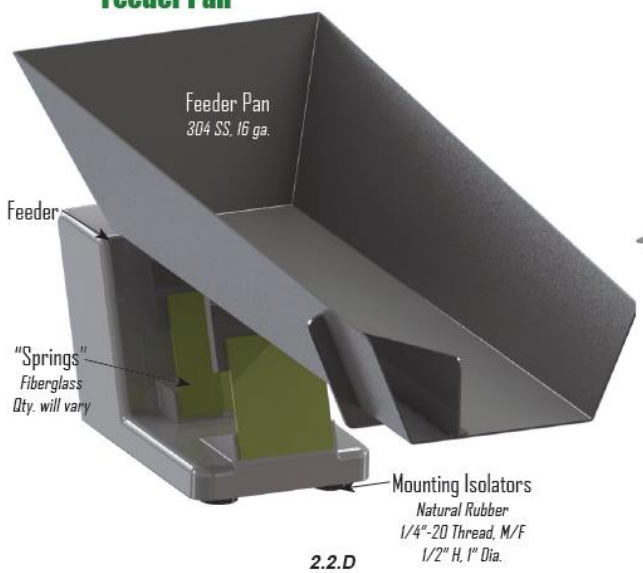
2.2.B

Load Cell



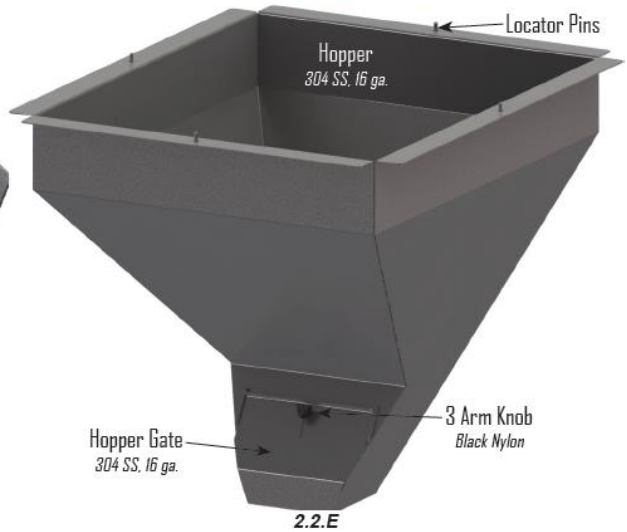
2.2.C

Feeder Pan



2.2.D

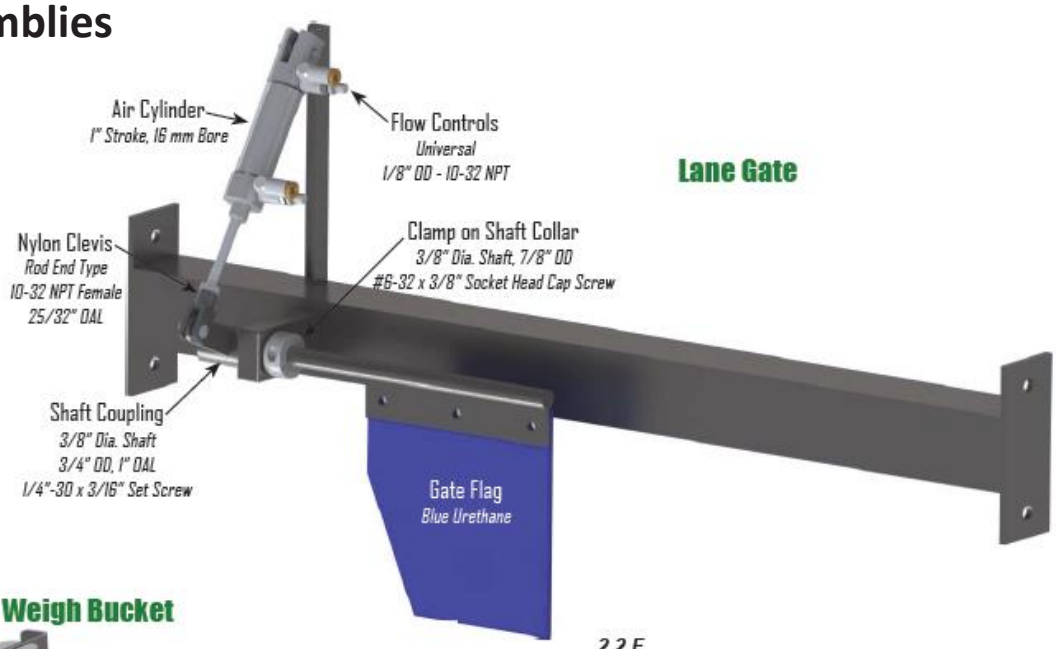
Hopper



2.2.E

2.2 Sub-Assemblies

Lane Gate



2.2.F

Weigh Bucket

2.2.G

Stand Up Pouch Former

2.2.J

Side Gusset Former

2.2.I

Open Utility Funnel

2.2.H

3.1 Location

The more controlled the environment is at your intended location the better your equipment will perform and the easier it will be for you to work in.

You should scout out an appropriate location for your system. While we can't tell you how to organize your facility or where to place your system there are several factors you should consider when evaluating potential locations.

Your location should meet the following criteria		
Power	Your location should be supplied with the appropriate power for your equipment, see *Sec. # 1.3*. For best results plug directly into a grounded, isolated, and dedicated circuit. A proper third wire ground is essential. Most dry products generate large amounts of static. If this cannot be dissipated it may interfere with your controls and/or do serious damage to the electronics. We recommend you check your power output with a voltmeter.	
	Tip	If a dedicated circuit is not available you may want to consider a 500-600 watt Ferro Resonant Line Conditioner
Air	Ensure your location is equipped with compressed air, see *Sec. # 1.3*. The actual air volume (cfm) required to operate a semi-automated **ME109** series system is negligible. Almost any size compressor will be sufficient. The "size" of the compressor is capacitive: *how much air can be stored in the tank*.	
	Note	Horsepower, CFM and other ratings are unimportant for semi-automated systems. For such systems we recom- mend making your selection based on how large the storage tank is (at least 5 gallons) to avoid
Floor	Choose a location where the floor is relatively flat and stable. Your stand, if you have purchased one, will come with levelers to correct for minor level issues. Casters are optional but lack leveling capabilities and provide less	

Things to Consider		
Space	Your location should have enough space to accommodate the system and adequate space for the operator to comfortably work. Check that there is sufficient clearance from scale input to ceiling in order to load the Hopper. Consider the means by which you intend to load bulk product. Is there enough clearance?	
Supply	Consider the proximity of your packaging area to your bulk product supply as well as the logistics of supplying product day to day. You now have the ability to process a great deal more product an hour than you had been prior to introducing automation. In many cases 8-15 times more per minute. You will therefore need a requisite amount of bulk product. Depending on your hopper capacity and the weights you are running you could be filling your hopper	
	Tip	Various elevator systems or hopper extensions are available as options. If you are interested in automating your means of supply contact your Actionpac Sales Associate.
	Note	The standard **ME109** has a hopper capacity of 2.4 cu. ft.
Internet	For touchscreen equipped systems take advantage of our remote assistance capabilities by supplying a broadband internet connection. An ethernet cable can be inserted directly into the ethernet port inside the controller on the rear of the door mount- ed touchscreen.	
	Tip	If your facility has a wireless internet connection there is an USB port located at the front of the screen where you can insert your own wireless internet device.

Things to Avoid		
Fans	Avoid areas prone to disturbed or rotating air such as in front of open doors. Point any wind generating equipment, like a fan, AWAY from the scale as this disturbs the weighing process.	
Inductive Loads	All heat generating or inductive equipment should be powered separately from the scale circuit this includes: Heaters, Sealers, Microwaves, Refrigerators, etc. Isolating your scale's circuit will minimize inductive loads and will protect system electronics from damage as well as ensure optimal performance and functionality.	
	Tip	Isolating your scale's circuit, maintaining appropriate power and supplying clean power will help minimize the rate at which electronic components such as boards and load cells will need
Vibration	Avoid areas prone to vibration and other such environmental disturbances.	

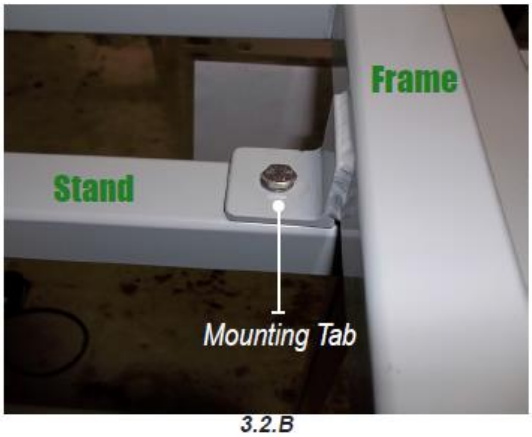
3.2 Set-up & Assembly

Assembly Tools & Materials			
Hand Tools *(e.g. screw drivers, wrenches)*	Electric Drill & Drill Bits	Spirit Level	Voltmeter

Tip	We recommend you gather the necessary tools before begining.	
	Recruit some help, it will make the process easier, not to mention faster.	

Assembly Procedure			
1	Remove all exterior crating materials, mind construction hardware such as staples, nails, etc.	⚠	*Reserve materials for future transit.*
2	Remove Controller strapping with a knife or similar tool.		
	Place Controller aside, leaving it wrapped for later assembly.	⚠	*Remember that the controller is leashed to Frame.*
3	Remove the screws securing the Stand and Frame to bottom pallet skid with an electric drill.		
	Lift the Stand up and over the Frame.		
4	Place the Stand in your designated location, adjust leveling feet as needed for stability.		
5	Un-pack the contents of the Hopper, used to hold all non-secured components including: contact surfaces, hardware, miscellaneous fittings in small pouches/bags, controller frame, etc.		
	The Magnetic Vibratory Feeder Assembly is secured in a separate box, elsewhere on the the pallet, up-pack that as well.		
6	Mount the Controller Frame to the Scale Frame with the supplied hardware, *Fig. # 3.2.A*.		
7	Place the Scale Frame onto the Stand, align the Frame mounting tabs with the corresponding through holes on the Stand, *Fig. # 3.2.B*.		
	Tip	Have one person hold the controller while one or more individuals lift the Frame in place.	
⚠	*Do NOT attempt to lift the Frame by any of the Sub-Assemblies such as the Pneumatic Manifold, Hopper or Load Cell Assembly.*		
8	Secure the Scale Frame to the Stand using the supplied hardware, 1/4-20 Bolts, Lock & Flat Washers, *Fig # 3.2.C*.		

3.2.A



3.2.B

3.2.C

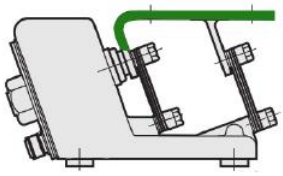
3.2 Set-up & Assembly

3.2.D

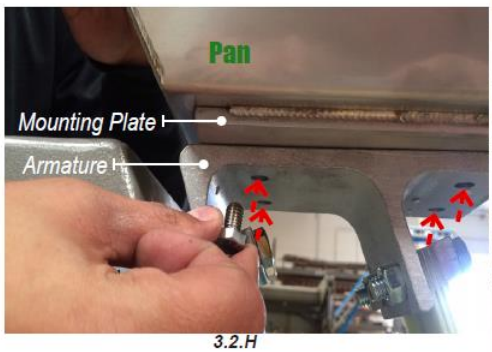
3.2.E

3.2.F

Assembly Procedure		
9	Un-wrap the Controller and mount into Controller Frame using supplied hardware: 1/4-20 Hex Nuts, Lock Washers, Flat Washers and Male/Male Rubber Mounting Isolators, *Fig. # 3.2.D.*	
	Secure at the front and back, *Figs. # 3.2. E & 3.2.F.*	
10	Attach Feeder Pan to the Feeder's Armature, detailed in green *Fig. # 3.2.G.*	
	Align the threaded mounting plate holes on the bottom of the Pan with the Armature through holes and fasten with supplied hardware, ½" Hex Bolts, *Fig. # 3.2.H.*	
11	Place Feeder Assembly into Locator Brackets on Scale Frame, *Fig. # 3.2.I.*	
	You will need to lift up the Hopper slightly to allow enough clearance for the Pan, once properly placed gently let the Hopper back down.	
	Note	Feeder Pan sides should overlap bottom of Hopper, *Fig. # 3.2.J.*
		Due to the nature of magnetic vibratory harmonics feeder units are not bolted to a frame but "located" with brackets to allow freedom of movement.
12	Connect Ground Straps see *Fig. # 3.2.K.*	
13	Plug in Feeder with 3 Pin Connector, *Fig. # 3.2.L.*	



3.2.G



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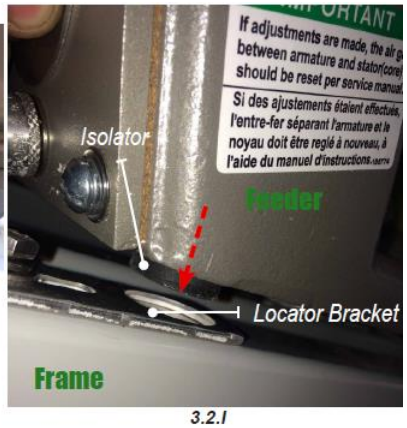
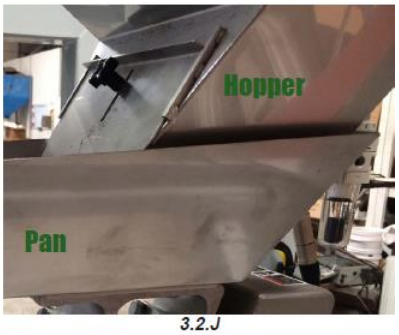


3.2.I

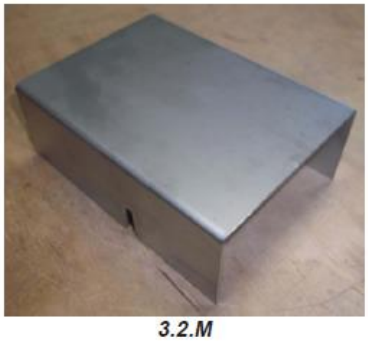
3.2.L

3.2.K



3.2.J

3.2 Set-up & Assembly



3.2.M

3.2.N

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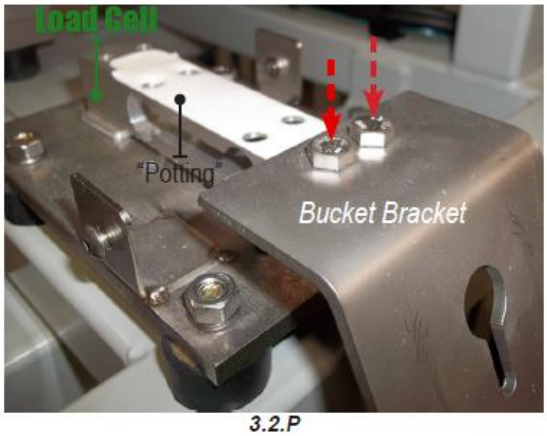
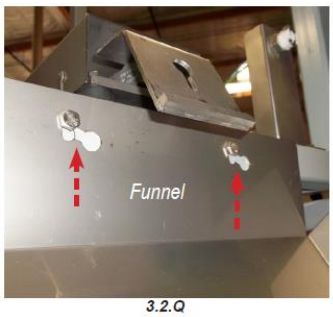
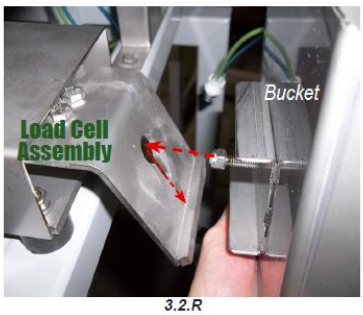


3.2.P

Assembly Procedure	
14	Carefully remove the Load Cell Cover, *Fig. # 3.2.M.*
15	Use the supplied M6 Bolts to secure the Bucket Bracket to the Load Cell *Fig. # 3.2.N & 3.2.O.*
	Firmly fasten the Bracket to Load Cell, avoid over tightening, *Fig. # 3.2.P.*
⚠	*Take care not to damage the Load Cell, avoid scratching or marring the white "potting" material along the top.*
	NEVER use the Bucket Bracket as a handle, grip or for leverage, NEVER apply any other load to the Load Cell or Bucket Bracket other than an Actionpac supplied Weigh Bucket.
15	Mount Funnel to Frame with the protruding bolts located directly below the Weigh Bucket as shown, *Fig. # 3.2.Q.*
17	Mount Bucket by sliding it into the keyhole slot, *Fig. # 3.2.R.*
18	With the Weigh Bucket in place insert the white nylon male fitting on the Weigh Bucket into the corresponding female fitting mounted adjacent on the Frame, *Fig. # 3.2.S.*
19	Fix Hopper Gate into position with three arm nylon mounting knob, *Fig. # 3.2.T.*
20	Check that all connectors are engaged such as the Vibratory Feeder, Load Cell and Hopper Vibrator (if equipped), *Fig. # 3.2.U.*



3.2.Q



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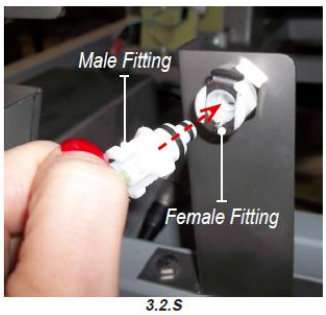
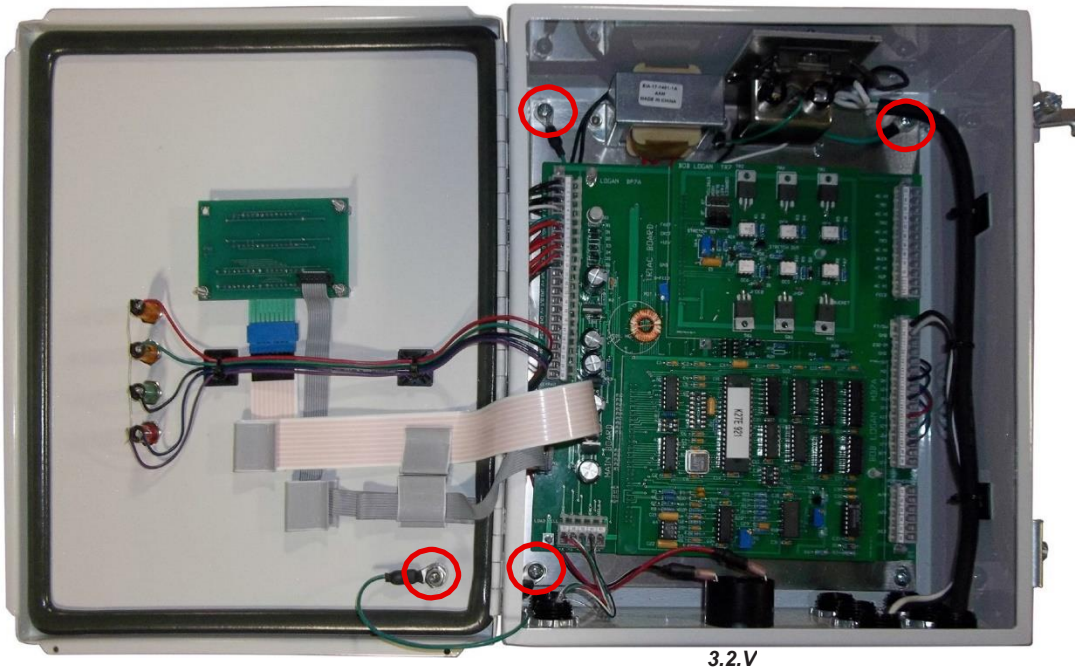


3.2.S

3.2.U

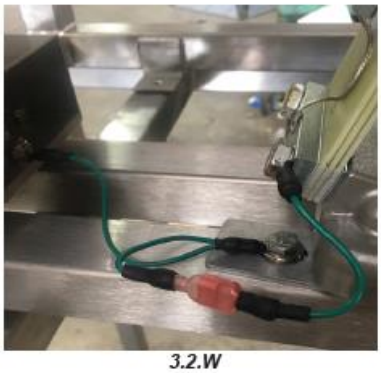
3.2.T

3.2 Set-up & Assembly



3.2.V

Assembly Procedure	
21	Open the Controller and remove any packaging materials.
22	Verify that all Boards are present and seated correctly, *Fig. # 3.2.V.*
23	Check that the inside grounding straps are secure, *Fig. # 3.2.V.*
	Tip Refer to *Sec. # 4.1* for detailed information concerning contents of the Controller to verify presence of components.
24	Check Load Cell/Feeder ground straps are secure, *Fig. # 3.2.W.*
⚠	*If you do not secure ground straps prior to operating the equipment you do so at the machine's peril. Check these regularly to avoid the detrimental build up of static.*
25	The Power Cord and Foot Pedal have been bundled and secured with zip ties for shipping. Carefully free these, make sure to support the weight of the Foot Pedal when un-bundling to avoid damage *Fig. # 3.2.X.*
26	With your **ME109** assembled and all components in place we strongly encourage you to check your power one more time prior to plugging it in. If your power is within the appropriate range you may plug it in and hook up the air, *Fig. # 3.2.Y.*



3.2.W

3.2.X

3.2.Y

4.1 Understanding the Controller

Please read everything in this section, it is a review of system logic and fundamentals as well as operational procedures.

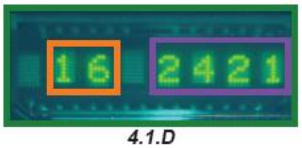
The standard **109 Series** Controller is operated with a digital keypad, *Fig. # 4.1.B.*

4.1.A

4.1.B

LED Display			
A real time reflection of the scale's status, *Fig. # 4.1.C*.			
The display will also register inputs during programming, modifying or tuning.			
Program	Two digits at display left indicate the program being run during regular		
Weight Regist	Four digits to the right reflect the state of the load cell, fluctuating up or down in response to applied weight or other disturbances, *Fig. # 4.1.D*.		
	Note	Actionpac does not filter the display as some others do.	

4.1.C



4.1.D

4.1.E

Indicator Lights		
The four Indicator Lights reflect the run status of a cycle in progress, *Fig. # 4.1.E*.		
BULK		Indicates which cycle stage you are in, either Bulk or Dribble.
DRIBBLE		
ACCEPT		The weight is acceptable based on the program set points, "pass"
OVER		The weight is not acceptable based on the program set points.
	Note	"Unders" are not possible in the program logic.
	Tip	If any Indicator Light is lit you are in **Run** mode.
		When in run mode all buttons are disabled except ***Run/Stop*** and the Incremental

Buttons
The twenty alpha/numeric Buttons are used to run your system, program, adjust and tune. The buttons have an audio feedback that sounds with each stroke. These buttons will be referenced and explained in greater detail in *Sec. # 4.2.*

4.2 The Standard Keypad

Inside are the brains of the system, which is microprocessor based, *Fig. # 4.1.D.* The controls are assembled using boards with proprietary software and weighing technology.

Boards	
Mother	All boards are mounted on the Mother Board, the largest of the boards, *Fig.*
Main	The processor, located on the Main Board, contains the operating system,
Triac	Controls vibratory functions, the smallest board, *Fig. # 4.1.Diii*.
Display	Mounted to the left on the enclosure door, *Fig. #4.1.E*

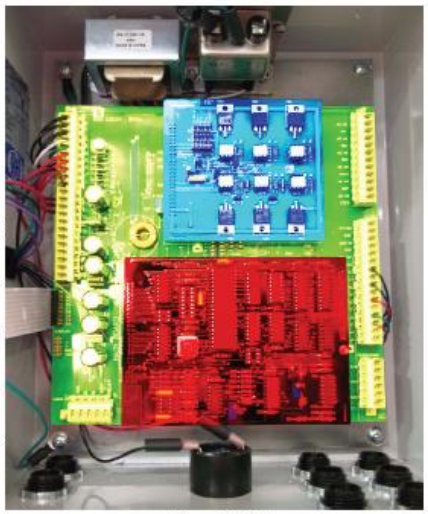
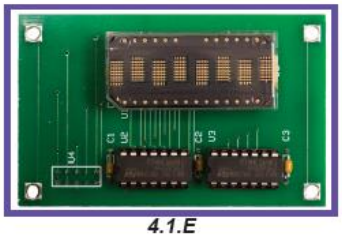


Fig. 4.1.D

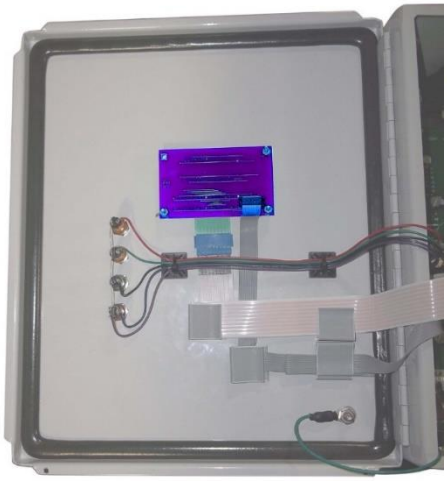
4.1.D.i

4.1.D.ii

4.1.D.iii



4.1.E



4.1.E

4.1.

The system's Foot Pedal and Power Cord come out through the bottom of the controller, *Fig. # 4.1.F*. Use care when moving equipment around so that these do not drag along the ground or become snagged.

4.2 The Standard Keypad

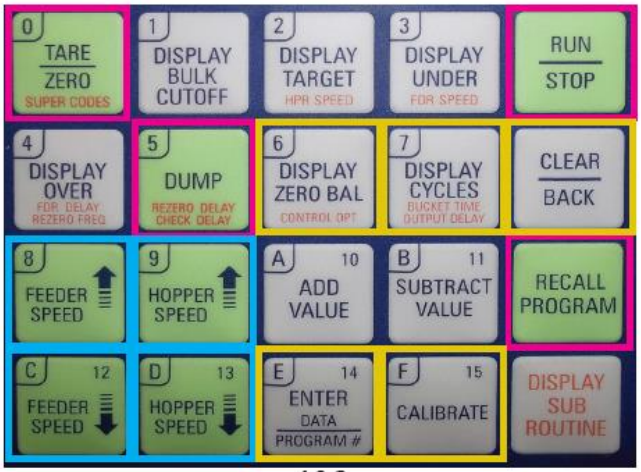
We just touched lightly on the Keypad as an element of the controller. In this section the Keypad is explored in greater detail.

The **Keypad** is composed of twenty alpha/numeric buttons. Most buttons have two or more functions depending on what mode you are in. Buttons perform operational functions as well as numeric inputs, ***0*** - ***9*** (top left) & ***10*** - ***15*** (top right)., *Fig. # 4.2.A & 4.2.B.*

Main Command Buttons					
Execute the most basic performance functions, used most often day to day.					
RECALL PROGRAM	***RECALL PROGRAM***	Program selection	0 TARE ZERO SUPER CODES	***0] TARE | ZERO***	Zero, Tare function
RUN STOP	***RUN | STOP***	Starts and stops scale	5 DUMP REZERO DELAY CHECK DELAY	***5] DUMP***	Opens/Empties weigh bucket
					⚠ *Unless in "Run" mode*

4.2.A

4.2.B

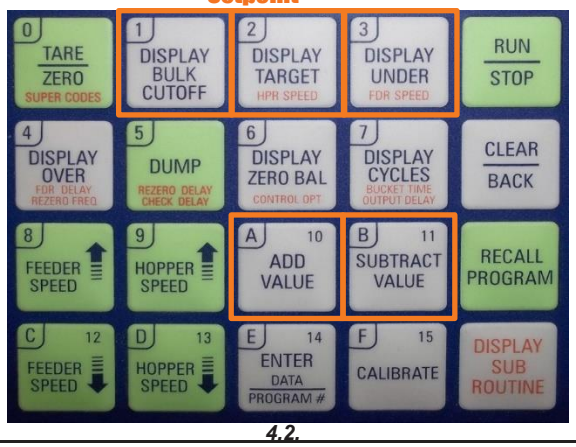


4.2.C

Incremental Speed Control Buttons		
Use to increase or decrease feeder speeds		
⚠	*Must be in "Run" mode to register, affects Bulk/Dribble only.*	
8 FEEDER SPEED	***8] FEEDER SPEED*** ↑	Increases front/single feeder speed
C 12 FEEDER SPEED	***C] FEEDER SPEED*** ↓	Decreases front/single feeder speed
9 HOPPER SPEED	***9] HOPPER SPEED*** ↑	Increases back feeder speed or hopper vibrator, if equipped.
D 13 HOPPER SPEED	***D] HOPPER SPEED*** ↓	Decreases back feeder speed or hopper vibrator, if equipped.
	Note	Increasing feeder speeds will not necessarily increase overall throughput.
	Tip	If Dribble is too quick to make adjustments press down on the Weigh Bucket quickly. This will force the logic to go to Dribble mode and give you plenty of time to experiment.

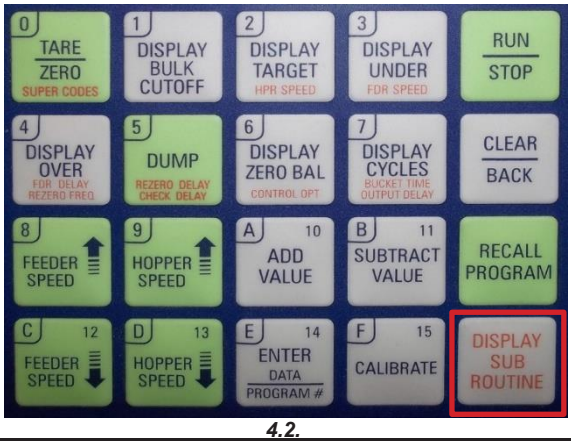
Misc. Command Buttons		
Used for a variety of functions and modes.		
6 DISPLAY ZERO BAL CONTROL OPT	***6] DISPLAY ZERO BAL***	Displays zero balance, No Tare
7 DISPLAY CYCLES BUCKET TIME OUTPUT DELAY	***7] DISPLAY CYCLES***	Displays # of cycles left
E 14 ENTER DATA PROGRAM #	***E] ENTER DATA***	Use to enter numerical inputs
F 15 CALIBRATE	***F] CALIBRATE***	Calibration function
CLEAR BACK	***CLEAR | BACK***	Clear, Back

Setpoint



4.2.

Subroutine Command Buttons



4.2.

Setpoint Buttons					
Used to adjust or create programs.			A set point is the weight at which a specific sub-routine is		
Note	These functions are printed in **blue** text on gray buttons.		* Activates Check Delay, *see Sec. 5.1 for Check Delay information.*		
1 DISPLAY BULK CUTOFF	***1] DISPLAY BULK CUTOFF***	Weight at which bulk feeding ceases and dribble begins	4 DISPLAY OVER FDR DELAY REZERO FREQ	***4] DISPLAY OVER***	Weight at which a cycle is Red indicator light activates
2 DISPLAY TARGET HPR SPEED	***2] DISPLAY TARGET***	A program's target weight*	A 10 ADD VALUE	***A] ADD VALUE***	Change all setpoints by adding
3 DISPLAY UNDER FDR SPEED	***3] DISPLAY UNDER***	Least amount of weight the program will accept	B 11 SUBTRACT VALUE	***B] SUBTRACT VALUE***	Change all setpoints by subtracting

Subroutine Command Sequence Buttons					
Use these buttons for programming and modifying			Sub-routines are the individual instructions that comprise a		
Note	These functions are denoted with **red** print.				
	To activate the subroutine function select ***DISPLAY SUB ROUTINE*** first *(also printed in red).*				
0 TARE ZERO SUPER CODES	***0] SUPER CODES***	Input supervisor code level	5 DUMP REZERO DELAY CHECK DELAY	***5] REZERO DELAY / CHECK DELAY***	Rezero Delay & Check Delay
1 DISPLAY BULK CUTOFF	***1] DISPLAY BULK CUTOFF***	Weight that BULK ends and DRIBBLE begins	6 DISPLAY ZERO BAL CONTROL OPT	***6] CONTROL OPT***	Control Options
2 DISPLAY TARGET HPR SPEED	***2] HPR SPEED***	Front Feeder speeds	7 DISPLAY CYCLES BUCKET TIME OUTPUT DELAY	***7] BUCKET TIME / OUTPUT DELAY***	Duration bucket door will stay open
3 DISPLAY UNDER FDR SPEED	***3] FDR SPEED***	Back Feeder or Hopper Vibrator speed *(if system equipped)*	F 15 CALIBRATE	***F] CALIBRATE***	Calibration Code
4 DISPLAY OVER FDR DELAY REZERO FREQ	***4] FDRDELAY/REZEROFREQ***	Fdr Delay & Rezero Freq	DISPLAY SUB ROUTINE	***DISPLAY SUB ROUTINE***	Display a program's Subroutines

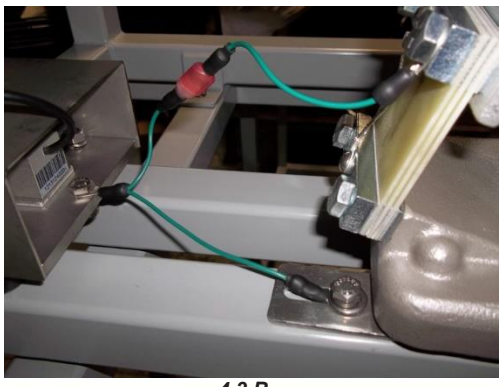
Tip When using the alpha/numeric buttons watch the LED display and listen for the beeper to verify the commands and inputs are registering. If the commands or inputs do not display you are either in "RUN" mode of you are entering numbers too quickly.

4.3 Scale On/Off

Your standard **ME109** series system with standard controller does not come equipped with an "On/Off" switch. Your system will be "on" or "off" with the insertion and removal of the 3-prong plug, *Fig. # 4.3.A*, into an appropriate outlet. When referencing the scale being "on" or "off" we are saying it is plugged in or unplugged.

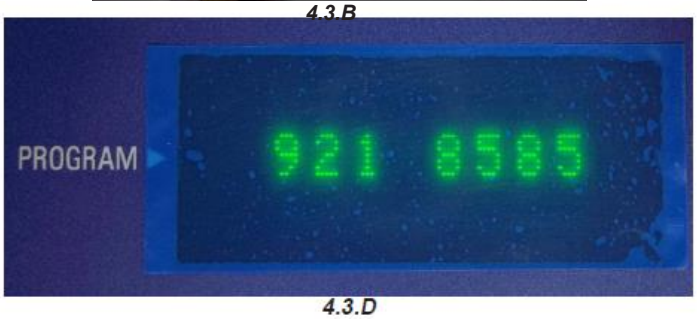
Scale On Procedure			
1	Check and re-secure ground straps for the Load Cell and Feeder Assemblies, *Fig. # 4.3.B.*		
2	Check and re-secure the Controller's interior ground straps, *Section # 3.2.*		
3	Plug the three prong plug into an appropriate outlet, *Fig. # 4.3.A.*	⚠	*Plug directly into the outlet. Do NOT use an extension cord.*
	The startup sequence will begin by displaying Actionpac, followed by our phone number **(805) 487-0403**, finishing with **V 9˙2˙1** (current system version) *Fig. # 4.3.C.*		
	Once the start-up sequence has finished the display will register its normal "Ready" configuration with **921** at the left in the program "Memory Location" position. The load cell status will be reflected in the four digits at the right, *Fig. # 4.3.D*.		
	Note	It is normal for the load cell display, especially the two right most digits, to move slightly up and down. This minor fluctuation is caused by environmental factors which the Load Cell is always registering.	
4	Once the display has stabilized your scale is ready.		

4.3.A



4.3.B

4.3.C



4.3.D

Scale Off Procedure	
1	To turn your scale "Off" simply unplug it.
	The display and indicator lights will flash with an audible fade away being heard, this is normal.
⚠	*We recommend you leave the scale plugged in at all times to avoid burn out.*

4.4 Recall a Program

To run and use your scale in production day to day you will only need to know how to recall a program ("Getting Started"). Your system has been pre-programed and tuned based on the weights and bulk sample product you supplied. A Program is the complete set of instructions the scale needs to do its job. A Subroutine is an individual instruction within a program. A Setpoint is the weight at which specific subroutines are activated.

Remember: A Program is the complete set of instructions the scale needs to do its job
A Subroutine is an individual instruction within a program.
A Setpoint is the weight at which specific subroutines are activated.

The factory installed programs and entry codes ("Memory Locations") are listed at the back of the manual in Sec. # 7 titled "Available Program Memory Locations."

Also, in **Section # 7** you will find "Program Data Sheets" *(PDS)*, for the factory installed programs along with blank sheets for future programs, *Fig. # 4.4.A*. These sheets are used to record the specific data of which a program consists such as the set points, subroutines, resolution, etc. and will be discussed in detail in the next section. To recall a program, you will need to know the two digit "code" *("Program Memory Location")*, as described above.

For instructional purposes we will use two example programs: **16** & **9E** *Fig. # 4.4.B & 4.4.C.*

Recall Program	
Push *RECALL PROGRAM*, followed by the two digit code as shown.	
Sequence	*RECALL PROGRAM* + *1* + *6*
Buttons	RECALL PROGRAM; 1 DISPLAY BULK CUTOFF; 6 DISPLAY ZERO BAL (CONTROL OPT)
The two digit code should be reflected to the left of the display, *Fig. # 4.4.D.*	

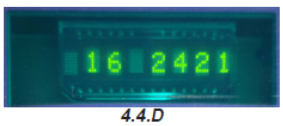
Recall Program-Example 2	
Another example using **9E**	
Sequence	*RECALL PROGRAM* + *9* + *E*
Buttons	RECALL PROGRAM; 9 HOPPER SPEED; E 14 ENTER DATA PROGRAM #

11 12 13 14 15 16 — 16 oz BEANS — *4.4.B*

9B 9C 9D 9E 9F 16 — 90 g GROUND — *4.4.C*

TARGET WEIGHT:	16 oz	
PRODUCT:	GROUND COFFEE	
SETPOINTS:		
1	1500	BULK CUTOFF
2	1599	TARGET WEIGHT
3	1597	UNDR TLERANCE
4	1605	OVER WEIGHT
SUBROUTINES:		
0	80 00	SET LANE GATE: N/A
1	00 0F	
2	50 00	
3		
4	04 0F	
5	16 16	SET HOPPER GATE: DOWN
6	80 00	
7		
8	01 01	
9	50 00	
F		
PROGRAM	16	
SET FOR (MODE)	oz	
BY (RESOLUTION)	.01 (1/100)	

4.4.A



4.4.D

With a program recalled the scale is ready and waiting for further instruction. You can now run the scale, modify programs, etc. Before running though there is one last thing, we need to "Empty The Bucket" ...

4.5 Emptying the Bucket

Before you start running the scale you must empty the Weigh Bucket(s). If you fail to do this the scale will tare itself with any product that may have accumulated in the bucket(s) which will result in over weight cycles.

Exit "Run" Mode	
You must exit "Run" mode before attempting to empty the bucket.	
Sequence	***STOP***
Buttons	

Empty Bucket		
If you are not in "Run" mode you do not have to press ***STOP*** first but we recommend you include it in the "Empty Bucket" sequence as best practice S.O.P.		
	*If any status lights are on press **STOP***	
	**Note**	The scale will not respond to commands, except for speed controls, while in "Run" mode.
Sequence		***STOP*** + ***DUMP***
Buttons		

Tip Have a box, tote or some other container under the funnel output to catch product. From time to time, especially as you are familiarizing yourself with the scale, you will have missed dumps and you will always have controlled bucket empties. A catch pan below will reduce mess and prevent unnecessary product/material loss.

4.6 "RUN" Mode

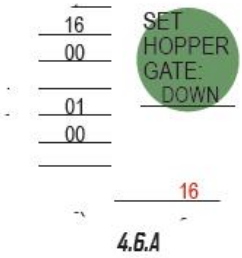
You should now be relatively familiar with your scale and ready to get your production on, finally.

While you can refer to the Quick Run Guide on pg. 4 we recommend reviewing this section before attempting to run your scale for the first time.

Now would be a good time for you to fill the Hopper with product if you have not already done so. Refer to the program's PDS to ascertain the correct height at which to set the Hopper Gate, Fig # 4.6.A.

Check that you have the appropriate Weigh Bucket and Funnel installed on the scale for your program and bags.

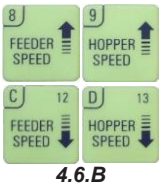
Start to Run Command	
Sequence	*RECALL PROGRAM + 1 + 6 + DUMP + RUN*
Buttons	RECALL PROGRAM; 1 DISPLAY BULK CUTOFF; 6 DISPLAY ZERO BAL (CONTROL OPT); 5 DUMP (REZERO DELAY CHECK DELAY); RUN / STOP



4.6.A

Pressing RUN starts the feeder, when the Bucket has filled to the Program's TARGET WEIGHT the feeder will stop. Throughout the filling process the Indicator Lights will change in reflection of the cycle's progress and the 4 digits at display right will increase until target is reached.

While the scale is filling arrange a bag onto the Funnel, see Sec. 4.7 for instructions. Once the scale has stopped filling the green or red Indicator Light will confirm whether the cycle is "Accept" or "over."



4.6.B

With a bag in place step on the Foot Pedal. The Weigh Bucket will open, releasing the product through the funnel and into the bag. While the product is transitioning into the bag the Weigh Bucket door will close and a new cycle will begin.

Note It is not necessary to watch the Display or wait for the scale to finish its cycle. You only have to have a bag/container in place to activate the foot pedal. The scale will not release product until it finishes the cycle.

Tip You can keep your foot on the Foot Pedal, as long as you have a bag in place.

While you are in "Run" mode the scale will continue this process of filling until you press STOP. As a reminder, while you are in "Run" you can't issue commands as the scale will not respond to them with the exception of the Incremental Speed Controls, Fig. # 4.6.B.

If you would like to switch the program to run another weight, press STOP to exit "Run" mode. You can then commence the "Run Command Sequence" as previously instructed but with another two digit program code.

Check that your Weigh Bucket and Funnel are still appropriate for the newly selected program. If you purchased additional Weigh Buckets and Funnels they would have been included with the scale.

For factory installed programs speeds have been pre-set to a conservative 8-12 cycles per minute for accuracy depending on the product sample you supplied. You may be able to speed this up with little or no accuracy loss though minor programming changes may be necessary, see **Sec. # 5** for details. You may also call and speak to a technician who can walk you through this.

Tip Set your Hopper Gate all the way down when filling an empty hopper to avoid product bouncing out of Feeder Pan.

Note If you want to expand your range of application and now require increased Bucket volume or a specialty funnel for new bag formats contact your sales associate for pricing and availability.

Note If any of the indicator lights are on you are in "Run" mode. The scale will not respond to commands while in "Run" mode. Always Note stop the scale before beginning any command sequence.

4.7 Funneling Instructions

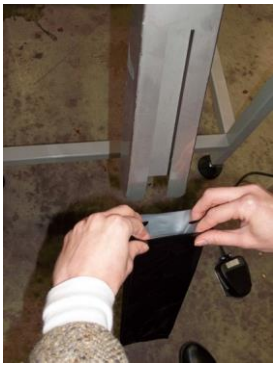
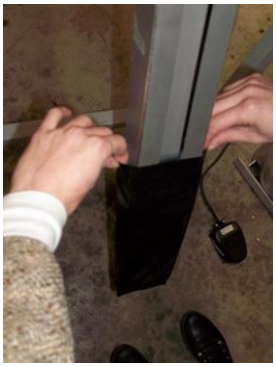
We have a variety of standard specialty funnels intended to increase efficiency and potentially double your output. You may have received at least one unless you commissioned a custom funnel designed for an un-conventional bag. If you do have a custom funnel these instructions are still relevant.

<table>
<tr><td rowspan="3">  </td><td colspan="4">Open Utility Funnel</td></tr>
<tr><td colspan="4">Primarily for open flat bags that do not need to be formed or open prior to filling, coordinated with Weigh Bucket.</td></tr>
<tr><td></td><td>Tip</td><td colspan="2">To prevent spill over avoid sliding bag onto funnel up as far as it will go.</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td>  </td></tr>
<tr><td>Insert both fingers into bag opening to open bag.</td><td>Slip bag onto funnel end, tip only.</td><td>Hold bag out with two fingers for max opening.</td><td>After Bucket dumps tap funnel back for any residual product, if necessary.</td></tr>
</table>

Side Gusset Former Funnel

Used for quad seal bags, bags with side gussets and bags with square or flat bottoms that require forming/ opening prior to filling. Two standard sizes available, larger size equipped with front slot to accommodate valve.

Tip: After filling pull bag all the way down and clear of Funnel before removing it to allow product to fully transition.

1	2	3	4
			
Insert both fingers into bag opening to open bag.	Slip bag opening onto end of funnel.	Slide bag up the funnel as far as it will go and square the bottom with the palm of	Hold bag in place with both hands until product has settled and is no

Stand-Up Pouch Former Funnel

Designed and used specifically for stand up pouches, doy pouches and bags with bottom gussets that need to be opened prior to filling, two standard sizes available.

Tip: After filling pull bag all the way down and clear of Funnel before removing it to allow product to fully transition.

1	2	3	4
			
Insert both fingers into bag opening to open bag.	Slip bag opening onto end of funnel.	Slide bag up the funnel as far as it will go and square the bottom with the palm of one hand.	Hold bag in place with both hands until product has settled and is no longer moving.

5.1 Program Fundamentals

Section # 5 is dedicated to the control system of your **ME109** and reviews general programming matters. A few things to keep in mind as we move through this section:

Your **109.**series net weigh has been programmed to run with the sample product you provided at regulated 115 VAC power.	
⚠	**Increases or decreases in voltage will cause ratiometric speed changes** and may result in accuracy loss
Generally you will be able to create new programs by modifying the programs with which your **ME109** was supplied.	
In some cases products that look the same may have slightly different flow characteristics that will require mechanical and/or electronic adjustments. See **Sec. # 6** is for information to evaluate and accommodate this.	
You can always call us if you get stuck, confused, need help or a friend.	

Before we get into the mechanics of programming, let's establish what a program is. Remember those definitions back in ***Sec. 4.4***? We need them now, let's review

PROGRAM	The complete series of instructions the scale needs to do its job.
SUBROUTINE	An individual instruction within a program.
SETPOINT	The weight at which specific subroutines are activated.

As discussed in ***Sec. 4.4*** the Program Data Sheet is an expression of the specific data of which a program is comprised. The PDS is divided into 5 main sectors. Let's use our example program, **16**, to look at these sectors individually, *Fig. # 5.1.A* .

TARGET WEIGHT:	16 oz		
PRODUCT:	GROUND COFFEE		
SETPOINTS:			
1	1500	BULK CUTOFF	
2	1599	TARGET WEIGHT	
3	1597	UNDR TLERANCE	
4	1605	OVER WEIGHT	
SUBROUTINES:			
0	80	00	SET
1	00	0F	LANE
2	50	00	GATE:
3			N/A
4	04	0F	
5	16	16	SET
6	80	00	HOPPER
7			GATE:
8	01	01	DOWN
9	50	00	
F			
PROGRAM	16		
SET FOR (MODE)	oz		
BY (RESOLUTION)	.01 (1/100)		

5.1.A

5.1 Program Fundamentals

Program ID		
Located at the top of each PDS, you can think of this as the "Program." This information is descriptive and used to identify the program; it includes the target weight and the product type.		
TARGET WEIGHT	The program is set to run 16 oz.	TARGET WEIGHT: 16 oz PRODUCT: GROUND COFFEE
PRODUCT	The program will run GROUND COFFEE	

Program Details		
Located at the very bottom are details that classify the program.		
PROGRAM	This is the Memory Location Code. It is always 2 digits. Keep in mind that it will not always directly correspond to the weight you are running as in this case 16.	PROGRAM 16 SET FOR (MODE) oz BY (RESOLUTION) .01 (1/100)
SET FOR (MODE)	The unit of measure in which the program is weighing, in this case ounces.	
BY (RESOLUTION)	The program's accuracy setting which is .01 (1/100) of an ounce here.	

TARGET WEIGHT: 16 oz
PRODUCT: GROUND COFFEE
SETPOINTS:
1 1500 BULK CUTOFF
2 1599 TARGET WEIGHT
3 1597 UNDR TLERANCE
4 1605 OVER WEIGHT

SUBROUTINES:

0	80	00
1	00	0F
2	50	00
3		
4	04	0F
5	16	16
6	80	00
7		
8	01	01
9	50	00
F		

SET LANE GATE: N/A
SET HOPPER GATE: DOWN

PROGRAM 16
SET FOR (MODE) oz
BY (RESOLUTION) .01 (1/100)

5.1.A

Gate Settings	
Located to the right are the vertical heights at which the gates are set for best results, based on product flow characteristics.	
SET LANE GATE:	Not all systems have a Lane Gate, if not equipped you will see N/A
SET HOPPER GATE:	Indicates at which level you should set your Hopper Gate. In this example you should set it DOWN as far as it will go. Depending on the product, weight and speed variables you may need to set it "UP" or "MID" and in some cases it would be "OFF".

SET LANE GATE: N/A
SET HOPPER GATE: DOWN

Setpoints		
The weigh "parameters" within which a program operates. Located directly beneath the Program ID info they essentially influence speed and accuracy and are numbered 1 - 4. Setpoints are highly variable based on the nature of you product.		
If the range between your under and over is fairly broad the cycle will process faster. While a more limited spread will process more slowly relative to the difference as it has less "room for error". This is something to consider when making your calculus on speed vs. accuracy and evaluating your product flow characteristics.		
BULK CUTOFF	at 1500 means bulk filling ceases at 15.00 oz. at which point Dribble will begin.	SETPOINTS: 1 1500 BULK CUTOFF 2 1599 TARGET WEIGHT 3 1597 UNDR TLERANCE 4 1605 OVER WEIGHT
TARGET WEIGHT	of 1599 means that you are aiming for 15.99 oz. of product.	
	This is also the weight at which Check Delay is initiated, Sub 5 *(see below)*.	
Note	Setting the target at 1599 as opposed to 1600 provides adequate time for the scale to determine over or under and may also process speed of the dribble action to this setpoint.	
	If the Check Delay logic finds the cycle "under the feeder will re-start and fill until target is met.	
	If the cycle is found to be "over" the red Indicator Light will activate at which point the scale must dump and release the load.	
	To avoid overs see Sec. 6.1 for information on how to best adjust Check Delay logic to suit your needs.	
UNDER TLERANCE	The least amount of product you will tolerate, in this case 15.97 oz.	
OVER WEIGHT	The maximum amount of product you will allow which is 16.05 oz.	

5.1 Program Fundamentals

Subroutines

Highly variable as well as interactive, each Subroutine controls specific action(s). A variety of results may be achieved depending on how they are set in relation to each other as well as the Setpoints.

There are a total of 11 Subroutines, numbered **0 - F**. The majority of these produce tangible results affecting performance which can be observed by an operator like Bucket Duration at **Sub 7** and Check Delay at **Sub 5**. Other less tangible subroutines are set at the factory to ensure proper machine functionality such as divisors and multipliers of the Load Cell input at **Sub 8**. **Sub 9, Sub F,** and **Sub 0.**

0 80 00	Each Subroutine is expressed as a pair of two digit bits, BIT # 1 & BIT # 2.
0 80 00	Each bit is comprised of two digits positioned, starting from the left, as the 1st, 2nd, 3rd and 4th digit.
	Each position is categorized, respectively, as Most Significant Digit aka MSD, 2nd MSD, 3rd MSD and Least Significant Digit aka LSD.

SUBROUTINES:

0	80	00
1	00	0F
2	50	00
3		
4	04	0F
5	16	16
6	80	00
7		
8	01	01
9	50	00
F		

Subroutine Bit Instructions

The bit expressions issue instructions to the system for the performance of their respective maneuvers. See *Section # 7.3* for further info.

We recommend you not make changes to those labeled "Factory Set" without consulting an Actionpac technician.

Subroutine	BIT # 1		BIT # 2	
	1st (MSD)	2nd (2nd MSD)	3rd (3rd MSD)	4th (LSD)
0	Supervisor Codes		Factory Set	
1	Periph Out Freq	Display Setpoint 1	Future	Zero Verify Tolerance
2	Dribble Hopper (+ to -)		Bulk Hopper (+ to -)	
3	Dribble Feeder (+ to -)		Bulk Feeder (+ to -)	
4	Feeder Delay		Rezero Frequency	
5	Rezero Delay		Check Delay	
6	Misc. Options	Print Options	Peripheral Options	Operational Options
7	Bucket Duration		Peripheral Delay	
8	# of Divisions	Factory Set	# of Accumulations	Factory Set
9	Factory Set		Factory Set	
F	Calibration Codes		Calibration Codes	

Table II

5.2 Setpoints & Subroutines

When modifying or creating programs the easiest changes to make are to the Setpoints. In fact when creating programs of differing weights and accuracies while using the same product adjusting the Setpoints may be all that is necessary. If you think of the Setpoints as a program's goals, the Target Weight being the goal, then the Subroutines are how the scale achieves those consecutive goals (this is a metaphor in case you were wondering).

⚠ *When making changes to the Subroutines keep in mind that your ability to do this is contingent upon any Supervisor Codes that have been stored into the program and the level of access granted. This is done to avoid accidental changes or modifications by unqualified personnel, see Sec. #5.3 for more on Supervisor Codes.*

Setpoints

View & Change — You can determine a program's Setpoints in two ways. You can look and find them on that proram's PDS, as discussed in the previous section, or you can view them manually using the controller's Keypad. You must have a program recalled in order to view or change the Setpoints.

SETPOINTS:

1	1500	BULK CUTOFF
2	1599	TARGET WEIGHT
3	1597	UNDR TLERANCE
4	1605	OVER WEIGHT

Setpoints, numbered **1-4**, are a program's parameters; each with a designated button on the Keypad.

View Setpoint Command

To view a program's Setpoint merely press the corresponding button.

While viewing the Setpoints you are in "**Display**" mode.

Sequence	Buttons
1	

Exit "Display" Mode

To escape, press any numeric key or ***CLEAR***.

Sequence	Buttons
CLEAR	

Change Setpoint Command

If you want to change that displayed setpoint, **SETPOINT 1** which is the Bulk Cutoff, from **1500** to **1100** you would use the applicable button sequence as illustrated below.

Note — Remember that you are in display mode when you begin the sequence so there is no need to enter the original value.

Sequence	*1* + *ENTER* + *1* + *1* + *0* + *0*
Buttons	

Save Setpoint

To store a changed Setpoint to the recalled program will need to enter its 2 digit code, say it is program **12**.

Sequence	*ENTER* + *1* + *2*
Buttons	

Let's review what we've learned so far with another example.

Button Sequence Review

The below sequence demonstrates recalling program **AF**, so that we may view **SETPOINT 2** then change and save it to **1200**.

Sequence *RECALL PROGRAM + A + F + 2 + E + 1 + 2 + 0 + 0 + E + A + F*

Subroutines							
View & Change	Subroutines may also be determined by referencing your PDS or viewed manually, though unlike setpoints with dedicated command buttons, individual subroutine commands are auxiliary functions noted in orange on a corresponding button. They are accessed by first pressing the Subroutine Command Button.						
Subroutine Command Button	**Individual Subroutine Buttons**						
DISPLAY SUB ROUTINE	0 TARE / ZERO SUPER CODES	2 DISPLAY TARGET HPR SPEED	3 DISPLAY UNDER FDR SPEED	4 DISPLAY OVER FDR DELAY REZERO FREQ	5 DUMP REZERO DELAY CHECK DELAY	6 DISPLAY ZERO BAL CONTROL OPT	7 DISPLAY CYCLES BUCKET TIME OUTPUT DELAY
DISPLAY SUB ROUTINE	*0] SUPER CODES*	*2] HPR SPEED*	*3] FDR SPEED*	*4] FDR DELAY| REZERO FREQ*	*5] REZERO DELAY| CHECK DELAY*	*6] CONTROL OPT*	*7] BUCKET TIME| OUTPUT DELAY*

View Subroutine

To view a program's s subroutine you first press the Subroutine Command Button followed by the corresponding numeric button you want to view.

While viewing the Subroutines you are in "**Display**" mode.

Sequence	*DISPLAY SUBROUTINE* + *0] SUPER CODES*
Buttons	DISPLAY SUB ROUTINE + 0 TARE / ZERO SUPER CODES

Change Displayed Subroutine

If you want to change that displayed subroutine, **Sub 0**, of program **16**, from **80 00** to **81 00** you would follow the below illustrated sequence.

Sequence	*ENTER* + *8* + *1* + *0* + *0*	**Buttons**	E 14 ENTER DATA PROGRAM # + 8 FEEDER SPEED + 1 DISPLAY BULK CUTOFF + 0 TARE / ZERO SUPER CODES + 0 TARE / ZERO SUPER CODES
Note	Your change is merely temporary at this point, you can save it to either the program you are engaged in or to another. If you save it to the program you are in, 16 in this case, that program will be permanently changed.		

Save Subroutine

To store these changes you need to save it using the same memory location.

Sequence	*ENTER* + *1* + *6*
Buttons	E 14 ENTER DATA PROGRAM # + 1 DISPLAY BULK CUTOFF + 6 DISPLAY ZERO BAL CONTROL OPT

Let's review what we've learned so far with another example.

Button Sequence Review

The below sequence demonstrates recalling program **AF**, so that we may view **SUBROUTINE 5** then change and save it to **16 18**.

Sequence — *RECALL PROGRAM* + *A* + *F* + *DISPLAY SUB ROUTINE* + *5] CHECK DELAY* + *E* + *1* + *6* + *1* + *8* + *E* + *A* + *F*

5.3 Supervisor Codes

One of the most common problems encountered by users of weigh fill/counting equipment is the alteration, inadvertent or not, of supervisor or factory settings of all fourteen interactive variables controlling speed and accuracy, so the follow- ing information is meant for the supervisor only.

The level of access to any given program is controlled by the "Most Significant Digit" of **SUB 0** which is the digit farthest to the left. Ascertain a program's access level by viewing **SUB 0** as described in the previous section.

Restriction Codes

There are four primary restrictions, each assigned a numeric value.

To determine the appropriate restriction level simply add the values of the possible restrictions and enter that into the MSD position of **SUB 0**.

8	No access to ***ENTER*** feature Cannot change any displayed information, cannot store programs
4	No access to incremental speed controls (*8*, *9*, *C*, *D*)
2	No access to setpoints ADD VALUE/SUBTRACT VALUE feature (*A* & *B*)
1	No access to display cycles (*7*)

If you want no access restrictions and the ability to make changes without any overrides you would set the MSD to **0**.

You can place as few or as many restrictions you like, tailoring the program's access level to your needs. For example, if you want to allow access only to the Speed Controls you would add 1 + 2 + 8 giving you 11.

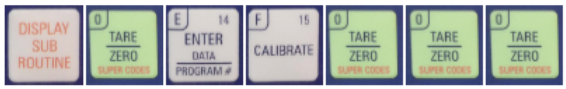
Use Hex Codes to express two digits in a single position, see ***Sec. # 7.3***. Basically, for numbers **10**-**15** you will use a corresponding letter of the alphabet starting with **A**, thus **A**:**10**, **B**:**11**, **C**:**12**, and so forth with **F**:**15**. Therefore you will use **B** to express your restriction level of **11**. The maximum is **15** and is expressed as **F**.

If the access code is set at anything other than **0** in the MSD position, you will need to use the Supervisor Override Code, **DD**, before any changes can be made or entered into the program. Essentially you must eliminate the Supervisor Code before you can change the program; **DD** is pre-loaded at the factory and cannot be altered.

5.3 Supervisor Codes

Of the four digit positions that **SUB 0** consists of only the 1st is relevant here as only that digit position controls the restriction level and represents the Supervisor Code. **You have to enter the other three digits exactly the same**, only change the MSD to **0**. Let's use an example program to illustrate adjusting restriction levels: **A5** *(Fig. # 5.3.A)*.

Reset Sub 0 to "0"	
As you can see from **SUB 0** your MSD is **8**. This level prevents an operator from saving or storing anything so we need to set it at **0**.	
Sequence	***DISPLAY SUBROUTINE*** + *0* + *E* + *D* + *D* + *0* + *0* + *0* + *0*
Buttons	
⚠	*You have to set Sub 0 to "0" in order to make changes or adjustments of any kind to a program, including the restriction level of **Sub 0***

Set Sub 0 from "0" to "F"	
With **Sub 0** set to **0** you may now set another level but once you do that you have set restrictions and will be unable to make subsequent changes to that program.	
💡 **Tip**	Most commonly people set **SUB 0** MSD at **8.**
	Make sure to note permanent changes in the PDS for future reference.
Sequence	***DISPLAY SUBROUTINE*** + *0* + *E* + *F* + *0* + *0* + *0*
Buttons	

TARGET WEIGHT:	500 G		
PRODUCT:	COFFEE BEANS		
SETPOINTS:			
1	0470	BULK CUTOFF	
2	0499	TARGET WEIGHT	
3	0498	UNDR TLERANCE	
4	0503	OVER WEIGHT	
SUBROUTINES:			
0	80	00	SET LANE GATE: N/A
1	00	0F	
2	FF	FF	
3			
4	04	0F	
5	16	16	SET HOPPER GATE: DOWN
6	80	00	
7	12	01	
8	01	01	
9	50	00	
F			
PROGRAM	A5		
SET FOR (MODE)	g		
BY (RESOLUTION)	1g		

5.3.A

5.3 Supervisor Codes

The below example demonstrates how to change the Supervisor Code, **Sub 0**, of program **16** from **80 00** to **00 00** and is presented to better illustrate the multi stage process involved in Supervisor Code adjustment.

Recall Progran	**Sequence**	*RECALL PROGRAM + 1 + 6*
	Buttons	RECALL PROGRAM; 1 DISPLAY BULK CUTOFF; 6 DISPLAY ZERO BAL

Remove Supervisor Code	**Sequence**	*DISPLAY SUBROUTINE + 0 + E + D + D + 0 + 0 + 0 + 0*
	Buttons	DISPLAY SUB ROUTINE; 0 TARE ZERO; E 14 ENTER DATA PROGRAM #; D 13 HOPPER SPEED; D 13 HOPPER SPEED; 0 TARE ZERO; 0 TARE ZERO; 0 TARE ZERO; 0 TARE ZERO

Save Overide	**Sequence**	*E + 1 + 6*
	Buttons	E 14 ENTER DATA PROGRAM #; 1 DISPLAY BULK CUTOFF; 6 DISPLAY ZERO BAL

Add New Supervisor Code	**Sequence**	*DISPLAY SUBROUTINE + 0 + E + B + 0 + 0 + 0*
	Buttons	DISPLAY SUB ROUTINE; 0 TARE ZERO; E 14 ENTER DATA PROGRAM #; B 11 SUBTRACT VALUE; 0 TARE ZERO; 0 TARE ZERO; 0 TARE ZERO

Save New	**Sequence**	*E + D + D + 1 + 6*
	Buttons	E 14 ENTER DATA PROGRAM #; D 13 HOPPER SPEED; D 13 HOPPER SPEED; 1 DISPLAY BULK CUTOFF; 6 DISPLAY ZERO BAL

TARGET WEIGHT:	16 oz		
PRODUCT:	GROUND COFFEE		
SETPOINTS:			
1	1500	BULK CUTOFF	
2	1599	TARGET WEIGHT	
3	1597	UNDR TLERANCE	
4	1605	OVER WEIGHT	
SUBROUTINES:			
0	80	00	SET LANE GATE: N/A
1	00	0F	
2	50	00	
3			
4	04	0F	
5	16	16	SET HOPPER GATE: DOWN
6	80	00	
7			
8	01	01	
9	50	00	
F			
PROGRAM	16		
SET FOR (MODE)	oz		
BY (RESOLUTION)	.01 (1/100)		

Again, you must enter the 2MSD, 3MSD and LSD (i.e. the other three digits) exactly the same as listed in the PDS. Keep in mind that depending on the program you are modifying those three digits may not all be 0.

5.4 To Make a New Program-Add/Subtract Value

The simplist way to make a new program based on an old program with the same product is by using the Add/Subtract Command Sequence. This adds or subtracts the difference between an old and new target weight.

Remember to check the Supervisor Code and set **SUB 0** MSD to **0** if necessary.

This method should only be applied when the new target weight is within 25% of the existing program's target and the product's flow characteristics are similar.

Use the Subtract Value Command Sequence to make a new program with a smaller Target Weight.

Subtract Value Procedure			
Suppose you have a 4 oz. coffee bean program, located at **04** *(Fig. 5.4.A)*, and you need a 2 oz. program.			
1	Pick any two digit code not in use, check the Available Program Memory Locations for availability, say **F2** is available.		
2	Establish the weight difference between old and new target weights.		
	The difference will be **0200** since: **0400** (old program) - **0200** (new program) = **0200**		
⚠	*Make sure you refer to Setpoint 2,* ***TARGET WEIGHT****.*		
3	Make a new program using the "Subtract Value Command" as shown below.		
4	Save to the new memory location, **F2**, using the "Save Command" as shown below.		
5	Fill out a new PDS and update your Available Memory Location Log, *Fig. # 5.4.B & 5.4.C.*		
	📝	**Note**	Transcribe all the **Subroutines** from the original as they will have remained the same since the controller makes all the necessary adjustments automatically.
		⚠	*The* ***Setpoints*** *will have to be changed accordingly to reflect the new program (Fig. # 5.4.B).*

	Subtract Value Command	Save Command
Sequence	*RECALL PROGRAM* + *0* + *4* + *B] SUBTRACT VALUE* + *E] ENTER* + *0* + *2* + *0* + *0*	+ *E] ENTER* + *F* + *2*
Buttons	RECALL PROGRAM · 0 TARE ZERO · 4 DISPLAY OVER · B 11 SUBTRACT VALUE · E 14 ENTER DATA PROGRAM # · 0 TARE ZERO · 2 DISPLAY TARGET · 0 TARE ZERO · 0 TARE ZERO	E 14 ENTER DATA PROGRAM # · F 15 CALIBRATE · 2 DISPLAY TARGET

TARGET WEIGHT: 4 oz
PRODUCT: COFFEE BEANS
SETPOINTS:

1	0360	BULK CUTOFF
2	0400	TARGET WEIGHT
3	0399	UNDR TLERANCE
4	0403	OVER WEIGHT

SUBROUTINES:

0	80	00	SET LANE GATE: N/A
1	00	0F	
2	FF	FF	
3			
4	04	0F	SET HOPPER GATE: DOWN
5	16	16	
6	80	00	
7	08	01	
8	01	01	
9	50	00	
F			

PROGRAM 04
SET FOR (MODE) oz
BY (RESOLUTION) .01 (1/100)

5.4.A

TARGET WEIGHT: 2 oz
PRODUCT: COFFEE BEANS
SETPOINTS:

1	0175	BULK CUTOFF
2	0200	TARGET WEIGHT
3	0200	UNDR TLERANCE
4	0202	OVER WEIGHT

SUBROUTINES:

0	80	00	SET LANE GATE: N/A
1	00	0F	
2	FF	FF	
3			
4	04	0F	SET HOPPER GATE: DOWN
5	16	16	
6	80	00	
7	12	01	
8	01	01	
9	50	00	
F			

PROGRAM F2
SET FOR (MODE) oz
BY (RESOLUTION) .01 (1/100)

5.4.B

	Save Overide (if Super Code On)
Sequence	+ *E] ENTER* + *D* + *D* + *F* + *2*
Buttons	E 14 ENTER DATA PROGRAM # · D 13 HOPPER SPEED · D 13 HOPPER SPEED · F 15 CALIBRATE · 2 DISPLAY TARGET

E1		F1	
E2		F2	2 oz. BEANS
E3		F3	

5.4.C

The original program **04** will not be affected as long as you correctly store the new program in a different location. Therefore it is extremely important when programming that you are clear on what memory locations are available and which are in use, making record keeping worthwhile.

5.4 To Make a New Program-Add/Subtract Value

Use the Add Value Command Sequence to make a new program with a larger Target Weight.

Add Value Procedure			
Suppose you have a 400 g ground coffee program, located at **4A** *(Fig. 5.4.D)*, and you want to make a 500 g program.			
1	Check the Available Program Memory Locations and pick any two digit code, say **5A** is available.		
2	Establish the weight difference between old and new target weights.		
	The difference will be **0100** since: **0499** (new program) - **0399** (old program) = **0100**		
⚠	*Make sure you refer to Setpoint 2,* ***TARGET WEIGHT****.*		
3	"Make a New Program" using the "Add Value Command" as shown below.		
4	Save to the new memory location, **5A,** using the "Save Command" as shown below.		
5	Fill out a new PDS and update your Available Memory Location Log, *Fig. # 5.4.E & 5.4.F.*		
	📝	**Note**	Transcribe all the **Subroutines** from the original as they will have remained the same since the controller makes all the necessary adjustments automatically.
		⚠	*The* ***Setpoints*** *will have to be changed accordingly to reflect the new program (Fig. # 5.4.E).*

	Add Value Command	Save Command
Sequence	***RECALL PROGRAM*** + ***4*** + ***A*** + ***A] ADD VALUE*** + ***E] ENTER*** + ***0*** + ***1*** + ***0*** + ***0***	+ ***E] ENTER*** + ***5*** + ***A***
Buttons	RECALL PROGRAM · 4 DISPLAY OVER · A 10 ADD VALUE · A 10 ADD VALUE · E 14 ENTER DATA PROGRAM # · 0 TARE ZERO · 1 DISPLAY BULK CUTOFF · 0 TARE ZERO · 0 TARE ZERO	E 14 ENTER DATA PROGRAM # · 5 DUMP · A 10 ADD VALUE

TARGET WEIGHT:	400 G	
PRODUCT:	GROUND COFFEE	
SETPOINTS:		
1	0370	BULK CUTOFF
2	0399	TARGET WEIGHT
3	0398	UNDR TLERANCE
4	0403	OVER WEIGHT
SUBROUTINES:		
0	81 00	SET LANE GATE: N/A
1	00 0F	
2	50 00	
3		
4	04 0F	
5	16 16	SET HOPPER GATE: DOWN
6	80 00	
7	12 01	
8	01 01	
9	50 00	
F		
PROGRAM	4A	
SET FOR (MODE)	g	
BY (RESOLUTION)	1g	

5.4.D

TARGET WEIGHT:	500 G	
PRODUCT:	GROUND COFFEE	
SETPOINTS:		
1	0470	BULK CUTOFF
2	0499	TARGET WEIGHT
3	0498	UNDR TLERANCE
4	0503	OVER WEIGHT
SUBROUTINES:		
0	81 00	SET LANE GATE: N/A
1	00 0F	
2	50 00	
3		
4	04 0F	
5	16 16	SET HOPPER GATE: DOWN
6	80 00	
7	12 01	
8	01 01	
9	50 00	
F		
PROGRAM	5A	
SET FOR (MODE)	g	
BY (RESOLUTION)	1g	

5.4.E

47		57	
48		58	
49		59	
4A	400g Ground	5A	500g Ground
4B		5B	

5.4.F

5.4 To Make a New Program-Add/Subtract Value

Let's review both Add & Subtract Value with examples before moving on.

	Review Subtract Value	Save
Sequence	*RECALL PROGRAM* + *1* + *A* + *B] SUBTRACT VALUE* + *E] ENTER* + *0* + *0* + *7* + *5*	+ *E] ENTER* + *0* + *A*
Buttons	RECALL PROGRAM; 1 DISPLAY BULK CUTOFF; A 10 ADD VALUE; B 11 SUBTRACT VALUE; E 14 ENTER DATA PROGRAM #; 0 TARE ZERO SUPER CODES; 0 TARE ZERO SUPER CODES; 7 DISPLAY CYCLES RUNTIME OUTPUT DELAY; 5 DUMP REZERO DELAY CHECK DELAY	E 14 ENTER DATA PROGRAM #; 0 TARE ZERO SUPER CODES; A 10 ADD VALUE

Review Subtract Value Procedure		
50 g program from a 125 g coffee bean program (*Fig. # 5.4.G*).		
1	New Program Location: **0A**	
2	Target Weight Value Difference: **0075**	**0125 - 0050 = 0075**
3	Apply Subtract Value Command	
4	Save to the new memory location, **0A.**	
5	Update your records, *Fig. # 5.4.H* & *5.4.I.*	

08		**18**	
09		**19**	
0A	50 g BEANS	**1A**	125 g BEANS
0B		**1B**	

5.4.I

TARGET WEIGHT:	125 G		
PRODUCT:	GROUND COFFEE		
SETPOINTS:			
1	0100	BULK CUTOFF	
2	0125	TARGET WEIGHT	
3	0125	UNDR TLERANCE	
4	0127	OVER WEIGHT	
SUBROUTINES:			
0	81	00	SET
1	00	0F	LANE
2	50	00	GATE:
3			N/A
4	04	0F	
5	16	16	SET
6	80	00	HOPPER
7	08	01	GATE:
8	01	01	DOWN
9	50	00	
F			
PROGRAM		1A	
SET FOR (MODE)		g	
BY (RESOLUTION)		1g	

5.4.G

TARGET WEIGHT:	50 G		
PRODUCT:	GROUND COFFEE		
SETPOINTS:			
1	0042	BULK CUTOFF	
2	0050	TARGET WEIGHT	
3	0050	UNDR TLERANCE	
4	0052	OVER WEIGHT	
SUBROUTINES:			
0	81	00	SET
1	00	0F	LANE
2	50	00	GATE:
3			N/A
4	04	0F	
5	16	16	SET
6	80	00	HOPPER
7	08	01	GATE:
8	01	01	DOWN
9	50	00	
F			
PROGRAM		0A	
SET FOR (MODE)		g	
BY (RESOLUTION)		1g	

5.4.H

	Review Add Value	Save
Sequence	*RECALL PROGRAM* + *2* + *1* + *A] ADD VALUE* + *E] ENTER* + *0* + *4* + *0* + *0*	+ *E] ENTER* + *6* + *1*
Buttons	RECALL PROGRAM · 2 DISPLAY TARGET · 4 DISPLAY OVER · A 10 ADD VALUE · E 14 ENTER DATA PROGRAM # · 0 TARE ZERO · 4 DISPLAY OVER · 0 TARE ZERO · 0 TARE ZERO	E 14 ENTER DATA PROGRAM # · 6 DISPLAY ZERO BAL · 1 DISPLAY BULK CUTOFF

Review Add Value	
16 oz. program from a 12 oz.ground coffee program (*Fig. # 5.4.J*).	
1	New Program Location: **61**
2	Target Weight Value Difference: **0400** | **1599** - **1199** = **0400**
3	Apply Add Value Command
4	Save to the new memory location, **61**.
5	Update your records, *Fig. # 5.4.K* & *5.4.L*.

20	
21	12 oz. Ground
60	
61	16 oz. Ground
62	

5.4.L

TARGET WEIGHT:	12 oz		
PRODUCT:	GROUND COFFEE		
SETPOINTS:			
1	1100	BULK CUTOFF	
2	1199	TARGET WEIGHT	
3	1197	UNDR TLERANCE	
4	1205	OVER WEIGHT	
SUBROUTINES:			
0	80 00	SET LANE GATE:	N/A
1	00 0F		
2	50 00		
3			
4	04 0F		
5	16 16	SET HOPPER GATE:	DOWN
6	80 00		
7			
8	01 01		
9	50 00		
F			
PROGRAM		21	
SET FOR (MODE)		oz	
BY (RESOLUTION)		01 (1/100)	

5.4.J

TARGET WEIGHT:	16 oz		
PRODUCT:	GROUND COFFEE		
SETPOINTS:			
1	1500	BULK CUTOFF	
2	1599	TARGET WEIGHT	
3	1597	UNDR TLERANCE	
4	1605	OVER WEIGHT	
SUBROUTINES:			
0	80 00	SET LANE GATE:	N/A
1	00 0F		
2	50 00		
3			
4	04 0F		
5	16 16	SET HOPPER GATE:	DOWN
6	80 00		
7			
8	01 01		
9	50 00		
F			
PROGRAM		61	
SET FOR (MODE)		oz	
BY (RESOLUTION)		01 (1/100)	

5.4.K

. 5.4 To Make a New Program-Add/Subtract Value

Notice that program **21** (*Fig. # 5.4.I*) has a value of **1199** in **Setpoint 2** though the program is for 12 oz. Conversely **1A** (*Fig. # 5.4.G)* has corresponding values of **0125** and 125 g respectively.

This is done to account for product fall. While the feeder may cease when a program hits target there may still be product in transition. Therefore **Setpoint 2** may be set at a value less than the "true" target to mitigate overweights yet maintain speed. This strategy is applied in program **21** yet not in **1A** because the potential weight of any product in transition for 125g is negligible. You should consider the potential for overweights based on the true target and set your values accordingly.

Add/Subtract Value Info.		
⚠		Must stay within +/- 25% of original program's Setpoint 2 or target weight.
		Add/Subtract is only appropriate when applied to weights of the same mode, i.e. ounces or grams.
		For best results the product should have similar flow characteristics to that of the old program's product.
📝	**Note**	The Setpoint Target Weight (1599) may not be the same as the Program Name (16 oz) or available Memory Location (61).
		Supervisor Codes may be embedded in programs requiring an Override Command before any changes can be attempted. Remember that these restrictions will be copied into any new programs created, see *Sec. 5.3.*
		This approach works best for the same or like products with the same flow characteristics. If your products are different you can still use this method to begin creating a new program but you may need to make further modifications and adjustments to accomodate divergent flow characteristics.
💡	**Tip**	If you've misplaced your PDS you can always display the Setpoints individually, see *Sec. 5.2* for instructions.

5.5` Scale Calibration

Before beginning locate a “Known Weight,” something that you have independently verified as a specific weight. Most standard **ME109** units (shipped after 10/2014) come with a supplied Calibration Weight. If your system did not come with that or if you’ve misplaced it you can use anything which is convenient and verifiable. Make sure it is a minimum of 50% capacity and that you check the weight with a reliable table top scale (the more accurate the better) keeping track of the exact weight.

Let’s use an example to better illustrate the calibration procedure. Prior to beginning the Calibration process designate an existing program with your desired mode and resolution, e.g. oz. by .01 or grams by 1.0 or lbs. by .01, etc.

Example Calibration Details		
Program	04	*Fig. # 5.5.A*
Mode	ounces	*Fig. # 5.5.A*
Poise Weight	2.58 lbs.	
	Ascertain the weight of the object to be used for this calibration process.	
	The technical name of such an object is “poise”	
Input Weight	41.28 oz.	
	Our program is in oz. so we must convert the poise weight to that mode.	
	16 oz. = 1 lbs.	2.58 x 16 = 41.28

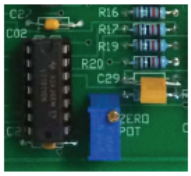
)__ 00
RAM 04
OR (MODE) oz
ESOLUTION) .01 (1/100)

5.4.A

Step #1	Sequence	*RECALL PROGRAM + 0 + 4*
	Buttons	

Step #2	Sequence	+ *6] DISPLAY ZERO BAL*
	Buttons	

Step #3



Adjust "Zero Pot" as needed

Step #4	Sequence	*0] TARE / ZERO*
	Buttons	

Calibration Procedure

Allow your system to warm up prior to begining this process, ≥ 15 minutes should suffice.

1	Recall the program you wish to calibrate, 04 in this case.
2	Display true (analog) Zero Balance
	Should be above +0100 for Calibration purposes as the scale will not display negative weight in the "gross" mode.
3	Adjust Zero Potentiometer if displayed value is not between 0100 and 1000
	Use a small flat head screwdriver and turn the small brass screw clockwise as needed until the displayed value falls within range.
4	Once in range put the scale in "Net" mode.
5	Place your known weight on/in the Weigh Bucket.
6	Gently enter the weight, using four digits, which you noted earlier: 41 28
	Wait until the scale has settled and stabilized to within ± 2 counts
7	Remove the weight, the display should return to 0 ± 2 counts
8	Save calibration to your program 04 ⚠ *Will not be successful unless the same is used as at the start.*
	The display should read STRP?? If you do not see this press *D+D* to overide
Tips	When entering the weight during Calibration be as gentle as possible to minimize movement and vibration as the scale could register it and affect your calibration.
	If you are going to use a household item like a can of soup, bear in mind that it will need to sit in the weigh bucket without touching anything around it.

Step #6	Sequence	*F] CALIBRATE + E] ENTER + 4 + 1 + 2 + 8*
	Buttons	

Step #8	Sequence	*E] ENTER + 0 + 4*
	Buttons	

6.1 Speed & Flow Introduction

System performance is completely dependent on Flow Control and Speed elements that interact proportionate to the other. The system will not perform optimally if either is badly managed. This is especially true for flow control as neither optimal speed nor accuracy can be achieved with poor flow control.

Consider that Flow Control is the foundation of a well-managed system and should be the first concern when considering or making changes to any of the other variables that impact performance. The system cannot be made faster or more accurate if the flow of product is out of control.

The primary variables that most impact system performance are: 1] The Hopper Gate Setting (Product Flow Control), 2] Bulk Cutoff (Setpoint 2) & 3] The Feeder Speeds (Bulk & Dribble).

The next several subsections will explain these variables and instruct you on how to manipulate them to achieve your desired results. This subsection is a crash course in product flow control management.

Flow Control is essentially the efficient management of product based on its characteristics. This means how well the product is running through the machine.

Flow of product out of the Hopper will determine the level of product on the Feeder Pan which will impact the consistency of product supplied to the Weigh Bucket. If that product supply to the Weigh Bucket is unreliable or inconsistent, accurate and efficient (read fast) weighing will be impossible to achieve.

Therefore when making adjustments to system performance that aim to increase throughput a good rule of thumb is to adjust first for accuracy. Basically this means control your product flow first and then worry about increasing speeds.

You must achieve and then maintain an efficient level of product in the Feeder Pan before making adjustments for speed. The ideal product level is that which is low (height) and consistent. This may seem counter-intuitive but truly less is more here. Keep the amount of product constant and consistently the same. Very often problems with accuracy and speed are the result of huge amounts of product on the feeder pan, see illustrations below.

Good	Bad
	
Product Level Height Low, Consistent & Uniform	Product Level Height Too High, Uneven & Inconstant

You should now have an appreciation for the importance of managing flow control.

6.2 Speed & Flow - Hopper Gate (Product Level)

As already mentioned, products that look the same do not always act the same and may have different flow characteristics.

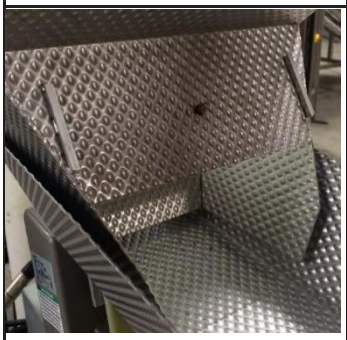
Products with different flow characteristics must be handled as such and may require both mechanical and electronic adjustments for optimal performance. What is good for one product may be very wrong for another.

Setting the Hopper Gate for flow characteristics should be the first adjustment made when approaching speed and flow.

The easiest way to adjust for a product's flow control is by setting the Hopper Gate at an appropriate height.

The Hopper Gate regulates the amount of product available for feeding, via the Feeder Pan, to the Weigh Bucket. It also functions as a restraint for products with excessive fluidity.

Hopper Gate Settings	The Hopper Gate height should be set based on the produt type being run.
	Always keep the gate height as low as practical for best control.

Bulky Products		Free-Flowing Products	
OFF	LOW	MID	HIGH
			

⚠ *Removing the gate will cause control problems and should be done only as a last resort. Always keep the gate as low as practical for best control.*

Adjusting Hopper Gate Height	
When	If you find the scale is not reacting as expected to a product you might first try adjusting the Hopper Gate setting.
	If the product is "bridging", becoming clogged at the Hopper output, raise the gate or remove it completely for bulky,
	If the product is overflowing the sides of the Feeder Pan lower the gate as needed to restrict loose products.
How	Slide the gate up/down in relation to the feeder pan to achieve the optimal hopper aperature.

Reset Gate Height	
1	Remove the Gate Knob, *Fig. 6.1.B*.
2	Slide the gate into the desired
3	Fix into place with Gate Knob.

6.1.B

6.3 Speed & Flow - Feeder Speeds: Incremental Speed Controls

Adjusting the Feeder Speeds will further control the flow of product. This means of product flow control may be required for products not well controlled via Hopper Gate adjustments.

Feeder Speeds can be changed using the Incremental Speed Controls which will be detailed in this sub-section and through a value change at **Subroutine 3** which will be explored in the next sub-section.

Increasing feeder speeds will not necessarily increase overall throughput.

⚠ *When it comes to feeder speeds + / - do not imply up and down respectively, it is actually reversed in this instance.* **0** *is as fast as possible and* **9** *slow with "***F***" set as off, essentially + to go slow and - to go fast.*

You can use the Incremental Speed Controls to adjust feeder speeds while in Run Mode. This means of adjustment affects real time performance of the program being run and is not a permenant alteration to that program. Once Run Mode is exited feeder speeds will revert back to the stored speed setting. However, you can save those adjustments to the program prior to exiting Run Mode. See **Save Speed Adjustments** below on how to store adjustments made during "Run" Mode with the Incremental Speed Controls permanently to the program.

8] FEEDER SPEED ↑ & ***C] FEEDER SPEED*** ↓ will alter performance of the magnetic vibratory feeder connected to that correspond- ing circuit. ***9] HOPPER SPEED*** ↑ & ***D] HOPPER SPEED*** ↓ will not actually cause the Hopper to move but would change the speed of a vibratory feeder hardwired into that circuitry. This may be a "Hopper Vibrator" or a "Spreader Feeder" if the system is so equipped. If there is no magnetic vibratory feeder hooked up to that circuit then commands issued using those buttons will not result in any change.

When in Bulk Mode ***8] FEEDER SPEED*** ↑ & ***C] FEEDER SPEED*** ↓ will affect speeds for that circuited feeder's "Bulk" speed and when in Dribble Mode ***8] FEEDER SPEED*** ↑ & ***C] FEEDER SPEED*** ↓ will affect speeds for that feeders circuited "Dribble" speed. This would also apply to any feeder on the Hopper Speed circuit.

Incremental Speed Control Adjustments					
	***8] FEEDER SPEED*** ↑	Increases feeder speed		***C] FEEDER SPEED*** ↓	Decreases feeder speed
	***9] HOPPER SPEED*** ↑	Increases back feeder speed or hopper vibrator, if equipped.		***D] HOPPER SPEED*** ↓	Decreases back feeder speed or hopper vibrator, if equipped.
	Must be in "Run" mode to register. Affects operating mode only therefore your scale must be running to register those adjustments.				
	Tip	If Dribble is too quick to make adjustments press down on the Weigh Bucket quickly. This will force the logic to go to Dribble mode and give you plenty of time to experiment.			

*This type of adjustment is merely **TEMPORARY** and the speeds will revert back to the stored setting if you do not save the change.*

Save Speed Adjustments		
To make the adjustment permanent you must save it to the program.		
1	Exit Run Mode	
2	Press ***E] ENTER***	
3	Input Program Code	Use the code for that program just exited
	Note	If you've been running program **7B** when you adjusted the speed you must re-enter that same code to store the speeds.

Save Speed Adjustment Example	
Sequence	***RUN \ STOP*** + ***E] ENTER*** + ***7*** + ***B***
Buttons	

6.4 Speed & Flow - Feeder Speeds: Bulk/Dribble @ Sub 3/Sub 2

The Feeder Speeds of a program can be altered by changing the value of **Sub 3.** This is a permanent change to the program. When that program is next recalled, assuming the change was stored correctly, the feeders will run as reset.

To highlight the role of **Sub 3** in setting program feeder speeds we will refer to an example, **A1**, *Fig. # 6.4.A.* It is also necessary to define the feeder process by explaining "Bulk" & "Dribble" as well as review subroutine bit controls.

TARGET WEIGHT: 125 G
PRODUCT: COFFEE BEANS
SETPOINTS:

1	0100	BULK CUTOFF
2	0125	TARGET WEIGHT
3	0125	UNDR TLERANCE
4	0127	OVER WEIGHT

SUBROUTINES:

0	80	00	SET LANE GATE: N/A
1	00	0F	
2	FF	FF	
3	40	18	
4	04	0F	
5	16	16	SET HOPPER GATE: LOW
6	00	00	
7	08	01	
8	01	01	
9	50	00	
F	26	52	

PROGRAM A1
SET FOR (MODE) G
BY (RESOLUTION) 1 G

6.4.A

	BIT # 1	BIT # 2
2	FF	FF
3	40	18
4	04	0F

6.4.B

As explained in *Sec. 5.1* a subroutine is composed of four digits expressed as two pairs of two digits each. These pairs are called bits and are labeled **BIT # 1** & **BIT # 2**, *Fig. # 6.1.B.*

Since feeder speed(s) are dictated by the set value of **Sub 3**, let's look at that subroutine of program **A1**, *Fig. # 6.1.A.*

A filling cycle is composed of two stages:

Bulk & Dribble.

Filling Process	
Bulk	Bulk is the initial phase and should be the faster of the two stages. It is designed to supply a majority of the program's target weight. The amount of product to be processed during Bulk is dictated by **SETPOINT 1**. In **A1**, *Fig. # 6.4.A*, 100 g of coffee beans will be run during bulk. It will be run at the speed set at **Bit #2** of **Sub 3** which in this case is **18**, *Fig. # 6.4.B.* When 100 g of coffee beans accumulates in the weigh bucket Bulk filling will cease and Dribble will commence.
Dribble	When Dribble begins the feeder will down shift in speed to allow for more accurate weighing of the product remainder which is 25 g in the case of program **A1**, *Fig. # 6.4.A.* The speed at which the 25 g of product will be processed is dictated by the value of **Bit #1** of **Sub 3** which in this case is **40**. That is significantly slower than **Bit #2** since feeder speed descends as the set value ascends; **99** would be the slowest possible value and **00** the fastest.

⚠ *All information pertaining to* **Sub 3** *value changes may be applied to* **Sub 2** *for Hopper Speeds IF a feeder is wired to that circuit.*

If you need to alter the speed of a program's set feeder speed you can make that adjustment to **Sub 3** of your program using the **Change Subroutine Command Sequence** detailed in *sub-Section 5.2.*

You do not need to change both “Bulk” and “Dribble” though you can if necessary. Let’s walk through a few button se- quence examples to further clarify this process. We will refrence program **A1**, *Fig. # 6.4.A* specifically **Sub 3.**

Example #1	**Reduce Feeder Dribble Speed Only (Sub 3)**
	Slow dribble to **60**, keep bulk the same.
	Bit #1 value, reset: **60**
	Bit #2 value, same: **18**

Example #2	**Increase Feeder Bulk Speed Only (Sub 3)**
	Increase bulk to **10**, keep dribble the same.
	Bit #1 value, same: **40**
	Bit #2 value, reset: **10**

Example #1	
Sequence	*RECALL PROGRAM* + *A* + *1* + *DISPLAY SUBROUTINE* + *3] FDR SPEED* + *E] ENTER* + *6* + *0* + *1* + *8* + *E] ENTER* + *A* + *1*
Buttons	RECALL PROGRAM · A 10 ADD VALUE · 1 DISPLAY BULK CUTOFF · DISPLAY SUB ROUTINE · 3 DISPLAY UNDER · E 14 ENTER DATA PROGRAM # · 6 DISPLAY ZERO BAL · 0 TARE ZERO · 1 DISPLAY BULK CUTOFF · 8 FEEDER SPEED · E 14 ENTER DATA PROGRAM # · A 10 ADD VALUE · 1 DISPLAY BULK CUTOFF

Example #2	
Sequence	*RECALL PROGRAM* + *A* + *1* + *DISPLAY SUBROUTINE* + *3] FDR SPEED* + *E] ENTER* + *4* + *0* + *1* + *0* + *E] ENTER* + *A* + *1*
Buttons	RECALL PROGRAM · A 10 ADD VALUE · 1 DISPLAY BULK CUTOFF · DISPLAY SUB ROUTINE · 3 DISPLAY UNDER · E 14 ENTER DATA PROGRAM # · 4 DISPLAY OVER · 0 TARE ZERO · 1 DISPLAY BULK CUTOFF · 0 TARE ZERO · E 14 ENTER DATA PROGRAM # · A 10 ADD VALUE · 1 DISPLAY BULK CUTOFF

6.4 Speed & Flow - Feeder Speeds: Bulk/Dribble @ Sub 3/Sub 2

Example # 3	**Reduce Feeder Dribble & Bulk Speed (Sub 3)**
	Slow dribble to 8 0, slow bulk to 3 0.
	Bit #1 value, reset: 8 0
	Bit #2 value, reset: 3 0

⚠ Remember, as with all program changes, to check your Supervisor Codes and override or re-set as needed, see *Section 5.3.*

Update your PDS accordingly, for future reference.

Refer to ***Table II***, *Section 5.1*, for a full list of Subroutine Bit Instructions

Example # 3	
Sequence	*RECALL PROGRAM* + *A* + *1* + *DISPLAY SUBROUTINE* + *3] FDR SPEED* + *E] ENTER* + *8* + *0* + *3* + *0* + *E] ENTER* + *A* + *1*
Buttons	RECALL PROGRAM · A 10 ADD VALUE · 1 DISPLAY BULK CUTOFF · DISPLAY SUB ROUTINE · 3 DISPLAY UNDER FDR SPEED · E 14 ENTER DATA PROGRAM # · 8 FEEDER SPEED · 0 TARE ZERO HOPPER CODES · 3 DISPLAY UNDER FDR SPEED · 0 TARE ZERO HOPPER CODES · E 14 ENTER DATA PROGRAM # · A 10 ADD VALUE · 1 DISPLAY BULK CUTOFF

Because you are adjusting the feeder speeds via programming it will be permanent, assuming correct execution.

Hopper Vibrator speed is to **Sub 2** as Feeder speed is to **Sub 3**.

Sub 2 of **A1**, *Fig. # 6.4.A*, is set as **FF FF** so we can discern that there is either no Hopper Vibrator or it is off for this program.

Assuming there is a magnetic vibrator connected to the Hopper Vibrator circuit available to set, or turn on in this case,

Let's review that process.

F is the hex code used for off.

Example #4	**Turn ON Hopper Vibrator, Set Bulk/Dribble Speed (Sub 2)**
	Set dribble to **5 0** (mid speed), set bulk to **0 0**.
	Bit #1 value, set: **5 0**
	Bit #2 value, set: **0 0**

Example # 4	
Sequence	*RECALL PROGRAM* + *A* + *1* + *DISPLAY SUBROUTINE* + *2] HPR SPEED* + *E] ENTER* + *5* + *0* + *0* + *0* + *E] ENTER* + *A* + *1*
Buttons	RECALL PROGRAM; A 10 ADD VALUE; 1 DISPLAY BULK CUTOFF; DISPLAY SUB ROUTINE; 2 DISPLAY TARGET (HPR SPEED); E 14 ENTER DATA PROGRAM #; 5 DUMP (REZERO DELAY CHECK DELAY); 0 TARE ZERO (SUPER CODES); 0 TARE ZERO (SUPER CODES); 0 TARE ZERO (SUPER CODES); E 14 ENTER DATA PROGRAM #; A 10 ADD VALUE; 1 DISPLAY BULK CUTOFF

The principles and mechanics described herein are an expansion on those put forth in *sub-sections 5.1 & 5.2* regarding sub- routines. These same principles may be applied to other subroutine changes such as **Sub 5**, the bit assignments of which control Re-zero & Check Delay. In the next sub-section we will look at **Sub 5** in detail..

Please refer to Table II in sub-section 5.1 for a complete list of Subroutine Bit Instructions.

6.5 increasing Accuracy - Check Delay

Very basically Check Delay is a pause between hitting the target weight and beginning the next indicated action. This pause is designed to ensure no under weights and is inextricably linked to accuracy. Its other purpose is to mitigate for the not obvious environmental factors, mainly gravity and inertia, that directly impact scale performance relative to application specifics. In this sub-section we will discuss Check Delay and the role it plays in optimizing accuracy while mitigating the effects of gravity and inertia as they pertain to your unique application. We will get into the theory and physics surrounding Check delay but first the process will be described.

Check Delay - **The Process**: *Pause, Dribble or Dump*

The scale programming is such that once the logic registers the amount of product in the weigh bucket has hit the Target Weight all feeders will cease and a pause is affected. The duration of this pause is programmable at **Bit # 2** of **Sub 5**. This pause is referred to as Check Delay. Upon expiration of Check Delay the load cell will read again and based on what is found to be in the Weigh Bucket the scale will perform an applicable action, see *Fig. # 6.5.A*.

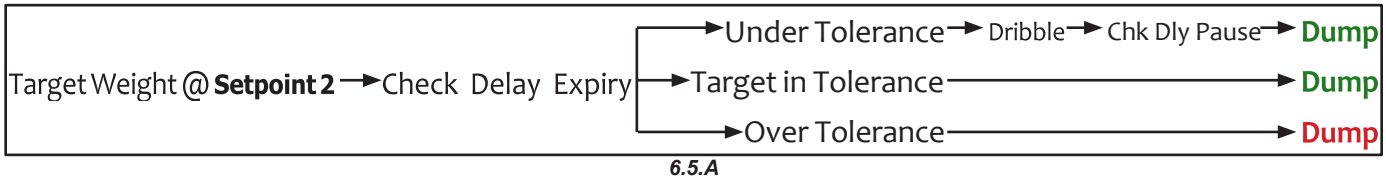
Accuracy vs. Speed

As already explained Check Delay is crucial to accuracy but it will increase the total length of time required for a cycle to complete. As with most things a compromise may have to be made between speed and accuracy. Your goal is to set Check Delay duration length so that it expires after sufficient time has elapsed to allow for all products in transition to settle in the Weigh Bucket.

Too Short	Risk of underweights, decreased	Too Long	Unnecessary slow down of throughput

Establishing an Effective Duration Length *(Drop Height/Mass/Volume)*

The Check Delay duration length should be set to allow for enough time for all products to fully transition and settle into the weigh bucket. The length of time that will take is relative to several factors that should be evaluated when determining an appropriate length, let's take a look at those:



6.5.A

See the previous sub-sections on Speed & Flow if you are experiencing an inordinate number of over-weights.

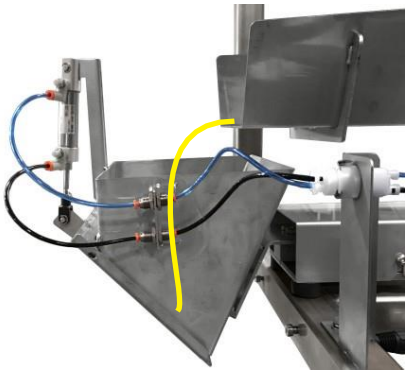
More complex systems may have integrated auto-rejects or alarms designed to handle an over-weight after Check Delay.

Check Delay - The Theory: *Transition, Motion & Inertia*

You want to make sure that what is in the weigh bucket is on target. You might assume that it is if the scale is set up right, the load cell is calibrated and the bucket was emptied prior to running; but that would be wrong. The environmental factors mentioned previously, the idiosyncrasies of the product's flow characteristics as well as the machine's configuration all have an impact on the weighing process, variables necessitating the inclusion of a pause in the logic.

Consider this: when the load cell registers the Target Weight, **Setpoint 2** of the program, there is probably still product in transition from the pan which has not yet reached the bucket. That product in transition must be accounted for which is why we need Check Delay. Transitional product is also why **Setpoint 2** Target Weight would be set at **0499** and not **0500** for a 500 g program. If the duration was set appropriately then all product will have transitioned into the weigh bucket once the delay has expired allowing for an accurate reading to be made.

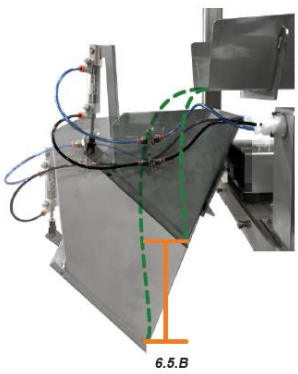
As product falls from the feeder pan it accelerates until it hits the weigh bucket. During the filling cycle the load cell is measuring the product's resistance to its sudden change in velocity (i.e. deceleration) as opposed to its actual weight at rest. Think about this: when you step on a floor scale to weigh yourself it initially spikes higher than your actual weight; if you jump on it the spike will be even greater. Once you have stopped moving the scale will give you an accurate reading.



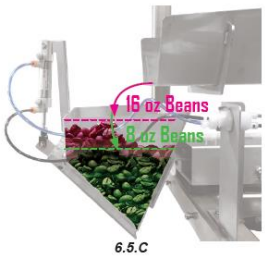
This inertial phenomenon makes Check Delay critical to accurate weighing. It allows time for the product to come to rest and the entire mass in the bucket to settle ensuring an accurate reading of the final weight of the completed cycle. Fundamentally Check Delay is a pause to allow for all variables to stabilize so that an accurate measure of the weight in the bucket can be taken.

Bucket Sizes	As you can see from the below illustrations, *Fig. # 6.5.B,* product must fall farther to reach the larger weigh bucket than the smaller. That increased product fall results in more product in transition when the Target Weight is registered. Product is also accelerating at a great speed when it hits the bucket, since it is falling from a greater height, so the inertial mass is greater and will result in increased weight spikes. Therefore you will have a larger amount of product in transition that is falling faster with the larger bucket so you would set the Check Delay duration length longer for the larger bucket than for the smaller.	
		The farther the fall, read the larger the weigh bucket, the longer the Check Delay duration length should be set.
Target Weights	When **SETPOINT 2** Target Weight is reached and the Check Delay pause commences the amount of product in transition will be greater for a higher Target Weight. The amount of product in transition is commensurate to the Target Weight and the Check Delay duration should be set accordingly even if the programs are run in the same bucket as illustrated in *Fig. # 6.5.C.*	
		The lower the Target Weight the shorter your may set the Check Delay duration length.
Type/ Volume	Products run to the same Target Weight but of differing densities may need different Check Delay duration lengths. Product density creates differences in the amount of product in transition, product fall height as well as bucket stability, *Fig. # 6.5.D.*	
		Denser products can have a shorter duration length as they transition more efficiently. Products with a high volume to weight ratio, i.e. "fluffy" products, or products with very large particulates will benefit from a lengthened duration.

The above suggestions are general rules of thumb. All products have unique flow characteristics; you should therefore evaluate different products individually based on their performance.



6.5.B



6.5.C

6.5.D

6.5 Increasing Accuracy - Check Delay

Check Delay - **Set Value**: *Sub 5 @ Bit # 2*

The Check Delay duration length is set at **Bit #2** of **Sub 5**. Alterations are made in the same manner reviewed previously in sub-section *# 6.4* on changing Feeder Speeds at **Sub 3**.

The relationship of Check Delay duration length to Target Weight is illustrated in the below example programs, *Fig. # 6.5.E, 6.5.F, 6.5.G*. The value of **Bit #2** of **Sub 5** increases as the Target Weight programmed at **Setpoint 2**.becomes greater.

TARGET WEIGHT:	2 oz
PRODUCT:	COFFEE BEANS
SETPOINTS:	
1 0175	BULK CUTOFF
2 0200	TARGET WEIGHT
3 0200	UNDR TLERANCE
4 0202	OVER WEIGHT
SUBROUTINES:	
0 80 00	SET LANE GATE: N/A
1 00 0F	
2 FF FF	
3	
4 04 0F	
5 16 12	SET HOPPER GATE: DOWN
6 80 00	
7 12 01	
8 01 01	
9 50 00	
F	
PROGRAM	F2
SET FOR (MODE)	oz
BY (RESOLUTION)	.01 (1/100)

6.5.E

TARGET WEIGHT:	16 oz
PRODUCT:	COFFEE BEANS
SETPOINTS:	
1 1500	BULK CUTOFF
2 1599	TARGET WEIGHT
3 1597	UNDR TLERANCE
4 1605	OVER WEIGHT
SUBROUTINES:	
0 80 00	SET LANE GATE: N/A
1 00 0F	
2 FF FF	
3	
4 04 0F	
5 16 16	SET HOPPER GATE: DOWN
6 80 00	
7 12 01	
8 01 01	
9 50 00	
F	
PROGRAM	16
SET FOR (MODE)	oz
BY (RESOLUTION)	.01 (1/100)

6.5.F

TARGET WEIGHT:	5 Lbs
PRODUCT:	COFFEE BEANS
SETPOINTS:	
1 0475	BULK CUTOFF
2 0495	TARGET WEIGHT
3 0490	UNDR TLERANCE
4 0515	OVER WEIGHT
SUBROUTINES:	
0 89 00	SET LANE GATE: N/A
1 00 0F	
2 40 26	
3 23 05	
4 0A 0F	
5 24 30	SET HOPPER GATE: UP
6 80 00	
7 20 01	
8 0A 02	
9 50 00	
F 32 F5	
PROGRAM	05
SET FOR (MODE)	Lbs
BY (RESOLUTION)	.01 (1/100)

6.5.G

The actual duration length will increase as the value setting increases with **00** being no pause and **99** being the longest possible duration. Once you have established the duration length value you would like to input, adjust the program as already instructed to do so using the **Change Subroutine Command Sequence** detailed in *sub-Section 5.2.* and in the previous sub-section.

Remember to input **Bit #1** of **Sub 5** the same as detailed in the PDS, you only need to change **Bit # 2** of **Sub 5** to adjust duration length. Failure to keep **Bit # 1** the same may compromise the program's functionality.

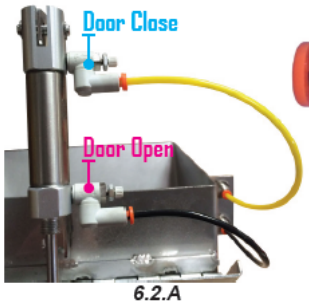
6.6 Bucket Adjustments

It is very important for the Weigh Bucket to open and close properly. If, for example, the bucket door opens too slowly product accrual may occur while a slamming door could result in altered or inconsistent weights or Load Cell damage.

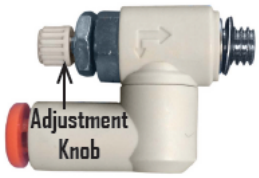
The two elements of bucket performance you can adjust for a specific product are: mechanical force and bucket duration.

Mechanical Force	The physical force of the door's open/close action is determined by the amount of air supplied to the Bucket's Air Cylinder.					
	This air supply is regulated by a pair of Flow Controls that maintain the force/speed of the door's open/close action, *Fig. 6.2.A.*					
	Too much air flow can interfere with the load cell producing weight spikes, altered weights and general inconsistencies. It may also result in damage to the Load Cell and/or Weigh Bucket as well as pose a hazard with potential for bodily injury from a slamming door.					
	Too little air flow may result in reduced system throughput, bridging and/or overflow.					
		Note	Bottom Flow Control	Door Open	⚠	*The more air the greater the force of action.*
			Top Flow Control	Door Close		

Adjust Flow Controls	
Each flow control has an **adjustment knob** to set the cylinder air supply, *Fig. 6.2.B.*	
1	Loosen the lock nut.
2	Adjust air flow with Adjustment Knob, then retighten lock nut.
Adjust flow controls if:	Door open and/or close action is too slow or too fast.
	Door is slamming open and/or closed.
	Door failing to open or close after checking program.



6.2.A



6.2.B

Bucket Duration	Bucket Duration is the length of time the door remains open and is set at **Sub 7**. Refer to **Section # 5** for subroutine instructions.		
	Bucket Duration "time" is dictated by a two digit Hex value in the first and second positions.		
	Value	***Time***	***Description***
	10	.8 seconds	Shortest suggested Duration
	32	2 seconds	Longest suggested Duration

6.2.E

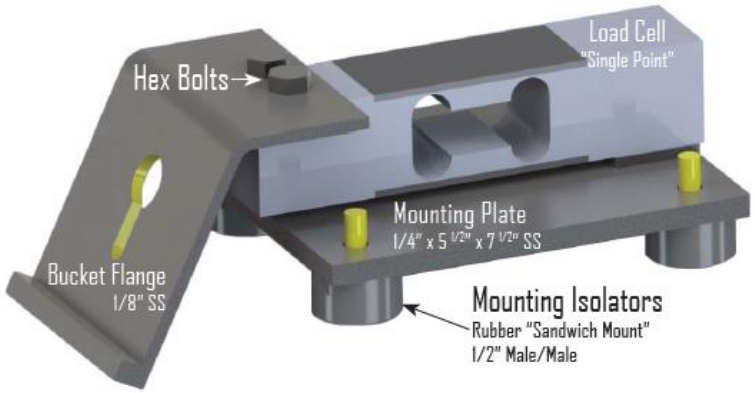
6.2.F

Tip Test Bucket performance without product in the scale to prevent mess and waste.

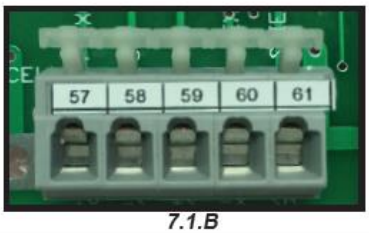
Set Bucket Duration Example	
Let's say **Sub 7** is set at **10 01**, an .8 second duration (value **10**), and you want to increase it slightly to a value of **15**.	
Sequence	***DISPLAY SUBROUTINE + 7 + E + 1 + 5 + 0 + 1***
Buttons	
⚠	*Remember you need to preserve the last two digits so your new subroutine value would be **15 01**.*

7.1 Load Cell Info

Each load cell has 4 colored wires and a shield wire. Each wire carries a voltage or piece of information to/from the controller where they are combined to result in an output weight. For the Load Cell to communicate correctly with the controller and produce an accurately displayed reading, the wires must connect to the appropriate terminal(s). These terminals are located on the Motherboard, *Fig 7.1.B*; the standard controller wiring pattern for load cell inputs, are listed in the below table.



7.1.A



7.1.B

Load Cell Wiring					
Function	+EXC	-SIG	+SIG	-EXC	GND
Terminal Location	57	58	59	60	61
Color Code	Red	White	Green	Black	Shield

While the ME-109 might use red for +EXC, white for –SIG, green for +SIG and so on this is not necessarily the same color coding for all load cell manufacturers. One of the most common tech calls we get is the Load Cell “not working” often this is a result of incorrect wiring.

If you are experiencing negatively displayed weights, all zeros when a load is applied, no displayed weight at all, etc., or if you have received a new Load Cell from either us or an alternate source and it does not work when you connect it then checking the wiring is the first course of action you should take.

Verify Wiring	
A black wire is always **-EXC** and a bare wire (shield) is always **GND**.	
Establish the pattern by locating the other three color wires.	
1	Set your multimeter to "RESISTANCE" (ohms signal).
2	Touch one of the multimeter's leads to the Load Cell's black wire.
3	With the lead positioned to the black wire, touch the other lead to the red, green and white wires sequentially.
4	The wire that reads the highest resistance is **+EXC**. Note the color for your reference.
5	Insert that wire into the **+EXC** terminal (#57) on the Motherboard.
6	Insert the black wire into **-EXC** terminal and Shield (bare wire) into the **GND** terminal.
7	Plug remaining two wires into the open terminals.
8	Gently press down directly on the load cell, if the weight registers negatively swap the two wires for the correct terminal locations.
Tip	Note the correct color pattern of load cell for later reference

Check Voltage Input/Output	
To check the DC voltage the Load Cell is receiving and outputting you will need to locate the wiring terminals located on the Mother Board, *Fig.#7.1.B*.	
Note	You will also need a multimeter to check DC voltage.
1	Remove wires from the **+ EXC** *(#57)* & **- EXC** *(#60)* terminals on the Motherboard.
2	Insert multimeter leads into terminals, measure readings.
3	The voltage between them should be approximately 10-12 volts.

Check Load Cell Output	
The DC millivots must be measured incrementally with increasing loads (known weights) applied directly to the Load Cell.	
1	Remove Weigh Bucket and Mounting Flange from Load Cell.
2	Remove wires from the **+ SIG** *(#59)* & **- SIG** *(#58)* terminals on the Motherboard.
3	Measure the DC millivots between the two:
	5% on end of load cell should measure 1 mV
	10% on end of load cell should measure 2 mV
	50% on end of load cell should measure 10 mV
	....100% on end of load cell should measure 20 mV
	NO load should measure close to Zero.

7.2 Hex Codes

The proprietary controls are based in Hex Code allowing more programming options and expands system capabilities. Essentially “Hex Codes” use letters to express numbers composed of two digits.

Hex Codes (Base 16)	
#	Hex Code
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	A
11	B
12	C
13	D
14	E
15	F

Table III

Linear Sequence
000, 001, 002, 003, 004, 005, 006, 007, 008, 009, 00A, 00B, 00C, 00D, 00E, 00F…
…010 (decimal 16), 011 (decimal 17), 012, 013, 014, 015, 016, 017, 018, 019, 01A, 01B, 01C, 01D, 01E, 01F…
…020, 021, 022, 023, 024…02A, 02B…02F…030, 031, 032…03C, 03D, 03E, 03F…090, 091, 092…09D, 09E, 09F…
0A0, 0A1, 0A2, 0A3, 0A4, 0A5, 0A6, 0A7, 0A8, 0A9, 0AA, 0AB, 0AC, 0AD, 0AE, 0AF….
….0F1, 0F2, 0F3, 0F4, 0F5, 0F6, 0F7, 0F8, 0F9, 0FA, 0FB, 0FC, 0FD, 0FE, 0FF.

Memory Location Storage Capacity			
The program storage capacity of your system depends on the number of available memory locations. The quantity of available memory location is based on whether or not Hex Codes are utilized.			
	Number of Available Memory Locations		
NO Hex Codes	100 Locations	000-009	10 x 10 = 100
Hex Codes	256 Locations	000-0FF	16 X16 = 256
Expanded Memory	1,024 Locations	000-3FF	256 x 4 = 1024

7.3 Subroutine Assignments (Control Options)

SUB 0, **SUB 1** and **SUB 6** are used to maintain the control options for any given program such as Supervisor Codes, peripheral equipment options and other miscellaneous variables not associated with a specific numeric value.

Each digit position can be set to a particular Hex Code for the performance of certain functions. Below is a list of these functions with their corresponding Hex Codes and requisite digit position.

Digit Positions	
MSD	Most Significant Digit
2MSD	2nd Most Significant Digit
3MSD	3rd Most Significant Digit
LSD	Least Significant Digit

Table IV

SUB 1

Digit Pos.	Hex Code	Function	Default	Comments
MSD	0-F	Peripheral Out Freq.	0	0 or 1 Periph. Out on every weighment
2MSD	0-F	SP1 Check Delay	0	Undersized Load Dribble
3MSD	0-F	Future	0	
LSD	0-F	Zero Verify Tolerance	F	# of Raw Counts (+/-) Trigger

Table V

SUB 0

Digit Pos.	Hex Code	Bit	Function	Default
MSD	8	F	No access to ***EJ ENTER***	1
	4	E	No access to Incremental Speed Controls	0
	2	D	No access to Setpoints No access to Add/Subtract Function	0
	1	C	No access to cycle count register	0
2MSD	8	B	Resolution/Count by "5"	1
	4	A	Resolution/Count by "2"	1
	2	9	1/2 piece offset	0
	1	8	Select alternate Zero Pot	0
3MSD	8	7	Internal Flag	0
	4	6	Internal Flag	
	2	5	Internal Flag	
	1	4	Internal Flag	
LSD	8	3	Internal Flag	0
	4	2	Internal Flag	0
	2	1	Internal Flag	0
	1	0	Internal Flag	0

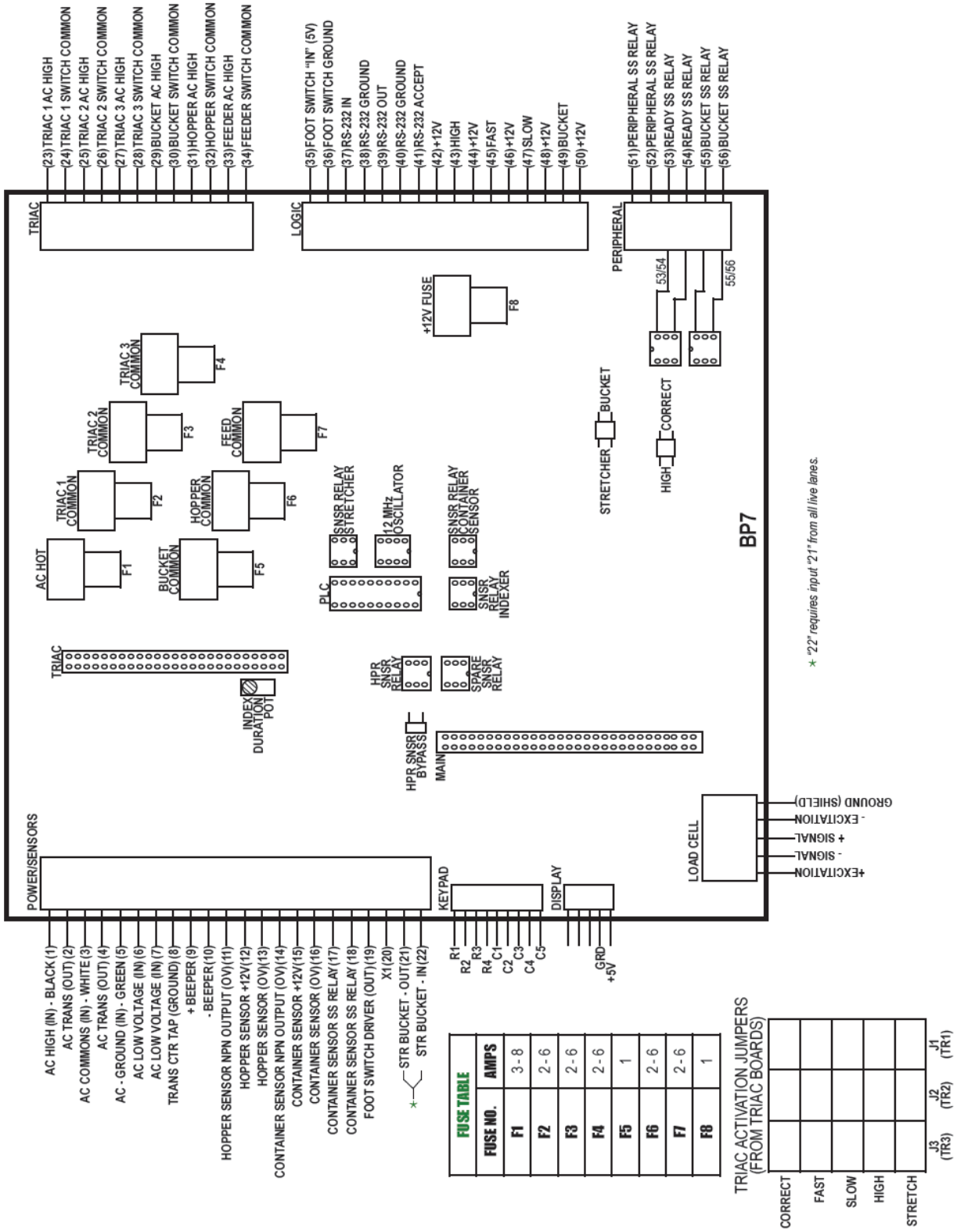
Table VI

SUB 6

Digit Pos.	Hex Code	Bit	Function	Default	Comments
MSD	8	F	Soft Restart Enable	0	
	4	E	Future	0	
	2	D	Allow "under" (chw)	0	
	1	C	Enable Audible Alarm	0	Zero Verify Default Alarm
2MSD	8	B	Future	0	
	4	A	Enable & Print Format	0	For A & D Analytical Only
	2	9	No Print on Over	0	
	1	8	Enable Print Output	0	Seq #, 4 digit weight "*" for Over
3MSD	8	7	Auto Taper Enable	0	
	4	6	Peripheral out during Ready	0	
	2	5	Peripheral out during Bucket	0	Leading Edge Bucket Signal
	1	4	No peripheral out when Over	0	
LSD	8	3	Future	0	
	4	2	Delay Bucket for Reject	0	
	2	1	Soft Start	0	
	1	0	Zero Verify	0	

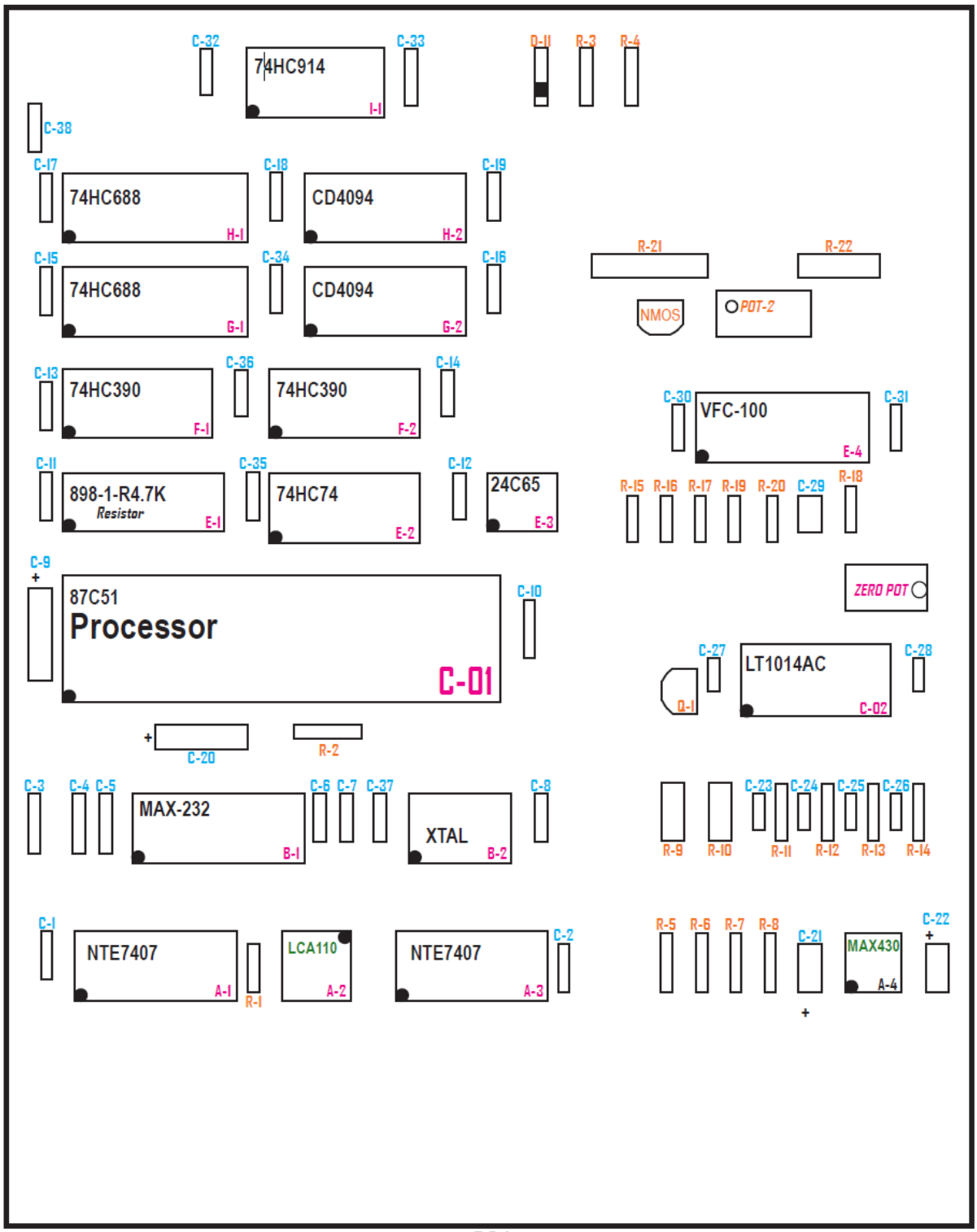
Table VII

7.4 Mother Board Terminals



7.5 Main Board Layout

The layout below depicts the location of each component on the Main Board as well as showing the overall configuration.



7.5.A

7.5 Main Board Functions

The tables below are an index of each Main Board component as depicted on the facing page, *Fig. # 7.5.A*.

Major Componenet Functions

Component	Function	Comments
I-1	Buffer/Driver	Affects display, foot pedal, feeder speed & memory retention
H-1	Feeder Speed Control	Affects Feeder Speed
H-2	Feeder Speed Control	Affects Feeder Speed
G-1	Feeder Speed Control	Affects Feeder Speed
G-2	Feeder Speed Control	Affects Feeder Speed
F-1	Hopper Speed Control	Affects Hopper Speed
F-2	Hopper Speed Control	Affects Hopper Speed
E-1	Resistor Pack	Pulls up resistors Affects foot pedal, lamp, peripheral outputs, memory retention and displayed information
E-2	Feeder Speed Control	Affects Feeder Speed load cell amplification
E-3	Program Memory	Affects retention of data
E4	Analog to Frequency Converter	Affects stability and accuracy of weight measurement
C-01	CPU	Affects ALL functions
C-02	Linear Amplifier	Affects stability and accuracy of weight measurement
B-1	Serial Interface	Affects communication between multi-head units and ancillary units such as printers
B-2	Crystal	System master clock, affects ALL functions
A-1	Lamp & Peripheral Driver	Affects lamps and related lamp functions
A-2	Opto-Coupler	Affects peripheral output contact
A-3	Lamp & Peripheral Driver	Affects lamps and related lamp functions
A-4	Linear Amplifier	Affects gain, accuracy and stability of weight measurements
ZERO POT	Set True Zero	Affects stability and accuracy of weight measurements

Table VIII

Capacitors

C-1	.1uF	C-14	.1uF	C-27	.1uF
C-2	.1uF	C-15	.1uF	C-28	.1uF
C-3	.1uF	C-16	.1uF	C-29	2200pF
C-4	.33uF	C-17	.1uF	C-30	.1uF
C-5	.33uF	C-18	.1uF	C-31	.1uF
C-6	.33uF	C-19	.1uF	C-32	.1uF
C-7	.33uF	C-20	10uF	C-33	.1uF
C-8	.33uF	C-21	4.7uF	C-34	.1uF
C-9	10uF	C-22	4.7uF	C-35	.1uF
C-10	.1uF	C-23	.47uF	C-36	.1uF
C-11	.1uF	C-24	.33uF	C-37	.1uF
C-12	.1uF	C-25	.47uF	C-38	.33uF
C-13	.1uF	C-26	.33uF		

Table IX

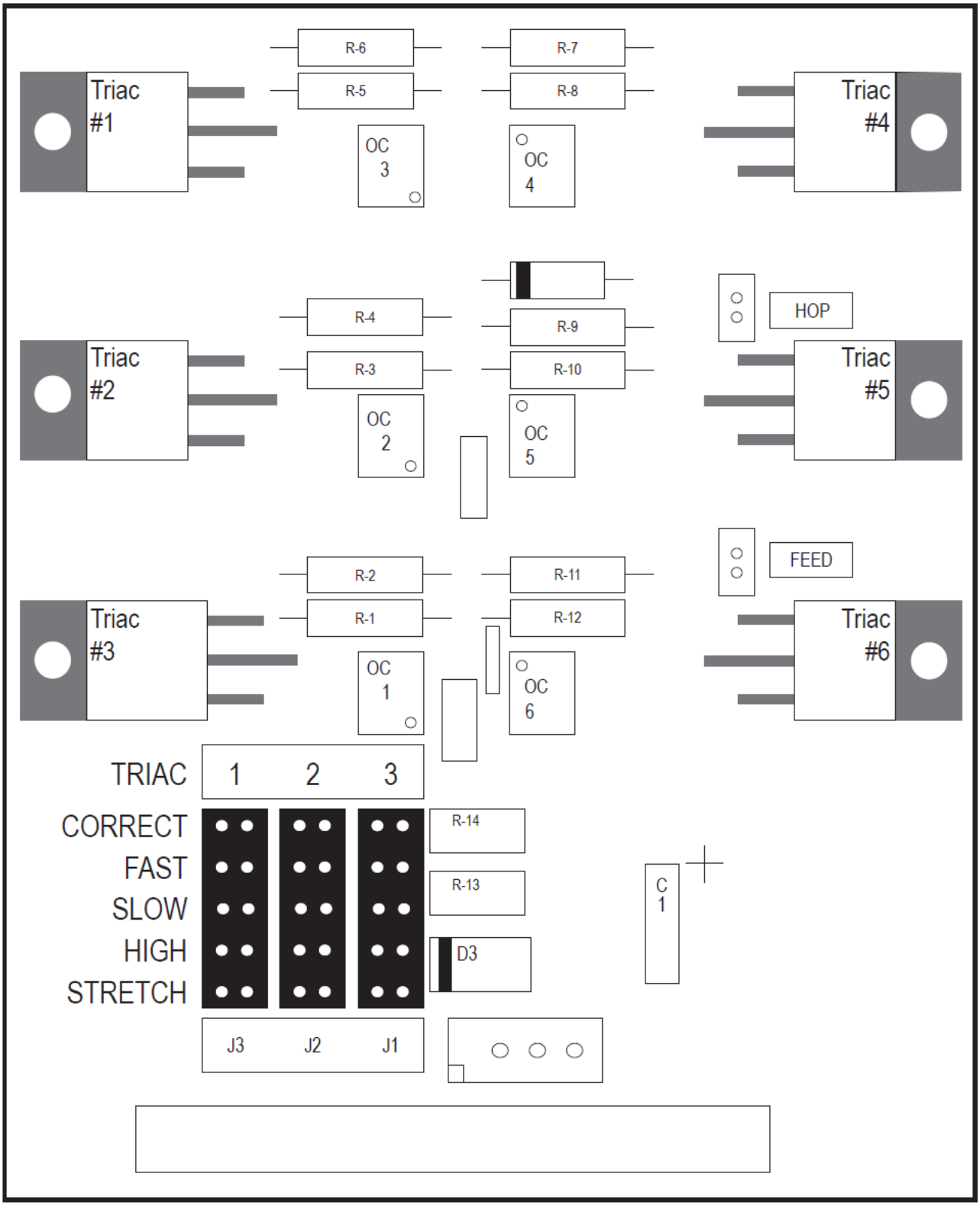
Resistors

OHMS(1%, 1/4 WATT)

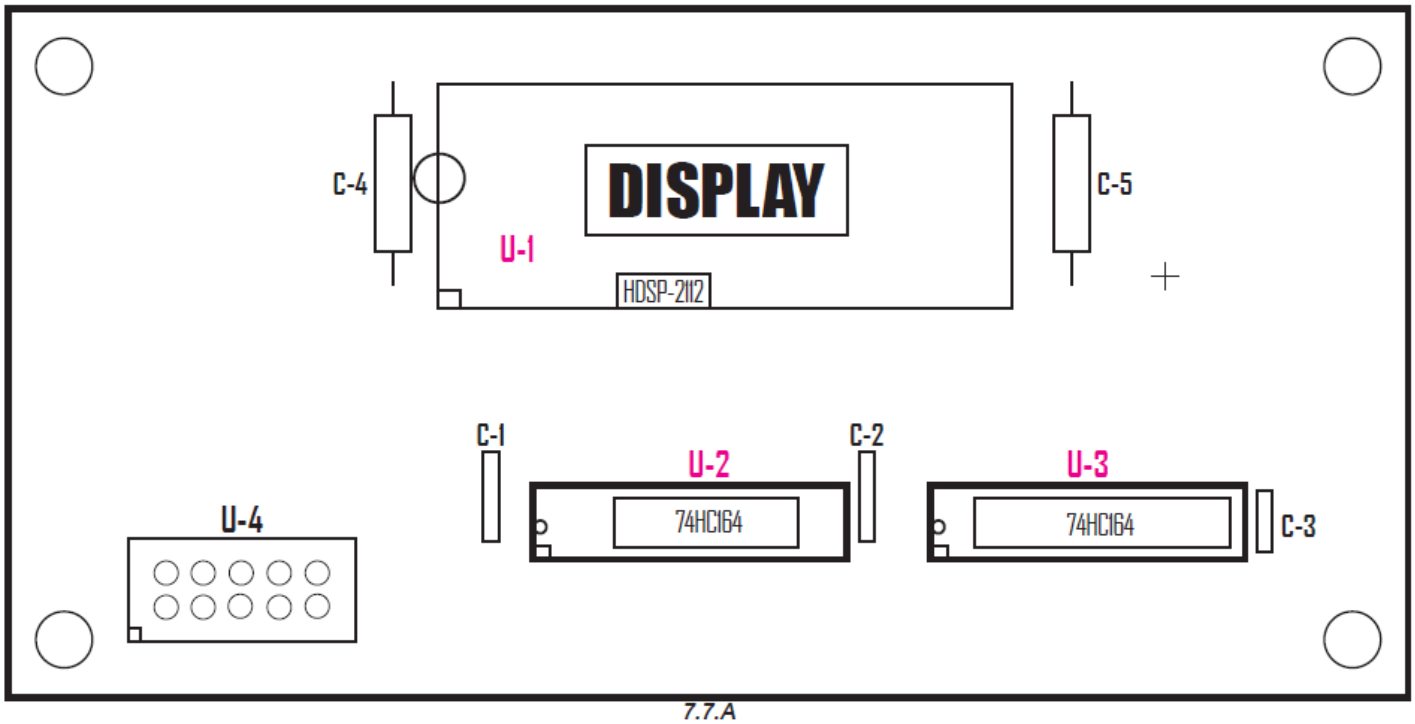
R-1	100	R-11	18.2K	R-20	10K
R-2	10K	R-12	46.4K	R-21	4.7K
R-3	33K	R-13	30K	R-22	4.99K
R-4	33K	R-14	35.7K	POT 2	100K
R-5	100	R-15	47	NMOS	ECG490
R-6	100	R-16	10K	Q-1	2N4401
R-7	10K	R-17	10K	D-11	5.1 v Zener Diode
R-8	51.1K	R-18	3.99K	D-12	1N914
R-9	2.5-4.0 RESET FUSE	ZERO POT	20K 20 TURN CERMET	D-13	1N914
R-10	2.5-4.0 RESET FUSE	R-19	10K		

Table X

7.6 Feeder/Triac Board Layout



7.7 Display Board Layout



7.7.A

Display Board Componenet Functions		
Component	**Function**	**Comments**
U-1	*Display*	Shows data
U-2	*Display Driver*	Affects displayed data
U-3	*Display Driver*	Affects displayed data

Table XI

7.8 Known Values

Mass Unit Conversion Chart

		TROY 1 POUND	TROY 1 OUNCE	TROY WEIGHT	TROY 1 GRAIN	AVOIRDUPOIS 1 TON	AVOIRDUPOIS 1 POUND	AVOIRDUPOIS 1 OUNCE	METRIC 1 TON	METRIC 1 KILOGRAM	METRIC 1 GRAM	METRIC 1 MILLIGRAM	METRIC 1 CARAT	METRIC 1 POINT
		EQUALS	EQUALS	EQUALS	EQUALS	EQUALS	EQUALS	EQUALS	EQUALS	EQUALS	EQUALS	EQUALS	EQUALS	EQUALS
TROY	POUND	-	0.083333	0.004167	0.000174	2430.56	1.21528	0.075955	2679.23	2.67923	0.002679	-	0.0053	-
	OUNCE	12	-	0.05	0.002208	-	14.5833	0.911458	32150.8	32.1508	0.032151	0.000032	0.00643	-
	DWT.	240	20	-	0.041667	-	291.667	18.229	-	643.015	0.643015	0.000643	0.128603	0.001286
	GRAIN	5760	480	24	-	-	7000	437.5	-	15321.4	15.4324	0.015432	3.08648	0.03865
AVOIR	TON	0.000411	-	-	-	-	0.0005	0.000031	1.10231	0.001023	-	-	-	-
	POUND	0.822857	0.068571	0.003429	0.000143	2000	-	0.0625	2204.62	2.20462	0.002246	-	-	-
	OUNCE	13.1657	1.09714	0.054857	0.002286	3200	16	-	35273.9	35.2739	0.035274	0.000034	0.007055	0.000071
METRIC	TON	0.00373	-	-	-	0.907185	0.000454	-	-	0.001	-	-	-	-
	KILOGRAM	0.373242	0.031104	0.001552	0.000065	907.185	0.453592	0.028352	1000	-	0.001	-	-	-
	GRAM	373.242	31.1034	1.5517	0.064799	-	453.592	28.3495	1 MILLION	1000	-	0.001	0.2	0.002
	MILLIGRAM	373242	31103.5	1555.17	64.7989	-	-	283495	-	1 MILLION	1000	-	200	2
	CARAT	1866.21	155.517	7.7759	0.323995	-	-	141.748	-	5000	5	0.005	-	0.01
	POINT	186621	15551.7	777.59	32.3995	-	-	-	-	-	500	0.5	100	-

Table XII

Abbreviations	
Pounds	lbs.
Ounces	oz.
Kilograms	Kg
Grams	g
Milligrams	mg
Centigram	cg

Table XIII

Quick Conversion Reference	
1 lbs.	16 oz.
1 Kg	2.204 lbs.
1 Kg	1,000 g
1 oz.	28.3495 g
1 g	.001 Kg
1 g	100 cg
1 cg	.01 g
1 g	1,000 mg
1 mg	.001 g

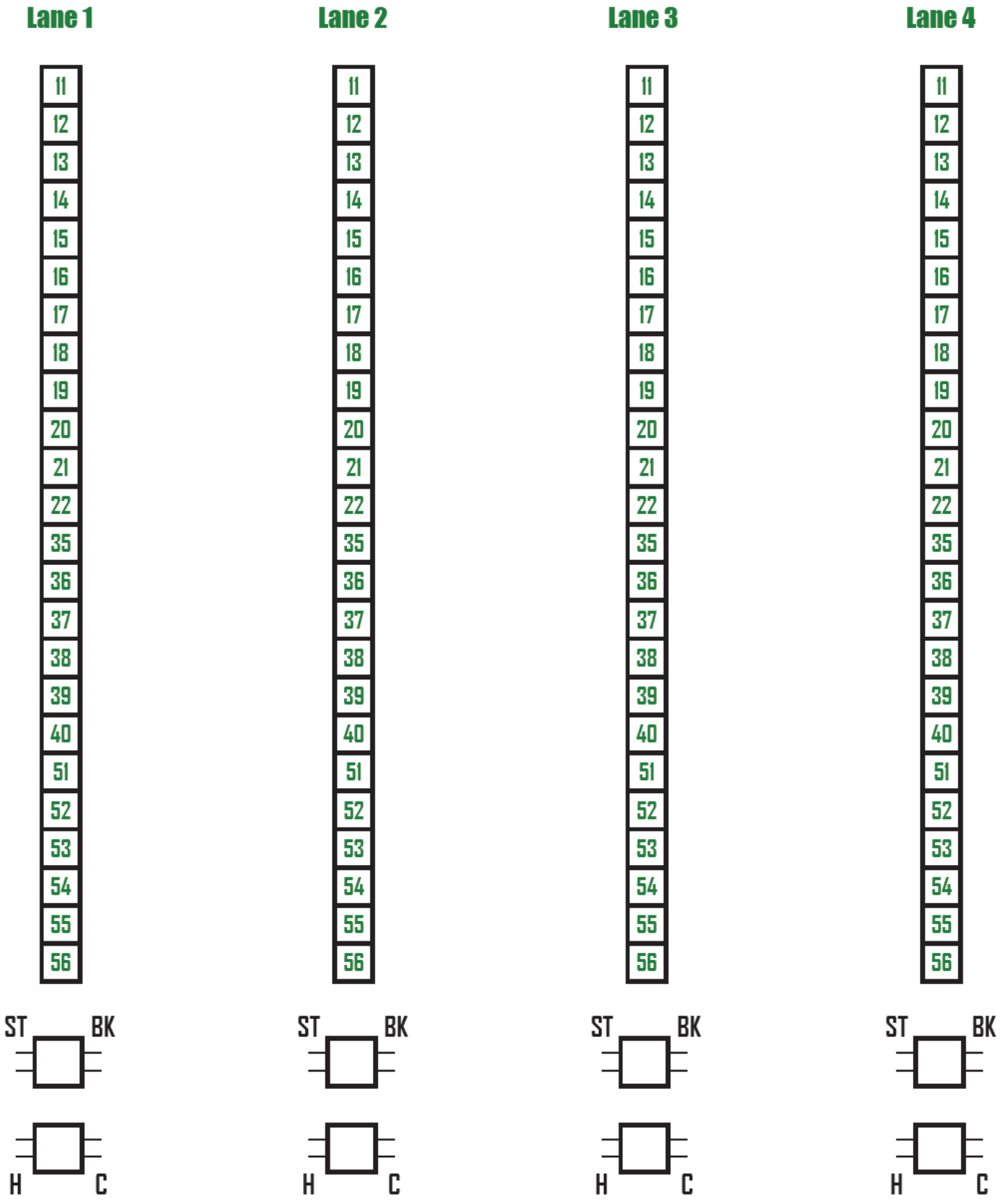
Table XIV

Definitions	
Avoirdupois	American & English system of weights based on pound (16 oz).
Troy Weight	Used for gold, silver and other precious metals.
	Based on 12 troy ounces to the troy pound.
Metric	A decimal system in which the gram *(.0022046 lbs)* is the basic unit.
	Prefixed: deca-10, hecto-100, kilo -1000, deci-1/10, centi-1/100, milli-1/1000
Grain	Same for Avoirdupois, Troy & Apothecary *(pharmaceuticals not shown)*
Carat	A unit of weight for precious stones, equal to 200 mg, weight of 4 grains
	From the Arabic "girat" meaning pod, husk.
Point	Basic unit of weight for precious stones equal to 1/100 carat.

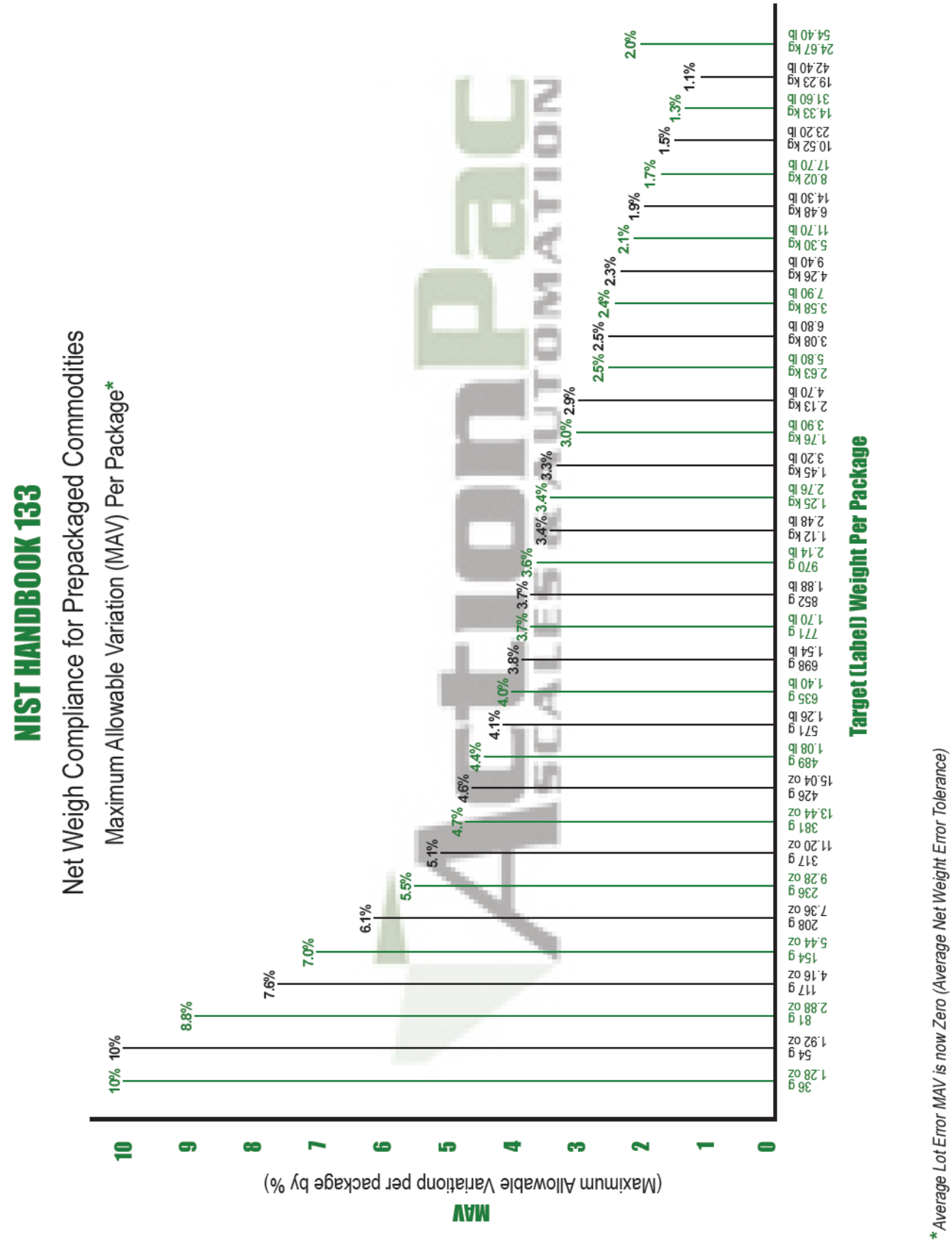
Table XV

Example
To convert from one unit to another, multiply known units *(top of chart)* by the appropriate factor *(right of chart)*.
1.75 lbs. AVOIR *(known)* **X** 453.592 *(from chart)* **=** 793.79 g METRIC

7.9 Interconnect Template For Multilane Units



7.10 MAV Graph



7.11 Available Program Memory Locations

00		10		20	2 oz. x .01 (Hop Vib)	30	
01		11		21	12 oz. x .01 (Hop Vib)	31	
02	2 oz. x .01	12	12 oz. x .01	22		32	
03		13		23		33	
04	4 oz. x .01	14		24		34	
05	5 Lbs. x .01	15		25		35	
06		16	16 oz. x .01	26		36	
07		17		27		37	
08	8 oz. x .01	18		28		38	
09		19		29		39	
0A		1A		2A		3A	
0B		1B		2B		3B	
0C		1C		2C		3C	
0D		1D		2D		3D	
0E		1E		2E		3E	
0F		1F		2F		3F	

40	4 oz. x .01	50	5 Lbs. x .01 (Hop Vib)	60		70	
41		51		61	16 oz. x .01 (Hop Vib)	71	
42		52		62		72	
43		53		63		73	
44		54		64		74	
45		55		65		75	
46		56		66		76	
47		57		67		77	
48		58		68		78	
49		59		69		79	
4A		5A		6A		7A	
4B		5B		6B		7B	
4C		5C		6C		7C	
4D		5D		6D		7D	
4E		5E		6E		7E	
4F		5F		6F		7F	

7.11 Available Program Memory Locations

80	8 oz. x .01 (Hop Vib)
81	
82	
83	
84	
85	
86	
87	
88	
89	
8A	
8B	
8C	
8D	
8E	
8F	

90	
91	
92	
93	
94	
95	
96	
97	
98	
99	
9A	
9B	
9C	
9D	
9E	
9F	

A0	50 g x 1
A1	75 g x 1
A2	100 g x 1
A3	125 g x 1
A4	250 g x 1
A5	500 g x 1
A6	
A7	
A8	
A9	
AA	
AB	
AC	
AD	
AE	
AF	

B0	50 g x 1 (Hop Vib)
B1	75 g x 1 (Hop Vib)
B2	100 g x 1 (Hop Vib)
B3	125 g x 1 (Hop Vib)
B4	250 g x 1 (Hop Vib)
B5	500 g x 1 (Hop Vib)
B6	
B7	
B8	
B9	
BA	
BB	
BC	
BD	
BE	
BF	

C0	75 g x 1
C1	100 g x 1
C2	125 g x 1
C3	250 g x 1
C4	500 g x 1
C5	1000 g x 1
C6	
C7	
C8	
C9	
CA	
CB	
CC	
CD	
CE	
CF	

D0	75 g x 1 (Hop Vib)
D1	100 g x 1 (Hop Vib)
D2	125 g x 1 (Hop Vib)
D3	250 g x 1 (Hop Vib)
D4	500 g x 1 (Hop Vib)
D5	1000 g x 1 (Hop Vib)
D6	
D7	
D8	
D9	
DA	
DB	
DC	
DD	
DE	
DF	

E0	
E1	
E2	
E3	
E4	
E5	
E6	
E7	
E8	
E9	
EA	
EB	
EC	
ED	
EE	
EF	

F0	
F1	
F2	
F3	
F4	
F5	
F6	
F7	1500 g x 1
F8	2000 g x 1
F9	2500 g x 1
FA	3000 g x 1
FB	
FC	
FD	
FE	
FF	

7.12 Blank Program Data Sheets

TARGET WEIGHT: ________

PRODUCT: ________

SETPOINTS:

1 ________ BULK CUTOFF

2 ________ TARGET WEIGHT

3 ________ UNDR TLERANCE

4 ________ OVER WEIGHT

SUBROUTINES:

0 ______ ______

1 ______ ______

2 ______ ______

3 ______ ______

4 ______ ______

5 ______ ______

6 ______ ______

7 ______ ______

8 ______ ______

9 ______ ______

F ______ ______

SET LANE GATE: ______

SET HOPPER GATE: ______

PROGRAM ______

SET FOR (MODE) ______

BY (RESOLUTION) ______

TARGET WEIGHT: ________

PRODUCT: ________

SETPOINTS:

1 ________ BULK CUTOFF

2 ________ TARGET WEIGHT

3 ________ UNDR TLERANCE

4 ________ OVER WEIGHT

SUBROUTINES:

0 ______ ______

1 ______ ______

2 ______ ______

3 ______ ______

4 ______ ______

5 ______ ______

6 ______ ______

7 ______ ______

8 ______ ______

9 ______ ______

F ______ ______

SET LANE GATE: ______

SET HOPPER GATE: ______

PROGRAM ______

SET FOR (MODE) ______

BY (RESOLUTION) ______

TARGET WEIGHT: ________

PRODUCT: ________

SETPOINTS:

1 ________ BULK CUTOFF

2 ________ TARGET WEIGHT

3 ________ UNDR TLERANCE

4 ________ OVER WEIGHT

SUBROUTINES:

0 ______ ______

1 ______ ______

2 ______ ______

3 ______ ______

4 ______ ______

5 ______ ______

6 ______ ______

7 ______ ______

8 ______ ______

9 ______ ______

F ______ ______

SET LANE GATE: ______

SET HOPPER GATE: ______

PROGRAM ______

SET FOR (MODE) ______

BY (RESOLUTION) ______

TARGET WEIGHT: ________

PRODUCT: ________

SETPOINTS:

1 ________ BULK CUTOFF

2 ________ TARGET WEIGHT

3 ________ UNDR TLERANCE

4 ________ OVER WEIGHT

SUBROUTINES:

0 ______ ______

1 ______ ______

2 ______ ______

3 ______ ______

4 ______ ______

5 ______ ______

6 ______ ______

7 ______ ______

8 ______ ______

9 ______ ______

F ______ ______

SET LANE GATE: ______

SET HOPPER GATE: ______

PROGRAM ______

SET FOR (MODE) ______

BY (RESOLUTION) ______

TARGET WEIGHT: ________

PRODUCT: ________

SETPOINTS:

1 ________ BULK CUTOFF

2 ________ TARGET WEIGHT

3 ________ UNDR TLERANCE

4 ________ OVER WEIGHT

SUBROUTINES:

0 ______ ______

1 ______ ______

2 ______ ______

3 ______ ______

4 ______ ______

5 ______ ______

6 ______ ______

7 ______ ______

8 ______ ______

9 ______ ______

F ______ ______

SET LANE GATE: ______

SET HOPPER GATE: ______

PROGRAM ______

SET FOR (MODE) ______

BY (RESOLUTION) ______

TARGET WEIGHT: ________

PRODUCT: ________

SETPOINTS:

1 ________ BULK CUTOFF

2 ________ TARGET WEIGHT

3 ________ UNDR TLERANCE

4 ________ OVER WEIGHT

SUBROUTINES:

0 ______ ______

1 ______ ______

2 ______ ______

3 ______ ______

4 ______ ______

5 ______ ______

6 ______ ______

7 ______ ______

8 ______ ______

9 ______ ______

F ______ ______

SET LANE GATE: ______

SET HOPPER GATE: ______

PROGRAM ______

SET FOR (MODE) ______

BY (RESOLUTION) ______

7.12 Blank Program Data Sheets

TARGET WEIGHT: ________

PRODUCT: ________

SETPOINTS:

1 ________ BULK CUTOFF
2 ________ TARGET WEIGHT
3 ________ UNDR TLERANCE
4 ________ OVER WEIGHT

SUBROUTINES:

0 ______ ______
1 ______ ______
2 ______ ______
3 ______ ______
4 ______ ______
5 ______ ______
6 ______ ______
7 ______ ______
8 ______ ______
9 ______ ______
F ______ ______

SET LANE GATE: ______

SET HOPPER GATE: ______

PROGRAM ______
SET FOR (MODE) ______
BY (RESOLUTION) ______

TARGET WEIGHT: ________

PRODUCT: ________

SETPOINTS:

1 ________ BULK CUTOFF
2 ________ TARGET WEIGHT
3 ________ UNDR TLERANCE
4 ________ OVER WEIGHT

SUBROUTINES:

0 ______ ______
1 ______ ______
2 ______ ______
3 ______ ______
4 ______ ______
5 ______ ______
6 ______ ______
7 ______ ______
8 ______ ______
9 ______ ______
F ______ ______

SET LANE GATE: ______

SET HOPPER GATE: ______

PROGRAM ______
SET FOR (MODE) ______
BY (RESOLUTION) ______

TARGET WEIGHT: ________

PRODUCT: ________

SETPOINTS:

1 ________ BULK CUTOFF
2 ________ TARGET WEIGHT
3 ________ UNDR TLERANCE
4 ________ OVER WEIGHT

SUBROUTINES:

0 ______ ______
1 ______ ______
2 ______ ______
3 ______ ______
4 ______ ______
5 ______ ______
6 ______ ______
7 ______ ______
8 ______ ______
9 ______ ______
F ______ ______

SET LANE GATE: ______

SET HOPPER GATE: ______

PROGRAM ______
SET FOR (MODE) ______
BY (RESOLUTION) ______

TARGET WEIGHT: ________

PRODUCT: ________

SETPOINTS:

1 ________ BULK CUTOFF
2 ________ TARGET WEIGHT
3 ________ UNDR TLERANCE
4 ________ OVER WEIGHT

SUBROUTINES:

0 ______ ______
1 ______ ______
2 ______ ______
3 ______ ______
4 ______ ______
5 ______ ______
6 ______ ______
7 ______ ______
8 ______ ______
9 ______ ______
F ______ ______

SET LANE GATE: ______

SET HOPPER GATE: ______

PROGRAM ______
SET FOR (MODE) ______
BY (RESOLUTION) ______

TARGET WEIGHT: ________

PRODUCT: ________

SETPOINTS:

1 ________ BULK CUTOFF
2 ________ TARGET WEIGHT
3 ________ UNDR TLERANCE
4 ________ OVER WEIGHT

SUBROUTINES:

0 ______ ______
1 ______ ______
2 ______ ______
3 ______ ______
4 ______ ______
5 ______ ______
6 ______ ______
7 ______ ______
8 ______ ______
9 ______ ______
F ______ ______

SET LANE GATE: ______

SET HOPPER GATE: ______

PROGRAM ______
SET FOR (MODE) ______
BY (RESOLUTION) ______

TARGET WEIGHT: ________

PRODUCT: ________

SETPOINTS:

1 ________ BULK CUTOFF
2 ________ TARGET WEIGHT
3 ________ UNDR TLERANCE
4 ________ OVER WEIGHT

SUBROUTINES:

0 ______ ______
1 ______ ______
2 ______ ______
3 ______ ______
4 ______ ______
5 ______ ______
6 ______ ______
7 ______ ______
8 ______ ______
9 ______ ______
F ______ ______

SET LANE GATE: ______

SET HOPPER GATE: ______

PROGRAM ______
SET FOR (MODE) ______
BY (RESOLUTION) ______