UNITED TOOLERS OF IL

Innovative Parts Handling Solutions

FEEDER MANUAL

United Toolers of Illinois (*UTI*)

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NOTE: Not all sections of this manual will be used for all systems. This is a basic manual. If you have any questions, please feel free to call United Toolers of Illinois(UTI) at 779-423-0548.

INTRODUCTION

Read this manual prior to operating your **United Toolers of Illinois** (***UTI***) equipment. The information is necessary for safe operation and optimal performance. Improper operation may result in personal injury or equipment damage.

This manual should be considered a permanent part of your equipment and should remain with the equipment at all times. All information, illustrations, and specifications in this manual are based on the latest information available at the time of publication. We reserve the right to make changes anytime without notice.

Common Feeder Terminology, as used by *UTI*

Air Jet:
Small diameter tubing used to assist in moving or orienting parts. Air is adjusted by trial and error. Air jets are used sparingly.

Amplitude Control:
A controller that uses voltage change to control speed.

Back Pressure:
The force of the parts pushing one against the other as they are fed.

Back Pressure Relief Device:
A sensor used to detect part levels in the discharge to control a solenoid that blows air to remove parts from the tooling. Used to keep difficult parts from jamming in tooling areas, or to keep multiple lane systems even.

Back Pressure Relief Tooling (Bubble-Off):
The area just prior to the entrance of the confined area where the parts will buckle if the discharge is full, the parts can then re-circulate in the feeder.

Bowl Basic:
The cylindrical "vertical" band and its internal tracks. Each bowl basic is custom fabricated per part and feed specifications, band height and diameter, internal track separation (height distance between tracks) angle and width.

External Tooling:
Any construction outside of the cylindrical "vertical" band. This tooling selects, separates, orients parts and relieves pressure build-up on oriented parts. A rule of thumb for a basic tooling area extending from the band/bowl diameter is 1/3 the bowl diameter.

Bowl Tuning:
A technical/craft to develop maximum spring energy level but to keep the coil assembly cool. Changing spring tension of the drive unit to allow the feeder mass to return to its neutral position before the next magnetic pulse takes over.

Confinement:
A section of the feeder used to control parts through the selector, or discharge chute. Confinements are provided to allow access to parts by removing a bolted on section.

Counter-Balance Weight:
A piece of metal of predetermined size and weight that is added to the exterior of the feeder at a location determined by a counter-balance wheel to off-set the weight of the external tooling.

Dirt Chute/Dirt Relief:
Used to discharge small particles of foreign material from the feeder. Must not be larger than the smallest dimension of the parts being used in the feeder.

Discharge Chute:
The end of the feeder bowl where fully oriented parts are staged for transition to a track, conveyor, or other device.

Down Angle Discharge Chute:
Used to assist parts from the vibratory parts feeder into a gravity track section or to meet a customer specification.

Escapement:
A mechanical device placed at the end of the feeder discharge that allows only one part at a time to move into another place, such as a dead nest, to be picked up by a placing device.

Fan:
An adjustable gap which allows part to swing or hang and separate.

Feed Rate:
The number of parts per minute or hour discharged from the vibratory parts feeder to maintain production requirements set by the manufacturer. It is good practice to require a 20% higher feed rate of the feeder bowl than the equipment it is supplying product too.

Horizontal Cam:
An irregular shaped piece of metal placed inside the feeder above the parts at different points to control level of parts on the track. Used to reduce the amount of product as it is transferred up the internal tracks.

Inline Vibratory Track/Feeder:
A vibratory drive unit designed to produce a straight-line motion. Used with a straight track to transport parts from the feeder discharge to a dead nest or a pick up point for removal via the customer. When used with a feeder they are mounted on risers so the inline tooling can be matched to the feeder discharge. A line track is critical to achieve a consistent feed rate and product accumulation.

Alternative Tracks to Vibratory:
Gravity tracks and vertical magazines are ways of getting parts from one location to another. Gravity tracks set on an angle great enough that the gravity will pull the part to its proper location. A magazine is a channel in which oriented parts are stacked.

Internal Tooling:
Any construction inside of the cylindrical "vertical" band. This tooling selects, separates, orients and relieves pressure build-up on oriented parts. Typically used on simple to orientate product (headless pins, balls, discs). The benefit of internal styled feeder bowls is reduced bowl size. There is very little material extending outside of the bowl diameter, unlike with an externally tooled bowl.

Orientation:
The position of the part as it exits the discharge required by manufacturer specifications.

Overhang:
The amount of straight track tooling that extends beyond either end of the inline drive-mounting bar.

Quick Dump Chute:
A quick opening "window" used to purge the bowl to allow a quick part change when multiple styles or sizes of parts are being fed in the same feeder.

Return Pan:
An area attached to the band, so the parts that have rejected due to incorrect orientation can be re-circulated back into the bottom of the bowl.

Running Surface:
The portion of the discharge chute that makes contact with product. The running surface is the surface specified for discharge height.

Selector:
Tooling that permits only oriented parts to pass. Miss-oriented parts are usually diverted to the return pan.

Sweep:
A strip of metal placed on the inside of the feeder bottom to guard the return hole and allow parts to flow evenly back up the track from the return pan.

SAFETY

General:

UTI designs and manufactures all of its products so they can be operated safely. However, as with any other piece of powered equipment, the operator must follow safe-operating practices at all times. Failure to do so could result in personal injury or damage to the equipment or property.

Do not mechanically modify the feeder system to change its performance beyond the original factory design and specifications, except with written approval from the manufacturer.

Before installing, operating, or servicing the machine, carefully read and follow all of the safety instructions found in this manual and in ALL other literature you may receive. Be thoroughly familiar with the controls and proper use of the equipment.

Preparation:

- Know how to stop the equipment and disconnect the power.
- Follow all local electrical and safety codes, along with the National Electrical Codes, (NEC) and the Occupational Safety and Health Act (OSHA).
- Make certain that the power source conforms to the requirements of the equipment. The equipment should match the line voltages, line frequency, and the equipment loads. Make sure the equipment is properly grounded.
- Protect the power cable from contact with sharp objects or liquids.
- Always turn off controls and disconnect sources of electrical and/or pneumatic power before adjusting, lubricating, or repairing equipment, unless otherwise specified.
- Each day, before operation, walk around the equipment and inspect for loose, missing, and/or damaged parts or parts out of adjustment. Perform all recommended maintenance procedures in a timely fashion.
- Be sure all personnel and loose tools are clear of the equipment before turning on power.

Operation:

- Eye protection should be worn at all times by personnel operating or maintaining equipment.
- Keep hands, arms, and other parts of the body and clothing away from moving parts.
- Maintain dry footing: stand on insulated surface. Keep hands, feet, floors, controls, and walking surfaces clean and free of fluid, water, or other liquid to minimize the possibility of slips and falls.
- Do not operate this equipment with electrical covers open or removed. Dangerous voltages are present within the electrical enclosures.
- Do not bypass or render inoperative any safeguards or protective devices.

CONTROLS

Before installing and starting your equipment, review this section thoroughly. Familiarize yourself with the controls and indicators, their purpose, location and use.

Main Power Switch:
Controls the electrical power to the entire system. Flipping switch to OFF position will immediately shut down system.

Bowl Power Switch:
Control electrical power to the bowl.

Bowl Potentiometer:
Control bowl vibration. Counter-clockwise rotation will decrease length of bowl stroke. Clockwise rotation will increase bowl stoke. The number of strokes will remain constant to the power supply.

Hopper Power Switch:
Controls electrical power to the hopper.

Hopper Potentiometer:
Controls hopper vibration. Counter clock-wise rotation will decrease hopper feed rate. Clockwise rotation will increase hopper feed rate.

Inline Power Switch:
Controls electrical power to the inline.

Inline Potentiometer:
Controls inline vibration. Counter clock-wise rotation will decrease inline feed rate. Clockwise rotation will increase inline feed rate.

OPERATION

Operation Description:

The vibratory bowl assembly is a dynamically balanced, two-mass vibrating system consisting of a bowl and bowl-mounting crossbar coupled to an electromagnetic drive assembly by means of drive springs. The drive assembly consists of a coil and a striking plate. The coil is connected directly to the base. The striking plate assembly is located opposite the coil assembly and is connected directly to the bowl-mounting crossbar. A system of drive springs is connected at the top to the crossbar and at the bottom to the base. The bowl, crossbar, and armature assembly are joined to the base only by the drive spring assemblies.

Parts flow into the vibratory bowl manually or from a hopper. The part level in the bottom of the bowl should be as indicated on the feeder operating instructions sheet located under the product levels section of the document. When the part level in the bowl is low, the limit switch will turn on the power to the hopper and parts will begin to flow until the level of parts in the bowl is at an acceptable level. Power to the hopper will then be interrupted until the part level decreases again. The hopper vibration rate is set on the hopper potentiometer at the factory and should remain at that setting.

Special rejecters, wipers, air jets, etc. for positioning and orienting the parts for your specific application are a part of the bowl's design. These devices, placed along the track and bowl wall, are installed to exacting measurements. **Any damage or mechanical change to these features may stop the flow of parts or alter orientation.**

MAINTENANCE

Preventative Maintenance:

A good maintenance program is the key to long and successful machine life and trouble-free operation. There are a few very important steps that you can perform in order to get the best performance from your ***UTI*** feeding equipment.

Cleaning Schedule and Procedures:

NOTE: The primary cause of decreased system performance is the presence of oil and/or debris within the system from the parts and product atmospheres.

Clean, dry parts and a clean system are essential for optimum feeder performance. The frequency of the cleaning schedule is entirely dependent upon the operating environment. In conditions that are less than ideal, it may be necessary to perform cleaning procedures once a day, once a shift, or even more frequently. In very clean environments, once a week or less may be adequate. It is the responsibility of the Purchaser to determine and adhere to an appropriate cleaning schedule.

WARNING: Turn off main power switch and disconnect power sources while performing cleaning procedures.

Parts:

- Parts must be clean and lubricant free.
- Do not reuse parts that have run through the system without first cleaning them.

Bowl and Hopper:

1. Remove all parts before attempting to clean.
2. Remove any visible debris and foreign objects.
3. Clean by wiping down with lacquer thinner, acetone, or enamel reducer and a clean cloth.

Daily Maintenance Schedule:

Inspect the system for the presence of debris or oil and perform any necessary cleaning procedures.

Weekly Maintenance Schedule:

Inspect the system for proper tightness of all nuts, bolts, and screws to be sure the machine is in safe working condition. Specifically, turn off the power to the bowl and check the drive unit bolts, the bowl's center bolt, all top and bottom spring clamp bolts, toe clamp bolts, and the coil bolts.

WARNING: NEVER OIL THE DRIVE SPRINGS!

TROUBLE SHOOTING GUIDE

Most common feeder systems failures:

1. Control switch may be in the “off” position.
2. The power supply to the control may be inadequate.
3. The cord from the feeder to the control may be unplugged or damaged.
4. A fuse may be blown in the controller.
5. A coil may be shorted out.
6. A wire lead may be unplugged at the coil.
7. The gap between the coil and striker plate may be closed or damaged.
8. Metal shavings may have entered the controller and shorted it out.
9. A foreign object may be lodged between the coil and striker plate.
10. The feeder bowl may have been attached to a rigid track, or the bowl and/or drive unit may be making contact with other equipment.
11. One or more springs may be cracked or broken.

Potential Failure Mode	Potential Effects of Failure	Potential Causes of Failure	Recommended Action(s)	Responsibility Target
Fails to feed any product, bowl is vibrating	Starves down stream equipment of product	Bad Product	Turn equipment off and remove bad part	Operator
		Product Jam	Turn equipment off And remove jammed product	Operator
		Wrong Product	Verify product	Production Manager
		Incorrect power service, drive coils overheat, fire potential	Inspect coil temperature, Verify incoming power To equipment	Electrical Technician
Fails to feed at desired rate, bowl is vibrating	Starves down stream equipment of product at desired rate	Bad Product	Inspect product for defects, flash, burrs, particulate, cleanliness, etc..	Operator
		Product level in bowl too high, too much product	Review bowl spec/ operation sheet for optimum level	Equipment Technician
		Product level in bowl too low, too much product	Review bowl spec/ operation sheet for optimum level	Equipment Technician
		Wrong Product	Verify product	Equipment Technician
		Static build-up	Inspect product for possible static charge	Equipment Technician
		Static build-up	Install de-ionizing equipment at problem spot	Equipment Technician
		Dirty/film build up on bowl, from product (oil, release, etc..)	Inspect and clean internal internal surfaces with approved solvents.	Equipment Technician
		Dirty/film build up on bowl, from product (oil, release, etc..)	Revised product processing/handling clean product before feed	Equipment Technician
		Drive control setting to low	Increase control setting (to no more than 80%)	Equipment Technician
		Drive spring damage/ wear	Contact for service	UTI (779) 423-0548
		Unlevel feeder support table	Inspect for table level And that all feet are Making firm contact with floor	Equipment Technician
		Loose bolts/fasteners	Inspect all bolts/fasteners for tightness	Equipment Technician
		Incorrect power service, drive coils over heat, fire potential	Inspect coil temperature, verify incoming power to equipment specifications	Electrical Technician

Potential Failure Mode	Potential Effects of Failure	Potential Causes of Failure	Recommended Action(s)	Responsibility Target
Fails to feed, bowl is not vibrating	Starves down stream equipment of product	Incorrect power service, drive coils over heat, fire potential	Inspect coil temperature, verify incoming power to equipment specifications	Electrical Technician
		Power failure	Check power switch	Operator/ Electrical Technician
		Power failure	Check power plug at Outlet receptacle	Operator/ Electrical Technician
		Power failure	Check system/controller fuse(s)	Electrical Technician
		Power failure	Check incoming power from service	Electrical Technician
		Power failure	Check power to drive coil	Electrical Technician
		Drive control setting too low	Increase control setting (to no more than 80%)	Equipment Technician
		Drive coil support failure	Inspect drive coil mounting For tightness and/or cracks. Set correct coil gap. Contact service.	Equipment Technician/ UTI (779) 423-0548
		Controller failure	After complete inspection, no power to coil/drivers, fuse replaced, power - OK	Equipment Technician
Alarming loud noise	Damage to coil or striker plate	Coil gap too close	Check gap and adjust to specification sheet	Equipment Technician
		Bowl discharge & track gap too close	Check gaps and adjust	Equipment Technician
	Poor feed rate over transfer point	Bowl or drive unit touching something	Inspect bowl and drive unit, adjust accordingly	Equipment Technician

Proper Mounting:

Each table or stand that supports a vibratory feeder must be rigid, reinforced, level, and connected to the floor via rubber mounting feet on all four corners. This will ensure maximum performance and tends to reduce the noise level. A stand should be constructed of steel or aluminum. Wooden tables or benches will absorb vibration required to reach the maximum performance.

This feeder is mounted properly. Due to the large dimension of the bar stock used for the riser and reinforcement, and the thick top and bottom plate, this drive unit will transfer sufficient vibration to the bowl to reach maximum performance in orienting the parts and delivering the maximum feed rate. Also note that the weight of the four rubber feet of the drive unit are well supported, which is vital to proper performance.

SPECIAL MAINTENANCE PROCEDURES

Clearing Part Jams:

Occasionally a back up of parts or parts jam will occur within the system. Most often, this is a symptom indicating the presence of oil and/or debris within the system. A thorough cleaning of the system may be required to keep the part jam from reoccurring.

Remove bolted confinements to remove the jams, never force product from the jammed tooling section. This may cause additional problems by damaging tooling, tracks or the confinements.

Visible part jams should be cleared by turning off the power and removing the affected parts.

WARNING: Turn off power before attempting to clear any parts jams.

Bowl Tuning:

Feeder bowls are driven by supplying a controlled pulsing voltage to an electromagnetic coil. The coil pulls on adjacent plates that are attached to a leaf spring/cross arm system that supports the weight of the bowl. The pulling force is greater than the spring return force, which translates to vibrations in a vertical direction. When the balance between the controlled pulls and spring return of the system is optimal for the application, the bowl is properly "tuned". Symptoms of an "un-tuned" bowl are poor performance and hot coils. The mass of the bowl, the rubber mounting feet, and a solid mounting base are all determining factors in tuning.

If it has been determined that re-tuning is necessary, follow the steps outlined below:

1. Make sure all bolts are tight, both on the drive and bowl. You must tighten every bolt. Bolts on the drive unit that are attaching springs must be torque very tight, utilizing a 12" breaker arm.

2. Gap coils approximately 1/8" for half wave and 60 HZ. Gap coil approximately 1/16" for 120V, you may need to change this as you tune.

3. On your drive unit you have either 2 or 3 coils. For every coil there are two spring packs. One is called an idler arm, this spring pack has no coil on it, this is the spring pack you break loose to check tuning.

4. Find one of the idler cross arms; loosen one of the bottom bolts.

    A. If the bowl speeds up, you have too many springs.
    B. If the bowl slows down, you must add springs.
    C. If nothing happens, break loose the other bolt next to it, and refer back to A&B.

5. If you must add springs, always remember these steps:

    A. Never have more springs on idler arms than on coils. Always keep your springs as close to even as you can. If the bowl tunes out, oddly put the greater number of spring on the coil arms.
    B. Always keep coils even. Idlers may be one spring different.
    C. If you are using two (2) different thicknesses of springs, always keep the thicker of the springs on the inside. Always keep thicker springs even on all spring packs. Use the thinner of the two for fine-tuning. You must have a spacer on top and bottom of each spring.

6. No matter if you are adding springs or taking them off, check the tuning after each spring adjustment by using step #4.

The vibratory bowl is properly tuned if the parts in the bowl speed up when you loosen the first bolt and slow back down when you loosen the second bolt. In the event this does not occur, take corrective action as described below.

1. If after loosening the first spring stack the parts slowed down, add one (1) spring.
2. If after loosening the first spring stack the parts sped up, remove one (1) spring.

Hopper Tuning:

The hopper is "tuned" using the same procedure as for the vibratory bowl. This is also done prior to shipment by the manufacturer. However, hopper tuning may require correction to improve the part feed rate from the hopper. If so, perform the steps above on the hopper spring stacks.

Inline Tuning:

The inline is "tuned" using the same procedure as for the vibratory bowl and the hopper. This is also done prior to shipment from the manufacturer. However, inline tuning may require correction to improve the part feed rate from the inline. If so, perform the steps above on the hopper spring stacks.

Setting Coil Gap (Air Gap):

WARNING: The bowl MUST NOT be operating while the air gap (coil gap) is being adjusted.

The air gap (coil gap) is the space between the pole face and the face of the coil assembly. Proper adjustment is critical for optimum feeder performance. The air gap (coil gap) is properly set by the manufacturer prior to shipment.

If the air gap (coil gap) has been moved due to improper handling or a modification of the spring set, adjustment may be necessary. To properly adjust the air gap (coil gap), follow the procedure outlined below.

1. Turn off the power and disconnect the electrical supply.
2. Adjust the coil in the required direction (either closer to or farther away from the pole face) by turning the screws that are attaching coil to coil support bracket.
3. Adjust a little at a time and equally on each side of the coil.
4. Re-connect the electrical supply.

WARNING: Never set the coil gap (air gap) so close, that a striking condition results. Keep the gap as close as possible without striking. If the air gap is too close, the pole face and coil will make contact during feeder operation. A striking condition will cause severe mechanical damage: broken springs, cracked bowl or base, cracked armature or core. If the coil gap (air gap) is adjusted so the pole face and coil are too far apart, the unit will draw high current and result in coil burnout, failure of control components or lack of material feed.

Springs or Leaf Springs:

Springs connect the feeder base mass to the bowl, track or pan. Everything attached to the top of the spring is part of the bowl, track or pan. The bowl, track or pan is the portion of a feed system that is supposed to vibrate. The much heavier mass of the drive base, plate and/or table contribute to how well the vibration is transferred to the bowl, track or pan.

Leaf springs are made from hardened steel or fiberglass. Thicker steel springs, ¼" and up, are used on Full Wave Units. Rectified or Half Wave Units typically use ¼" steel springs or thinner, as the thinner springs handle the greater amplitude better.

Spring Force:

Spring force is the amount of force required to deflect a spring and the amount of load it will return when deflected. Spring force is an expression used to describe the stiffness of a spring. A full wave feeder, because it has a shorter time cycle, requires about 4 times the spring force to return the same amount of mass as a rectified or half wave feeder.

Spring Replacement:

When it is necessary to add or remove a spring while tuning a bowl, do so in small increments, re-checking the bowl with each small alteration. When modifying the spring stacks, a symmetrical pattern should be kept on the opposing spring stacks, if possible. Failure to do so could negatively affect bowl performance.

WARNING: The equipment MUST NOT be operating while performing this procedure.

WARNING: Work with one (1) stack of springs at a time. This permits the remaining stacks to support the weight of the bowl and its components.

It will be necessary to adjust the bowl feed rate after adding or removing springs. (See Adjusting Bowl, Hopper, and Inline Feed Rates).

To replace, add or remove a spring, perform the following procedure:

1. Disconnect electrical supply.
2. Remove bolts, mounting blocks, springs and spacers from the spring stack. It is important to take special note of their location in the spring stack arrangement. Proper arrangement of the individual springs within the spring stacks is critical. Before removing any springs, mark both top and bottom so they can be reinstalled to their original arrangement.
3. Examine each spring for signs of fatigue or defects (breaks, hairline cracks, rust, etc.). If a bad spring is found, be sure to check all springs in that set carefully.
4. Replace any damaged springs with a new spring of the same thickness and width.
5. When reassembling a set of springs, be sure to separate each spring (at top and bottom) with a spacer.
6. With the spring stack in place, tighten both the top and the bottom bolts.
7. Torque each mounting block bolt a little at a time and evenly to a recommended torque of 250 foot pounds.

Adjust the air gap, reconnect the electrical supply. An adjustment to the bowl feed rate may also be necessary.

WARNING: After each alteration to the spring arrangement, whether replacing, adding or removing a spring, the air gap MUST be rechecked and adjusted if required. Failure to do so could result in severe mechanical damage!

Estimating Spring Force:

When trying to estimate spring force required for spring replacement, for a feeder to replace a spring of a different thickness can be determined by the following method:

1. Measure the thickness of the spring to be replaced, (to the closest 1/16”)
2. Square the numerator of that fraction.
3. Measure the thickness in 1/16” of the springs available for replacement.
4. Add the squares of the numerators of the replacement springs, to match as close as possible, the squared numerator of the spring to be replaced.

For example, if a 3/8” spring breaks and you do not have one to replace it with, you could use two ¼” and one 1/8” spring to replace it with. (Note: each spring requires to be spaced from each other)

Adjusting Bowl, Hopper, and Inline Feed Rates:

The system has been set up and thoroughly tested prior to shipment. Under normal operating circumstances it should not be necessary to adjust the bowl, hopper or inline feed rates with the potentiometers on the exterior of the control box. While you may temporarily alleviate a change in feed rate by using these control knobs, problems will most likely occur and require some action.

However, after tuning the bowl, or adding, removing, or replacing springs, adjustments to the bowl feed rate using the potentiometer may be necessary. The rate of feed is controlled by varying the length of the bowl stroke. The number of strokes will remain constant to the power supply, but the stroke length can be varied by the appropriate control knob to increase or decrease. Slowly rotate the control knob until desired output is reached.

WARRANTY AND PARTS

United Toolers of Illinois warrants products of its manufacture to be free from defects in material and/or workmanship when properly installed, maintained and operated under its design conditions and proper maintenance. Should failure to conform to the warranty become apparent during a period of one (1) year or 4000 operating hours, whichever comes first from the date of shipment, **United Toolers of Illinois** shall repair or replace the defective part or parts, without charge to the buyer. Where the need for such repair or replacement is shown to be a result of improper design, careless workmanship, or assembly, or the use of faulty or inferior raw materials or its purpose or intent. Machinery, equipment and accessories integrated by **United Toolers of Illinois** but manufactured by others, are warranted to the extent of the manufactures warranty to **United Toolers of Illinois**.

Sellers obligation under this warranty is limited to repairing at seller's factory or furnishing a replacement for any part or correcting any workmanship, which shall be demonstrated to our satisfaction to have been defective at the time of installation.

Defective parts shall be returned to seller F.O.B. sellers factory, and repaired or replacement parts shall be shipped by seller F.O.B. sellers factory. The removal by buyer or parts returned to seller for repair or replacement and the installation by buyer of replacement or repaired parts shall be at buyers expense. No work will be done by seller at the site of installation unless, in sellers opinion, it is impractical for buyer to remove the defective parts and return them to sellers factory. Repairs, replacements or adjustments to equipment for which seller is responsible will be made as promptly as possible within a standard (8) hour working day. Overtime, holidays and shifts other than first (6:00 am to 9:00 am start time) if required, will be paid by buyer, the difference of standard working hours and the non-standard hours.

This warranty does not cover commercial components purchased by buyer, components supplied by buyer, cutting tools, dyes or other tooling.

Seller will make no allowance for work done by buyer unless previously authorized by seller in writing. Buyer shall operate the equipment to sellers instructions, following all specified operating and maintenance procedures, with all safety devices operating and guards in place (when applicable).

Equipment modifications, addition or removal of components, or improper operation by buyer's personnel shall be at buyer's own risk. Buyer and/or its employees shall not hold seller liable for resulting equipment malfunction and/or injuries to buyer's personnel. Thereafter, seller shall not assume any responsibilities or liabilities arising from improper use of the system by buyer's employees.

What this warranty does not cover:

- Repairs necessary due to improper installation, operator misuse, abuse or negligence, or if the failure is cause by unreasonable use including, but not limited to, failure to provide reasonable and necessary maintenance.
- Product which has been altered or modified to change its performance beyond the original factory design and specifications.
- Damage caused by disasters such as fire, flood, or lightning; accidents, improper electrical current; or excessive air pressure, repair or maintenance using the improper parts; or service outside of normal maintenance that is performed by anyone other than **United Toolers of Illinois** personnel.
- Expendable parts which become worn during normal use.
- Third party parts, components, or devices added to the product after its shipment from the factory.
- Materials provided by purchaser or design stipulated by purchaser.
- The **United Toolers of Illinois** warranty does not extend to parts and products not assembled by **United Toolers of Illinois**. As to such, purchaser shall be entitled to proceed only upon the terms of that particular manufacture's warranty.

Should the product be misused, abused or modified to change its performance beyond the original factory design and specifications, this warranty will become void and warranty service will be denied.

ORDERING INFORMATION

Service Parts can be ordered by phone, fax or email. Contact:

United Toolers of Illinois
7203 Clinton Rd.
Loves Park, IL. 61132
Phone: 779-423-0548
Fax: 779-423-1650
Web address: www.unitedtoolers.com

Purchaser should include the following information with each parts order:

1. Shipping address
2. Billing address
3. Name and phone number of contact person to handle any questions concerning the order
4. Purchase order number and authorization number
5. Model number of the equipment for which the parts are being ordered
6. Part number(s)
7. Part descriptions(s)
8. Quantities required for each part ordered
9. Date required

All parts will be shipped FOB **United Toolers of Illinois** factory, unless other arrangements have been made.