

Inkjet System

BK600 Inkjet Series

BK600 Inkjet System User's Guide

Transport Base & Inkjet Controller
for BK600 Inkjet System

BK600 Inkjet System User's Guide

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1.1 Description

- Power Rocker Switches
- Machine Function Pushbuttons
- Speed Regulation Potentiometers
- Resettable Piece Counter

1.2 Features

- Vacuum shuttle feeder
- Vacuum table belts
- Variable pitch selector
- Complete Instrument Panel
- BK1600 series conveyor compatibility
- BK600 inkjet system compatibility
- Maintenance consideration
- Print quality considerations

1.3 Specifications

- Material handling
- Physical
- Production rate
- Electrical requirements

1.4 Overview

- Inkjet Base Drawing

1.1 Description

The BK600 Inkjet Base is a mailpiece feeding and transportation system comprised of a feeder station and transport mechanism that is controlled via a centrally located operator control panel. The system was specifically designed as a flexible and reliable platform whose purpose was to optimize the performance of an inkjet imaging system. The BK600 inkjet base, in conjunction with the BK600 Inkjet imaging system, produces some of the highest quality imaging within one of the simplest and most efficient operating environments.

The feeder, capable of separating and dispensing a wide variety of mailpieces from single sheets to publications, is of a vacuum shuttle style which has adjustable side and rear guides to accommodate various mailpiece sizes, a movable material gate and upper feed rollers for thickness adjustments, and vacuum control in the form of differing feed plates augmented with a regulating valve.

The mailpiece transport system, modified for the inkjet process, consists of vacuum equipped table belts with variable pitch control technology permitting regulation of the belt movement to conform to the mailpiece's size. In addition, an alignment section with side guides and a variable height skidbar is present at the output of the feeder to reduce mailpiece skew prior to entering the inkjet imaging area. Interface of the transport system to the inkjet sequencing control is provided by a directly coupled shaft encoder mounted on the rear belt pulleys.

Control of the BK600 inkjet base is enabled by a series of electrical switches and buttons displayed on a clear unhindered control panel centrally positioned at the front of the base. The control panel consists of circuit breaker switches for the Main and Pump power; A resetable LCD piece totalizing counter; variable speed potentiometers for both the Machine and Conveyor; Start/Stop/Jog pushbutton controls for machine operation; and an On/Off/Auto selector for the conveyor.

All these features, in addition to the manufacturing quality and innovative product design, add up to an extremely functional inkjet base capable of years of reliable, trouble-free operation.

1.2 Features

Vacuum Shuttle Feeder

The BK600 Inkjet Base features a vacuum shuttle feeder capable of feeding a wide variety of mailpieces from single sheets to thick publications. The feeder is equipped with adjustable side and rear guides, variable height material gate and upper feed rollers, and a valve for vacuum regulation. The shuttle plate also has two rear pushers which provide feeding assistance for heavy mailpieces. In addition, the unique vacuum plate construction enhances the separating capabilities of the feeder.

Vacuum Table Belts

The table belts, which transport the mailpieces from the feeder past the inkjet imaging area, have vacuum applied to them so that a completely unhindered area is provided for the inkjet heads, enabling unparalleled head placement capabilities. With the addition of vacuum to the belts, there is no need for obstructive skidbars or side guides which may interfere with printhead positioning.

Variable Pitch Selector

The transport belts have a unique facility permitting an unlimited belt pitch setting which translates into greater productivity with no sacrifice in print quality. That is to say the belt's movement can be adjusted so that minimal gap for various mailpieces(length) can be attained thus reducing surface speed for a given production rate. This causes an improvement in the print quality since quality is directly surface speed dependent.

Belt pitch adjustment is done through the use of a rotary knob mounted on the front panel. The innovative belt pitch technology included in the BK600 inkjet base allows the operator to perform a one-time belt pitch adjustment at low speeds which is then retained throughout its speed range.

Complete Instrument Panel

All necessary controls required to operate the inkjet base are easily accessible to the operator on a central instrument panel. The control panel comes complete with circuit breaker equipped rocker switches, large pushbuttons for all machine/conveyor functions, variable speed potentiometers for machine/conveyor speed regulation, and a resettable piece counter.

BK1600 Series Conveyor Compatibility

The inkjet base is fully compatible with any BK1600 series conveyor from a 6 ft model through to an 18 ft. model. Connection to the conveyor is made through a 7 pin circular plastic connector located at the end of the base. The base has a fully fused DC speed controller mounted in it which comes with a speed potentiometer, located on the front panel, to permit complete control of the conveyor's belt speed.

BK600 Inkjet System Compatibility

The BK600 inkjet base has pre-drilled mounting holes and a series of connectors to accommodate the inkjet computer console should the complete system be desired. In addition, an inline shaft encoder mount, full electrical wiring terminations and facilities for mounting two complete printhead assemblies, is provided.

Maintenance Considerations

The BK600 inkjet base is designed to facilitate maintenance should it be required. The front upper panel, as well as the tabletops, are easily removable in order to expose all the mechanical components. The central instrument panel has quick disconnect plugs for removal and the rear electrical panel can be accessed without hindering any machine functions.

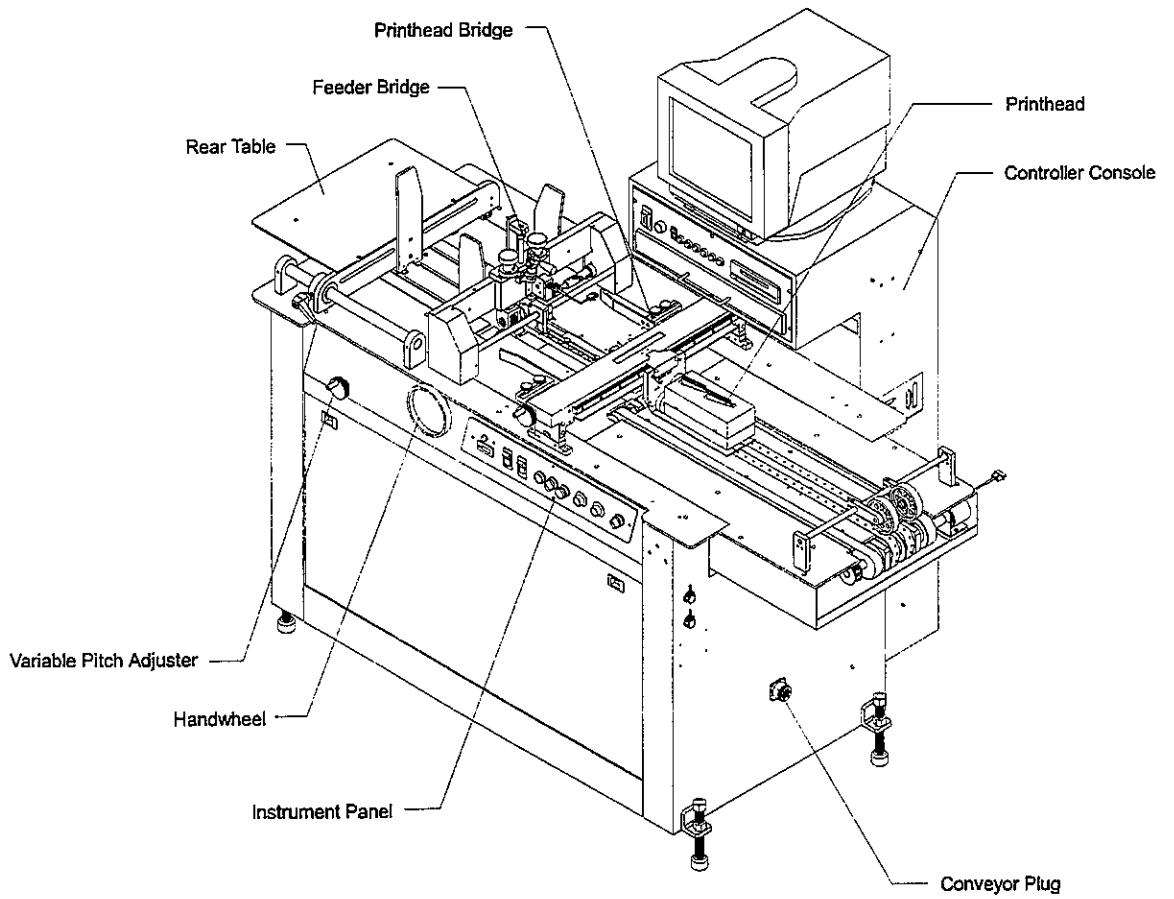
Print Quality Considerations

The inkjet base has been specifically designed for the inkjetting process and as such incorporates certain unique features to optimize print quality. Included in the machine is an inherently smooth mechanical operation which in itself goes a long way to improving printing results. Particular attention was paid to traditional transport problems such as shaft encoder slippage, and belt movement fluctuations to arrive at a very reliable transport platform.

1.3 Specifications

Material Handling	Minimum	3" x 5"	76 mm x 127 mm	
	Maximum	17" x 17"	432 mm x 432 mm	
	Thickness	Single sheet to 1.25"	16 mm	
Physical	Overall Length	65 in.	1651 mm	
	Overall Height <i>including video monitor</i>	64 in.	1625 mm	
	Height <i>tabletop</i>	33.5 in.	850 mm	
	Overall Width <i>including computer cabinet</i>	38.5 in.	978 mm	
	Width <i>inkjet base</i>	28 in.	711 mm	
	Weight <i>crated</i>	700 lb	320 kg	
Production Rate	Belt Speed	0 to 600 fpm	0 to 3.05 m/s	
	Cycling Speed	0 to 30,000 pph		
	Cycle Pitch	Variable 3 in to 18 in	76 to 457 mm	
	Conveyor Spacing	0 to 26 in/s	0 to 0.7 m/s	
Electrical Requirements	Voltage	220 V.A.C.		
	Current	15 Amps		
	Power	3.3 KVA		
	Machine Motor	1/2 H.P., 180 VDC DC Speed Controller		
	Vacuum Pump	3/4 H.P., 220 VAC, 4.3 A 1.8 CFM @ 20 Hg volume		
	Conv. Interface	1/8 H.P., 90 VDC DC Speed Controller		
	Control Panel	Circuit Breaker Switch		Main, Pump
		Machine Pushbuttons		Start, Stop, Run/Jog
Conveyor Selector:			On, Off, Auto	
Speed Potentiometer			Machine, Conveyor	
	Piece Counter (resettable)			

1.4 Inkjet Base Drawing



2.1 Instrument Panel Functions

- Power Rocker Switches
- Machine Function Pushbuttons
- Speed Regulation Potentiometers
- Resettable Piece Counter

2.2 Feeder Setup Instructions

- Feed Plate Selection and Installation
- Upper Feed Roller and Material Gate Adjustments
- Feeder Side Guide Adjustment
- Feeder Rear Pusher Setting

2.3 Skidbar and Transport Side Guide Adjustments

- Skidbar Adjustment
- Transport side Guide Adjustment

2.4 Vacuum System Instruction

- Vacuum Level Setting
- Spool Valve Setting

2.5 Belt Pitch Setting

2.6 Maintenance Schedule

2.1 Instrument Panel Functions

The BK600 Inkjet base is equipped with a centrally located instrument panel which displays all the necessary controls to operate the system. The controls can be subdivided into 4 distinct classes of functions which are :

- Main, and Pump Power Rocker Switches
- Machine and Conveyor Function Pushbuttons
- Machine and Conveyor Speed Regulation Potentiometers
- Resetable Piece Counter

NOTE : Refer to the main electrical schematic BK600E01.DWG for further information.
Code in brackets after instrument control refers to the main electrical schematic.

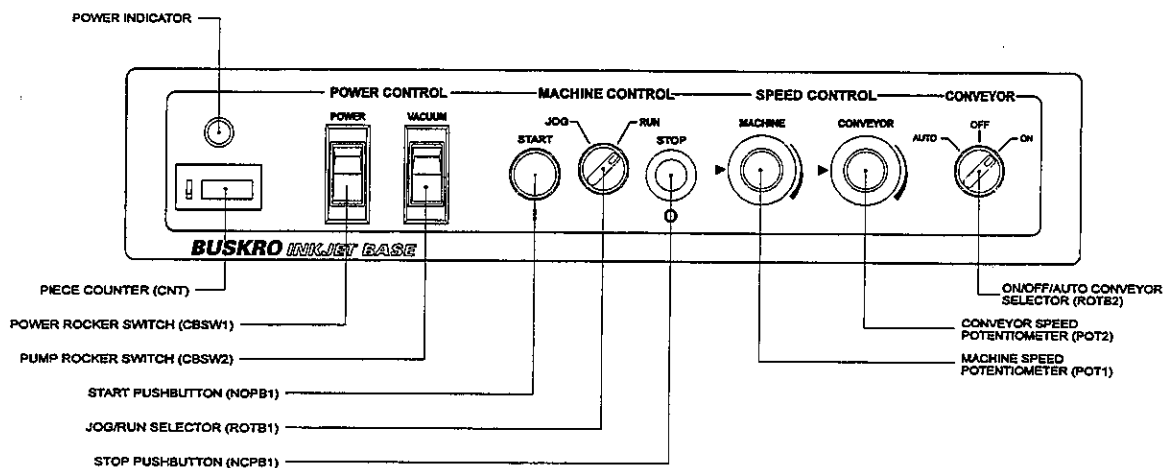


Figure 2.1 - Instrument Panel Control Illustrating Power Switches, Speed Potentiometers, Machine and Conveyor Control Pushbuttons, and a Resetable Piece Counter.

2.1.1 Power Rocker Switches

The power rocker switches, the two switches located to the right of the piece counter, provide power to the inkjet base (Power) and the vacuum pump (Vacuum). These switches are equipped with resettable circuit breakers to protect against overload conditions.

Power Rocker Switch (CBSW1)

Switch which turns on main power to the inkjet base or, in the case of european models, the entire inkjet system. Upon turning this switch on, the power indicator light above the counter should go on indicating that power is now available to all electrical components. The circuit breaker is rated at 15 Amps (220 VAC) for the BK600 Inkjet base.

Pump Rocker Switch (CBSW2)

Switch which turns on the vacuum pump. When this switch is on, the distinct humming sound of the vacuum pump's compressor should be heard. The circuit breaker is rated at 8 Amps (220 VAC).

2.1.2 Speed Regulations Potentiometers

The speed regulations potentiometers, two dials located to the right of the machine pushbuttons, permit adjustment of the machine and conveyor speeds by rotating them. A clockwise rotation of the speed dials corresponds to a speed increase. Conversely, a counter-clockwise rotation results in a speed decrease.

Machine Speed Potentiometer (POT1)

Machine speed dial which permits complete control of the inkjet system's speed over its full range. The speed range is from 0 (0) to 30,000 (10) pieces/hour. A clockwise rotation of the dial corresponds to a speed increase.

Conveyor Speed Potentiometer (POT2)

Conveyor speed dial which permits complete control of the conveyor's speed over its full range. The speed range is from 0 (0) to 26 in./S (10). A clockwise rotation of the dial corresponds to a speed increase.

2.1.3 Machine and Conveyor Function Pushbuttons

The pushbuttons and selector knobs located on the front panel permit control of the machine operation as well as the conveyor's. The **Start** (green) and **Stop** (red) pushbuttons allow engagement and suspension of the inkjet base operation while the **Run/Jog** selector (black) sets the system to run continuously (RUN) when the start button is momentarily depressed or run intermittingly (JOG) provided that the start button remains depressed. The conveyor **On/Off/Auto** selector controls the manner in which the conveyor is capable of operating with the Auto selection causing the conveyor to operate simultaneously with the inkjet base's operation and the On selection causing the conveyor to run continuously, independent of the base's operating status. An Off selection would suspend the conveyor's operation.

Start Pushbutton (NOPB1)

Pushbutton which turns on machine contactor and applies power to the motor controller. When this button is depressed, the machine will cycle provided that the following conditions have been met,

- The computer relay is not energized.
- The machine **Stop** button is not depressed.
- The conveyor **Stop** button is not depressed (*if present*).
- The conveyor connector (J3) is properly attached to the base.

Stop Pushbutton (NCPB1)

Pushbutton which suspends operation of the inkjet base by interrupting the power to the machine DC controller via the machine contactor. This is used mostly as an emergency stop button since depressing this button will cause the machine to stop immediately regardless of the printing status; Possibly causing the loss of a mailpiece since print quality of the image could be adversely affected.

Note : The Stop pushbutton has a locking feature, which when engaged, will prevent the system from cycling. Should this condition occur, twist and release the locking mechanism to allow base operation.

Jog/Run Selector (ROTB1)

Selector button which permits a choice between continuous and intermittent machine operation. When the **Run** mode has been selected and the **Start** button is depressed, the machine will operate continuously. In the **Jog** mode, the machine will cycle only as long as the **Start** button remains depressed.

- **Run Mode** - Machine will operate the instant the **Start** button is depressed.
- **Jog Mode** - Machine will operate only while the **Start** button is depressed.

On/Off/Auto Conveyor Selector (ROTB2)

Selector button which provides the operator with the capability to operate the conveyor in one of three modes. In the **ON** mode, the conveyor will cycle at all times. Conversely, if the **OFF** mode is selected, the conveyor will not operate at any time. Finally, in the **AUTO** mode, the conveyor will function in conjunction with the inkjet base; that is, when the base is operating so will the conveyor.

- **On Mode** - The conveyor will operate continuously when the selector is turned to **On**.
- **Off Mode** - The conveyor's operation will be suspended when the selector is turned **Off**.
- **Auto Mode** - The conveyor will run in conjunction with the inkjet base; that is when the inkjet base is on, the conveyor is on. Conversely, when the inkjet base is off, the conveyor will be off.

2.1.4 Resettable Piece Counter

Counter which monitors the number of mailpieces which are detected by the photo cue sensor when the inkjet controller is placed "Online". The counter, equipped with a locking feature to prevent accidental resets, can be reset by depressing the reset button located on it.

Note: Counter will not be reset to 000000 when the Power rocker switch (CBSW1) is turned off. However, The inkjet controller's counter will reset to zero when its power is turned off. Hence the piece counter can be used as the total job count while the controller counter will indicate the session count.

2.2 Feeder Setup Instructions

The feeder setup instructions comprise all the adjustments necessary to properly separate and feed any mailing piece which is within the criteria specified in *Chapter 1, Specification, Material Handling*. Proper setup of the feeder station will go a long way to ensuring a trouble-free operation of the inkjet process.

2.2.1 Vacuum Plate Selection and Installation

The selection of the proper vacuum plate for the mailpiece being processed is central to the proper operation of the feeding system. In most instances the concave plate should be used first as most mailpieces are of a pliable nature and can conform to the surface of this plate. For thicker pieces such as magazines, a flat plate is ideal. For open-ended mailpieces it is best to attempt the concave plate initially, however if the upper page separates from the lower one(s) and catches the material gate, the convex plate should be employed.

Convex Plate

The convex plate is the vacuum plate which has a coarsely textured arched surface. This plate is used primarily with open-ended mailpieces whose leading edge must be bent to ensure that all its individual pages are compressed together into one edge. The plate's lead three holes are threaded (8-32 UNF) to permit the installation of set screws preventing vacuum leakage for certain materials.

Concave Plate

The concave plate, also known as a dish plate, is the polyurethane covered vacuum plate with a depression in the center. This plate is used with thin pliable mailpieces capable of being "sucked down" and conforming to the recessed surface. The plate's lead three holes are threaded (8-32 UNF) to permit the installation of set screws preventing vacuum leakage for certain materials.

Flat Plate

The flat plate, a polyurethane covered vacuum plate, has a flat surface for those mailpieces which cannot bend and conform to the concave plate's surface. Usually this vacuum plate is used in conjunction with thick, rigid materials. The plate's lead three holes are threaded (8-32 UNF) to permit the installation of set screws preventing vacuum leakage for certain materials.

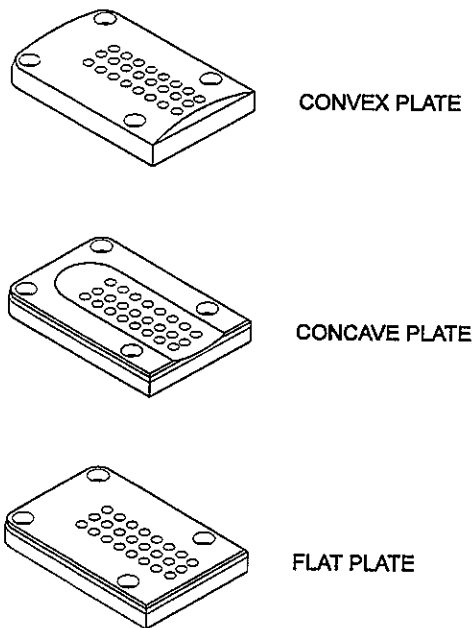


Figure 2.2 - Vacuum Plate Selection including flat, convex, and concave plates.

☞ To Select the Vacuum Feed Plate (see figure 2.2)

There are 3 vacuum feed plates provided with the inkjet base and they include a flat plate, a concave plate and a convex plate. Select one of the following plates :

1. **Flat Plate :** Used for thick and stiff mailing pieces. This feed plate has a front row of tapped holes so that they may be blocked off with 8-32 Unf set screws if a round-edged mailpiece is employed. Typical mailpieces which can be processed are thick publications, newspapers, cardstock, etc.

- OR -

2. **Concave Plate :** Used for thin, pliable mailpieces which can conform to the plate's profile when vacuum is applied. Mailpieces used with this plate could include : single sheets, envelopes, leaflets, light cardstock, thin pamphlets, self mailers, etc.

-OR-

3. **Convex Plate :** Used for open-ended mailpieces where the upper page may catch the material gate. This feed plate, when vacuum is applied, should cause all the pages to pinch together. Used for multiple page mailpieces which must be fed from the open side.

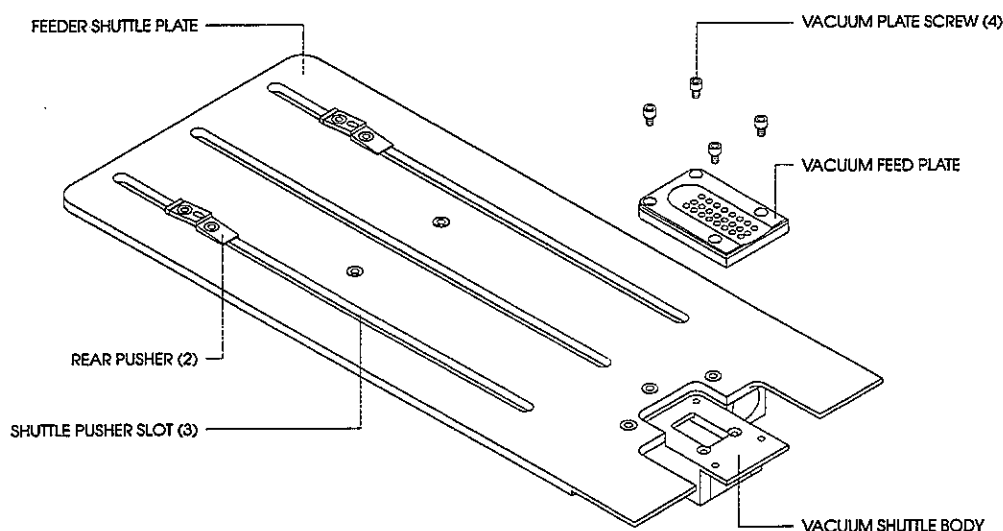


Figure 2.3 - Shuttle feed plate illustrating all adjustment points including the feed plate and pushers.

☞ To Install a Vacuum Feed Plate (see figure 2.3)

Upon selecting a feed plate using the criteria defined in ☞ To Select the Vacuum Feed Plate (see figure 2.2), the plate will have to be installed on the vacuum shuttle body.

1. Raise the Material Gate sufficiently (approximately 3/16") using the instructions given in ☞ To Set Material Gate. This will ensure that the vacuum plate does not interfere with the tip of the material gate after the vacuum plate has been installed.
2. With the handwheel, rotate the machine so that the feeder shuttle plate is fully back, exposing most of the vacuum feed plate.
3. With a 9/64" hex key, loosen and remove all four 8-32 Unf vacuum plate screws. Remove the vacuum feed plate.
4. Place the required vacuum feed plate into position and replace the vacuum plate screws. Do not overtighten these screws as it may result in the threads being stripped in the vacuum shuttle body !

Note : Do not overtighten the vacuum plate screws as it may result in stripped threads located in the vacuum shuttle body.

Cycle the system manually with the handwheel to ensure that the vacuum plate does not interfere with the material gate tip.

Lifting the material gate using the quick-release mechanism will permit greater access to the vacuum plate during installation.

2.2.2 Upper Feed Roller and Material Gate Adjustment

Upper feed roller and material gate adjustment must be done to accommodate differing mailpiece thicknesses. A successful adjustment of these items will result in a single mailpiece being deposited onto the transport belts without any hint of skewing.

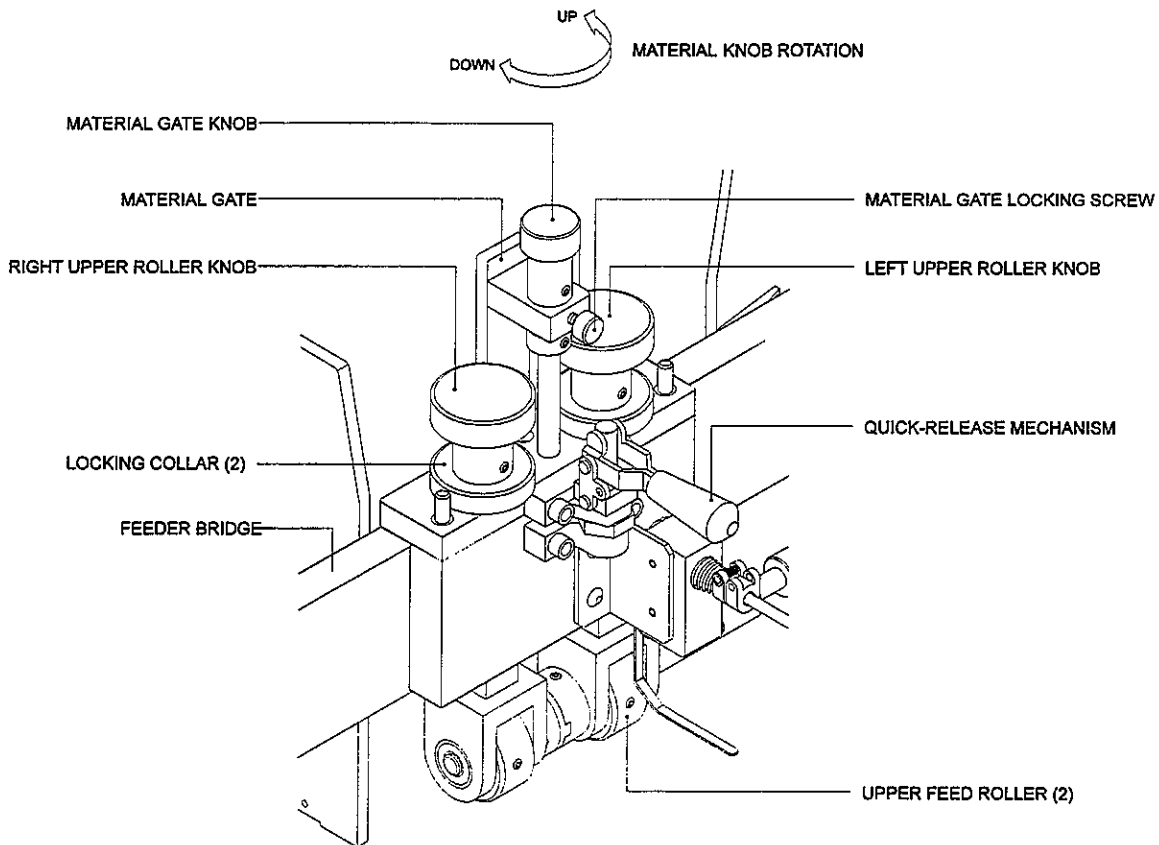


Figure 2.4 - Feeder material gate/ upper feed roller details indicating adjustment points located on the feeder bridge assembly.

☞ To Set the Upper Feed Rollers (see figure 2.4)

When feeding a new mailpiece, it may be necessary to adjust the upper feed rollers to accommodate the mailpiece's thickness. Adjustment should be made so that there is just enough tension on a mailpiece between the upper and lower feed rollers such that it cannot be removed by pulling it. Adjustment of the left and right upper feed roller should be done evenly to prevent the mailpiece from skewing upon exit from the rollers.

1. Loosen the material gate locking screw. Then loosen the upper feed roller locking collars by rotating them counterclockwise.
2. Raise the material gate sufficiently so that a single mailpiece easily clears its tip. This is done by turning the material gate knob counterclockwise.
3. Raise both the left and right upper feed rollers until a single mailpiece clears both rollers. This is accomplished by turning the feed roller knobs in a counterclockwise direction.
4. Ensure that the lower feed rollers are fully upward. This can be accomplished by rotating the handwheel until the shuttle plate is fully forward.
5. Place the desired mailpiece in between the upper and lower feed rollers. Grip the rear of the mailpiece with one hand and lower the left upper feed roller onto it until firm pressure is applied. (i.e. when it becomes impossible to pull away the mailpiece from under the rollers). A clockwise rotation of the left upper roller knob corresponds to a lowering of the feed roller.
6. Repeat step 5 for the right upper feed roller.
7. When the proper upper feed roller setting has been attained for the mailpiece, tighten the locking collars of the feed roller by rotating them clockwise until they lock against the gate adjuster plate.

NOTE : An improper setting of the upper feed rollers will result in skewed or delayed mailpieces.

Do not overtighten the upper feed rollers as this will result in rapid wearing of the upper and lower feed rollers as well as placing an excessive load on the hopper roller cam assembly. This condition is usually detected when the feed rollers make a "clunking" noise when they meet.

Always make sure that the lower feed rollers are up when making this adjustment, otherwise the aforementioned wear condition may occur.

☞ To Set the Material Gate

1. Ensure that the material gate is in a raised position as described in the previous instructions entitled ☞ *To Set the Upper Feed Rollers*.
2. Turn the vacuum pump on by depressing the **Pump** rocker switch as described in section 2.1, Instrument Panel Function.
3. Place a mailpiece centrally in the hopper and advance the feeder shuttle plate until the lead edge has passed by the material gate. This is accomplished by rotating the handwheel clockwise.
4. Now place a second mailpiece over the first one and lower the material gate onto it by rotating the material gate knob clockwise. Grip the rear of the top mailpiece and pull it away from the material gate; a slight resistance should be present.
5. After removing the top mailpiece, lower the material gate slightly by incrementally rotating the material gate knob clockwise. Do not lower the material gate excessively causing the remaining mailpiece to be pinched.
6. After the proper setting has been attained, tighten the material gate locking screw.

NOTE : An improper gate setting will result in multiple mailpieces being dispensed if the gate is too high. Conversely, damaged or unfed mailpieces will result if the gate is too low.

In the event that a very thin mailpiece is used with a concave plate; it may be necessary to regulate the vacuum flow in addition to adjusting the material gate to obtain the desired result.

When changing feed plates, ensure that the material gate is raised up since interference may occur between the new vacuum feed plate and the material gate. This would result in damage to the vacuum feed plate and possibly the material gate.

Adjustments for mailpieces thicker than 0.625" must be done by screw re-adjustment on the feeder bridge.

2.2.3 Feeder Side and Rear Guide Adjustment

The feeder guides must be set to accommodate differing mailpiece sizes. This adjustment, though quite simple, requires some attention since a setting which is too tight or too loose may cause ineffective material feeding. Typically, a rear guide which is set loosely causes material misfeeds because the mailpiece oscillates back and forth with the shuttle preventing the vacuum from securing and advancing the front of the mailpiece. As well, side guides which are tight causes the material to be pinched and prevents the mailpiece stack from dropping onto the shuttle plate. In addition it is often necessary to remove the side guide bottom plates for thin, narrow mailpieces as these hold up the material and prevents it from being sucked down by the vacuum feed plate.

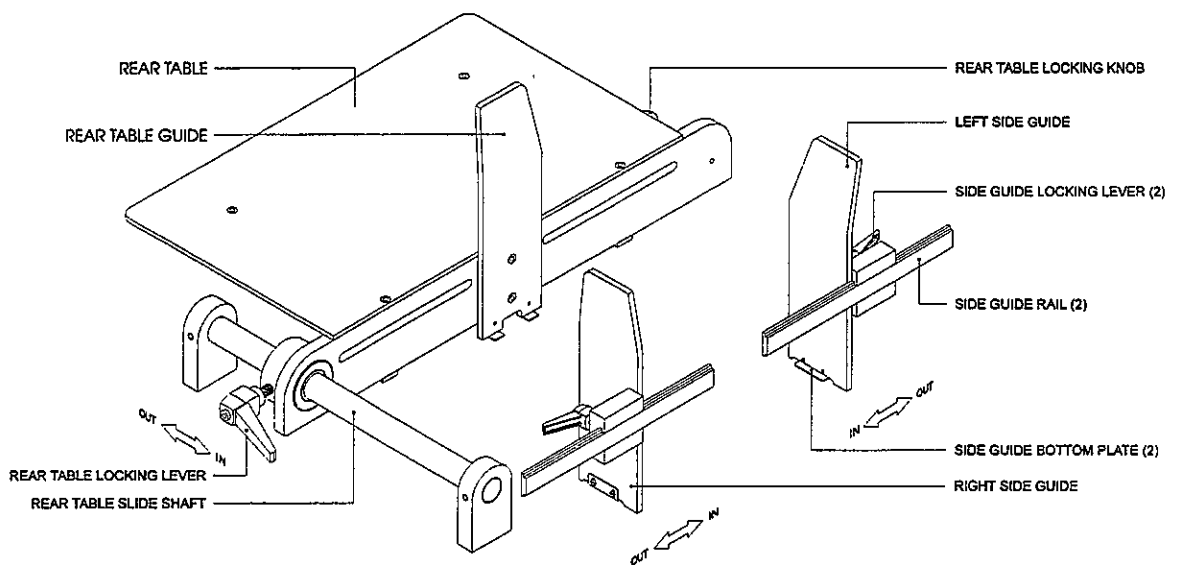


Figure 2.5 - Rear table and side guide illustration indicating the various adjustment points when setting up the hopper material guides.

Installation of the vacuum feed plate (See [☞ To Install a Vacuum Feed Plate](#)) and adjustment of the feed rollers (See [☞ To Set the Upper Feed Rollers](#)) and material gate (See [☞ To Set the Material Gate](#)) should be done prior to setting the material guides as the guides are usually moved when performing the aforementioned setup steps.

☞ To Set the Feeder Side Guides (see figure 2.5)

The feeder's side guides mounted on slide rails on the feeder bridge, are used to align the mailpiece stack centrally in the feeder hopper so that the mailpiece is transported evenly on the belts.

1. Loosen the rear table locking lever and remove the rear table locking knob by turning it counter-clockwise. Slide the rear table assembly back to a fully open position.
2. Loosen both left and right side guide locking levers and slide both outward to a fully open position.
3. Place the desired mailpiece centrally in the hopper.
4. Slide the left and right side guides inward until both are 1/16" to 1/8" from the side edges of the mailpiece. Ensure that both side guide bottom plates (*if used*) are underneath the mailpiece and then retighten the side guide locking levers.

NOTE : If the guides are closed too tightly against the mailpiece, proper feeding will be affected due to mailpiece pinching.

In the event that the mailpiece is thin and narrow, it is probably best to remove the side guide bottom plates as these sometimes hinder the separating and feeding operation.

Occasionally due to the edge of the mailpiece which is presented to the material gate, it is better to offset the mailpiece slightly along the centerline in order to improve the feeding operation.

☞ To Set Rear Table (see figure 2.5)

The rear table must be properly set to control the rear of the mailpiece stack so that the mailpieces do not oscillate with the feeder shuttle's motion.

1. Ensure that the rear table is fully backward as described in ☞ *To Set the Feeder Side Guides*.
2. Place a mailpiece in the feeder hopper.
3. Slide the rear table assembly forward until the rear guide is approximately 1/16" (1.5 mm) from the rear of the mailpiece. Ensure that the rear guide bottom plate is underneath the mailpiece.
4. Retighten the rear table locking lever. Place the rear table locking knob in the nearest threaded hole located in the base's tabletop, and tighten it by rotating it in a clockwise fashion.

NOTE : A loose adjustment of the rear table assembly will result in oscillation of the mailpieces resulting in intermittent feeding.

2.2.4 Feeder Rear Pusher Setting

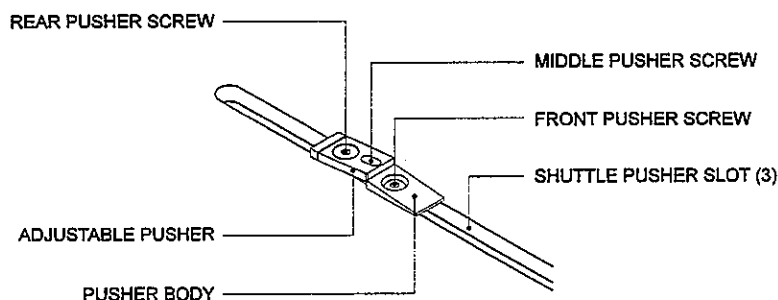


Figure 2.6 - Rear pusher details indicating the location of the various adjustment points.

☞ To Set Rear Pushers for Thick Mailpieces (see figure 2.6)

Rear pushers are to be used if the vacuum feed plate is not sufficient to advance the mailpiece into the feed rollers. This condition may present itself with thick, heavy mailpieces. Adjustment of the rear pushers may best be accomplished with the rear table fully back.

1. Rotate the handwheel in a clockwise direction until the shuttle plate is fully back.
2. With a 3/32" hex key, loosen the front and rear pusher screws until the pusher assembly is just loose. If both pushers are used, loosen the screws for the second pusher assembly.
3. Slide the pusher(s) fully back in the slots of the shuttle plate.
4. Place a mailpiece in the feeder hopper.
5. Advance the pusher(s) until it is up against the rear of the mailpiece. With the 3/32" hex key, set the height of the pusher just below the top surface of the mailpiece, by rotating the middle pusher screw. A clockwise rotation corresponds to a lowering of the pusher.
6. After the proper height has been attained, set the pusher(s) so that the pusher is approximately 1/8" (3 mm) from the rear edge of the mailpiece.
7. Tighten both the front and rear pusher screws using the 3/32" hex key.
8. Set the rear table as per instructions provided in ☞ *To Set Rear Table (see figure 2.5)*. Ensure that the rear pushers do not remain under the mailpiece stack when the shuttle plate is fully back. If the pushers do in fact remain under the bottom mailpiece, repeat steps 2 to 7.

NOTE : Two pushers are provided with the BK600 inkjet base. In the case of a narrow piece, only one pusher in the central pusher slot may be required.

An improper pusher setting will result in a damaged or jammed mailpiece if the pusher is set too high. Conversely, a pusher which is set too low or too far away will have no effect on feeding performance .

2.3 Skidbar and Material Side Guide Adjustments

Proper adjustment of the skidbar assembly and material side guides will permit dependable and accurate feeding of the mailpieces so that they are correctly aligned when presented under the printhead(s). The objective of this section of the transport base is to straighten out any mailpiece which may come out of the feeder in a skewed manner such that when the printheads produce the image, it will be placed properly and accurately onto the mailpiece.

As there is no vacuum applied to the belts in this section of the transport, it is the skidbar's purpose to provide positive mailpiece movement in this area by forcing the mailpiece against the central transport belt. Both material side guides provide the ability to correct any material skew which may be caused by the feed rollers. When adjustment of the side guides is performed, it is imperative that they not squeeze and retard the advancing mailpiece as this would result in incorrect print positioning.

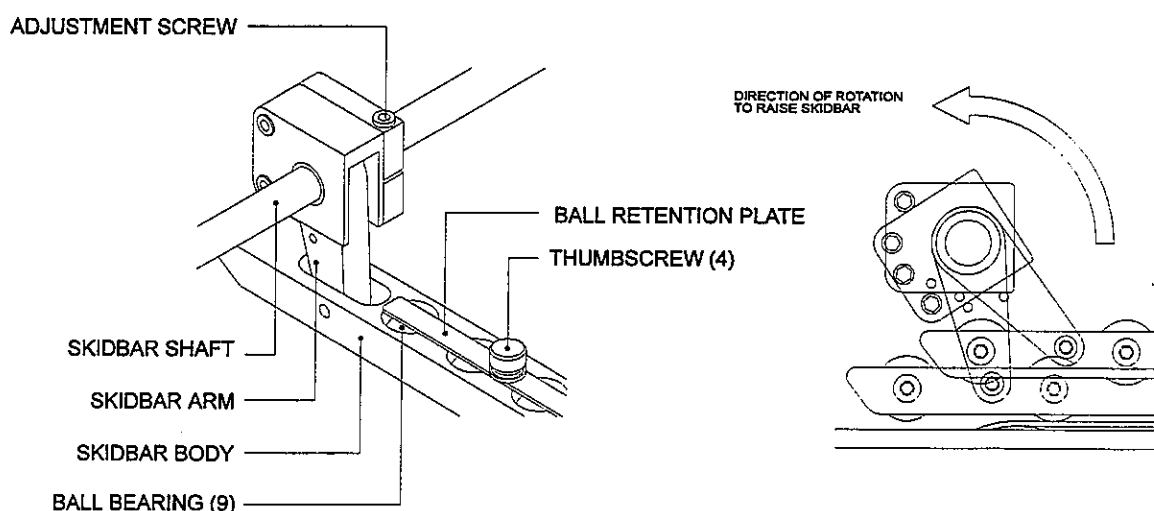


Figure 2.7 - Skidbar adjustment points including an illustration of the height adjustment method.

☞ To Make a Skidbar Adjustment (see figure 2.7)

A proper skidbar adjustment is essential to ensure positive skew-free transport of the mailpieces. The skidbar is used in conjunction with the transport side guides to eliminate and correct any skewed mailpieces prior to the inkjetting process.

1. After the feeder has been setup as described previously in *Section 2.2, Feeder Setup Instructions*, place a stack of mailpieces in the feeder hopper. Ensure that the vacuum pump is operating by placing the Vacuum rocker switch to the ON position.
2. Loosen both skidbar adjuster screws using a 9/64" hex key and raise the skidbar away from the transport belts to ensure unencumbered passage of a mailpiece.
3. Rotate the handwheel clockwise until a mailpiece has been completely fed onto the table belts.
4. Lower the skidbar onto the mailpiece until the skidbar's ball bearings contact the upper surface and pressure is applied.
5. While holding the skidbar down (slight spring tension exerted on the skidbar), retighten both skidbar adjuster screws.
6. Some of the ball bearings may have to be removed to prevent mailpiece buckling at the feed rollers. To do this, manually lift the skidbar and rotate the handwheel to permit the feeding of a mailpiece. Halt the feeding of the mailpiece the instant the trailing edge of the mailpiece just clears the feed rollers. Release the skidbar onto the mailpiece.
7. Loosen and remove the thumbscrews holding the ball retention plate. Now remove all the ball bearings contacting the surface of the mailpiece. If a ball bearing just makes contact with the mailpiece at its lead edge, it may be left in place.
8. Replace and tighten the ball retention plate against the ball bearings by turning the thumbscrews in a clockwise fashion.

NOTE : An improper skidbar adjustment may cause inconsistent transportation of the mailpiece resulting in jams and improper inkjet image positioning. If there is sufficient retardation of the mailpiece, an inkjet image may completely miss the mailpiece and/or the piece will become trapped in the transport track resulting in a Photo Eye Jam message.

If sufficient balls are not removed and firm pressure is applied to the mailpiece, buckling of the mailpiece will occur; This may cause mailpiece jams at the feeder resulting in a Feeder Jam message.

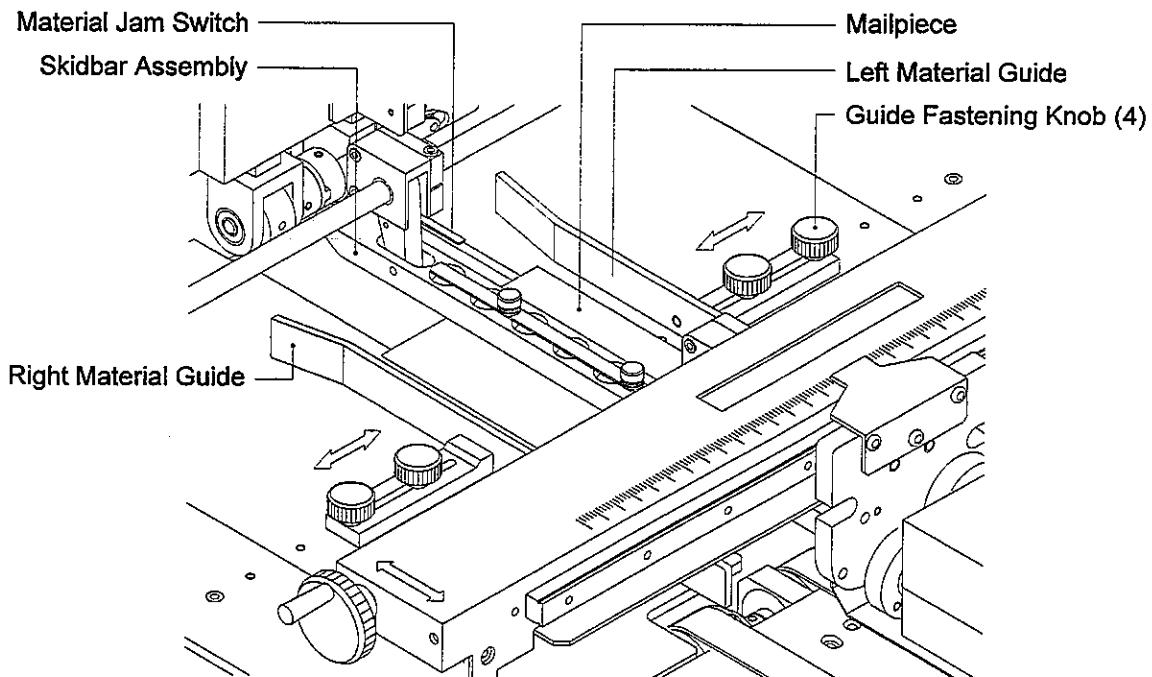


Fig 2.8 - Outfeed section of the feed rollers illustrating the material side guides and the skidbar.

☞ To Adjust the Material Side Guides (See figure 2.8)

The material side guides must be set correctly to ensure that the mailpieces are directed in a straight fashion into the inkjet imaging area. These guides, used in conjunction with the skidbar, can correct mailpiece skewing.

1. Loosen off the two fastening knobs present on each material side guide. Remove them.
2. Turn the vacuum pump ON and place mailpieces in the feed hopper. Rotate the handwheel in a clockwise fashion to cycle the machine and dispense a mailpiece onto the transport belts. Stop the rotation the instant the trailing edge of the mailpiece has cleared the feed rollers.
3. Place the left and right side guides about 1/16" to 1/8" from the corresponding edge of the mailpiece. Ensure that the guides do not pinch the mailpiece anywhere along its edges.
4. Replace the fastening knobs in the nearest threaded holes located in the base's tabletop, and by turning them in a clockwise fashion, retighten them.
5. Dispense another mailpiece onto the transport belts by rotating the handwheel and check that the mailpiece's path is unobstructed by the material side guides; If so repeat steps 1 to 4.

Note : If the material side guides are improperly set, the mailpiece may become trapped between them and/or cause a jam at the output of the feed rollers.

The Material Jam switch may trigger resulting in a system stoppage if the material side guides and/or skidbar are incorrectly set.

2.4 Vacuum System Adjustments

The vacuum system consists of a vacuum circuit breaker switch; a vacuum pump; a vacuum distribution block featuring a relief valve and vacuum gauge; and two hoses which lead to the vacuum table and feeder vacuum plate respectively. The larger diameter hose leading to the feeder station is equipped with a shutoff valve in order to regulate the vacuum for light mailpieces (See figure 2.9).

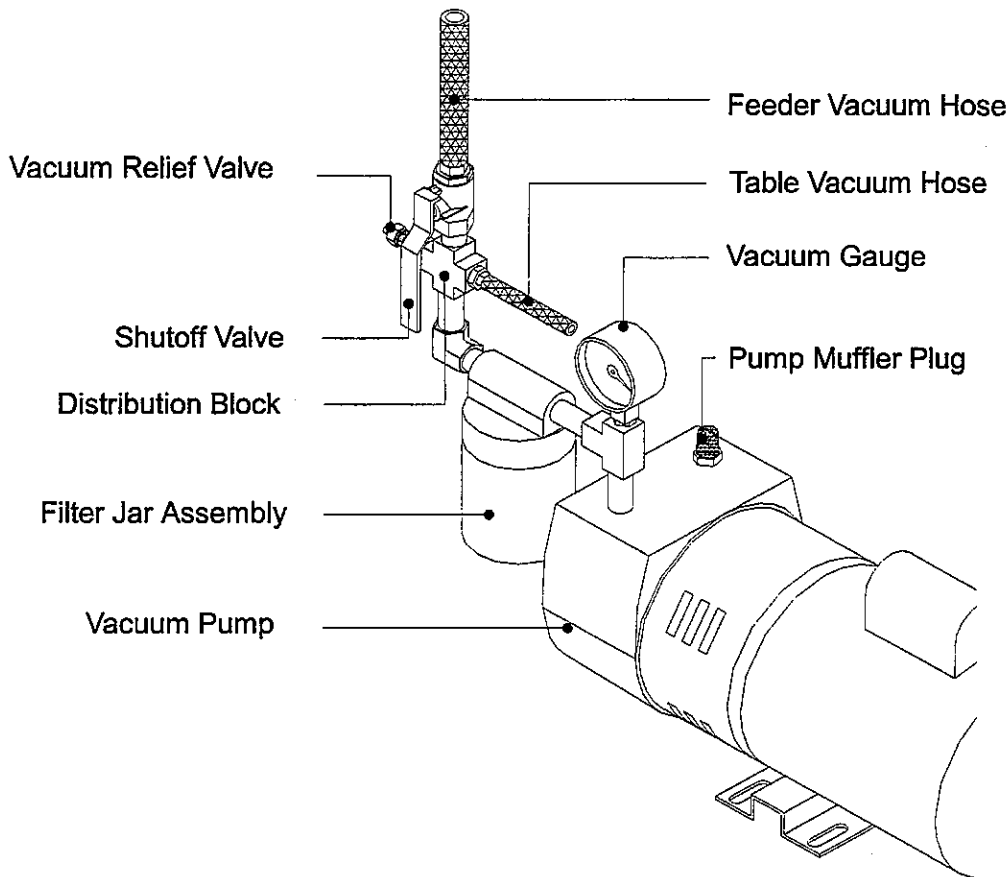


Figure 2.9 - Vacuum Pump System illustrating vacuum relief valve, shutoff valve, filter jar assembly, vacuum gauge and hose locations.

Adjustments to the vacuum system are simple and accomplished quite readily by an operator. Most adjustment points are situated on the distribution block with filter replacement being done at the filter jar assembly. Vacuum pressure regulation in the range of 20 to 25 In. Hg is provided by the vacuum relief valve and is observed at the vacuum gauge. Should vacuum pressure remain persistently low even after filter replacement and relief valve adjustment, it may be necessary to replace the pump vanes which should only be performed by the factory or an authorized dealer.

☞ To Set Vacuum Level (25 In.Hg) (See Fig. 2.9)

Peak feeder performance is achieved when the vacuum level is set to its maximum which is in the 20 - 25 In.Hg range. Adjustment is made via the vacuum relief valve situated on the distribution block (See Figure 2.9).

1. Remove the front panel door to expose the vacuum pump and distribution block.
2. Close the shutoff valve (See fig. 2.9) by rotating it fully clockwise so that the valve handle points to the right (towards vacuum pump).
3. Completely restrict the vacuum to the table vacuum hose by kinking it with your hands.
4. Turn the vacuum pump ON with the Vacuum switch located on the instrument panel (See Figure 2.1).
5. Take a vacuum level reading from the vacuum gauge. If it appears low (< 20 In. Hg.), an adjustment of the vacuum relief valve will be required.
6. Place a flat screwdriver in the vacuum relief valve slot, and, with the other hand, rotate the nut in a clockwise direction in order to compress the spring. Keep rotating downward until maximum pressure (25 In. Hg.) has been attained.

Note : If after this adjustment has been completed, the vacuum level is still below acceptable values (< 20 In. Hg.) and the filter has been replaced, it may be necessary to replace the vacuum pump vanes. This should only be done by an authorized technician.

If it appears that the vacuum pump vanes are worn, please contact your dealer or the factory for assistance.

2.4.2 Feeder Vacuum Valve Adjustments

The spool valve which controls the vacuum flow to the vacuum feed plate (See 2.2.1 Vacuum Plate Selection and Installation) must be properly set to ensure optimum performance of the feeder station. The correct vacuum setting is such that when the shuttle plate is completely back, the vacuum is fully ON; and, conversely, it must just go OFF when the leading edge of the mailpiece is 1/4" (6 mm) past the feed rollers.

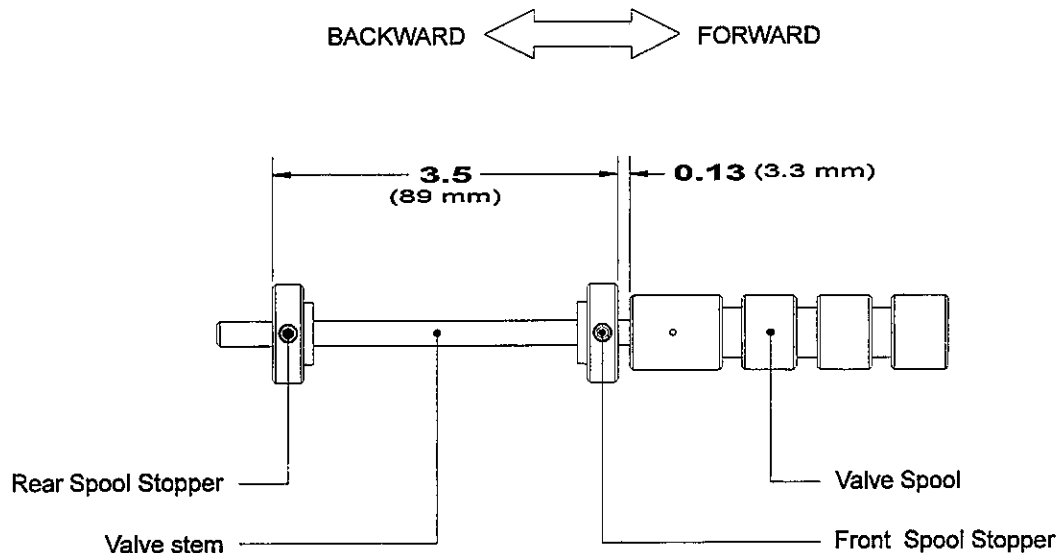


Figure 2.10 - Spool valve assembly illustrating the initial settings for the front and rear spool stoppers. Arrow indicates shuttle feed plate movement.

The spool valve controls the sequencing of the vacuum supply to the vacuum feed plate permitting proper mailpiece separation and dispensation. The front spool stopper regulates the vacuum turn-ON time which occurs when the shuttle feed plate is fully back causing the vacuum feed plate to "pull down" (separating) the next mailpiece from the stack; Vacuum supply just begins when the shuttle feed plate is 1/8" (3mm) from the fully back position and is completely supplied at the fully back position. Once the vacuum is ON, it remains so until the rear spool stopper disengages it 1/4" past the center of the feed rollers. Improper setting of the front spool stopper will cause a partially obstructed vacuum port resulting in insufficient vacuum being supplied to the feeder.

The rear spool stopper's task is to shut-OFF the vacuum after the front of the vacuum feed plate has past the center of the feed rollers by 1/4" (6 mm) with the objective being to keep the vacuum supply ON until the shuttle feed plate has brought the separated mailpiece into the feed rollers whereupon it is dispensed onto the transport belts. If vacuum is maintained too long, the mailpiece may be damaged as the feed rollers would attempt to advance it while the vacuum would continue to "hold it down" acting as a brake; Conversely, if the vacuum is not maintained ON long enough, the mailpiece might slip with its lead edge not being deposited between the feed rollers resulting in a misfeed.

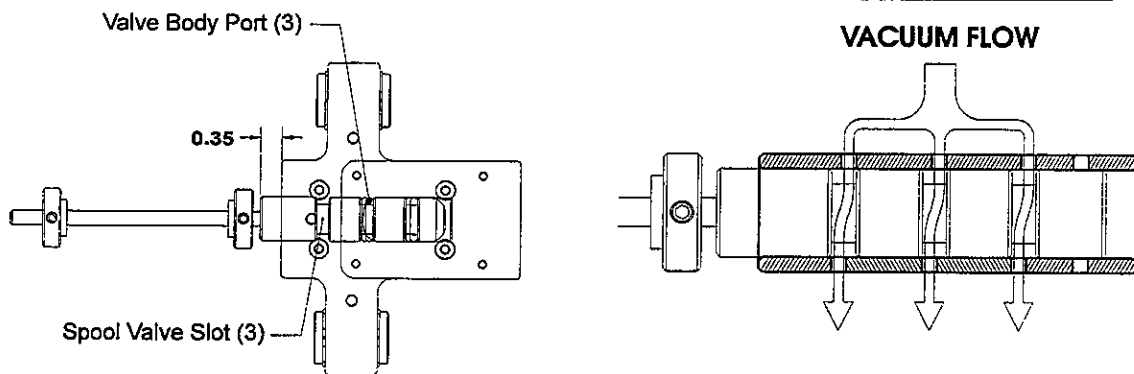


Figure 2.11 - Feeder vacuum valve assembly illustrating the location of the spool assembly when the shuttle feed plate has attained its fully back position. Side view shows vacuum flow from the top to the lower valve body port when spool valve slots are properly centered along the ports. End port shown is the vent port which is completely blocked by the spool.

☞ To Adjust the Front Spool Stopper (Vacuum ON setting)

This adjustment is best accomplished by removing the vacuum feed plate in order to view the spool valve slot alignment with respect to the valve body ports (3) (See Figure 2.11). To remove the vacuum feed plate refer to ☞ *To Install a Vacuum Feed Plate*.

1. Remove the vacuum feed plate following the instructions described in ☞ *To Install a Vacuum Feed Plate*.
2. With a 3/32" hex key, loosen both the front and rear spool stoppers. The spool stopper screws should be accessed through the central pusher slot of the shuttle feed plate (See Figure 2.3). If the screws are not aligned with the pusher slot, rotate the entire spool valve assembly manually from the bottom of the shuttle feed plate.
3. Adjust the front spool stopper as per the initial setting illustrated in Figure 2.10; tighten lightly onto the valve stem with a 3/32" hex key. Repeat for the rear spool stopper.
4. Rotate the handwheel until the shuttle feed plate is fully back. Observe the position of the spool valve's slot with respect to the corresponding valve body's port. The spool valve's slot should be centered over the upper and lower ports with no slot edges showing (See Figure 2.11). If this is not so, the front spool stopper will have to be adjusted; proceed to step 5.
5. Loosen the front spool stopper screw with a 3/32" the hex key.
6. Insert the 3/32" hex key in the rear spool stopper screw, and proceed to move the complete spool valve assembly until the spool valve's slot is centered over the upper and lower valve body ports. No spool valve slot edges should be visible.
7. With a 3/32" hex key, tighten the front spool stopper screw against the valve stem ensuring that the rubber washer and front spool stopper are resting against the Shuttle Slide Shaft Mount (P.N. 330001H).
8. Repeat step 4 to ensure that the front spool stopper is properly set. You can double-check this setting by measuring the distance by which the spool protrudes from the rear of the valve body; This measurement should be 0.35" (8.9 mm) as per Figure 2.11.

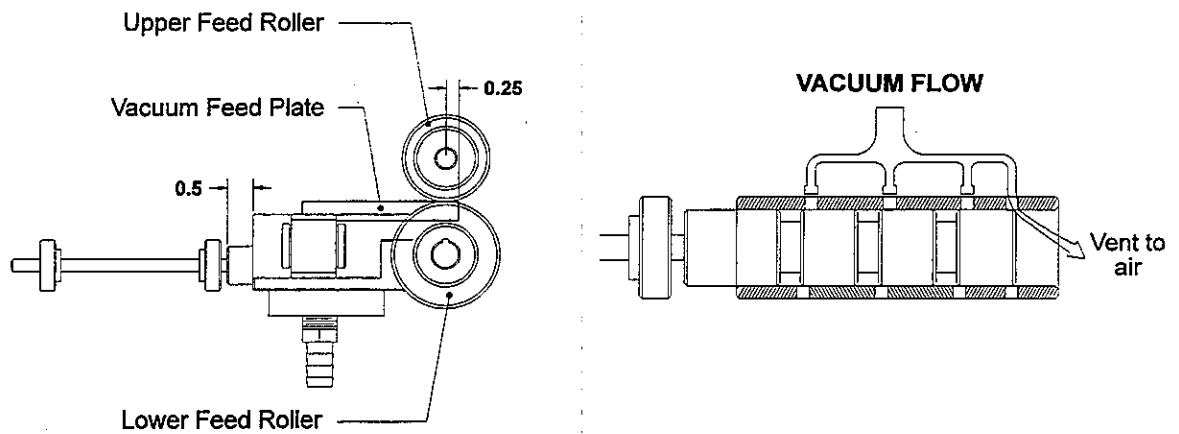


Figure 2.12 - Feeder vacuum valve assembly illustrating the location of the spool assembly when the shuttle feed plate is 1/4" past the center of the feed rollers. Side view shows vacuum flow from the top to the exhaust port when vacuum is released. End port shown is the vent port which is fully open.

☞ To Adjust the Rear Spool Stopper (Vacuum OFF setting)

1. Once the proper position has been achieved for the front spool stopper, it is now necessary to adjust the rear spool stopper such that the vacuum shuts off the instant the lead edge of the vacuum feed plate is 1/4" (6 mm) past the center of the feed rollers. With the initial rear spool stopper setting as per Figure 2.10, rotate the handwheel slowly until the vacuum is just OFF and is no longer supplied to the vacuum feed plate. Measure the position of the lead edge of the vacuum feed plate with respect to the center of the feed rollers.
- 2a. If the vacuum shuts OFF too soon (i.e the front of the vacuum feed plate position is < 1/4"), then the rear spool stopper moved **backward** the distance necessary to cause vacuum shutoff at 1/4".
- Or -
- 2b. If the vacuum shuts OFF too late (i.e the front of the vacuum feed plate position is > 1/4"), then the rear spool stopper will have to be moved **forward** the distance necessary to cause vacuum shutoff at 1/4".
3. Once you have determined the amount of movement necessary and the direction in which the rear spool stopper should be moved as per step 2a or 2b, loosen the rear spool stopper screw with a 3/32" hex key.
4. Hold the spool valve assembly stationary by placing a 3/32" hex key in the front spool stopper screw.

☞ To Adjust the Rear Spool Stopper (continued)

5. Place another 3/32" hex key in the rear spool stopper screw and move it according to the distance calculated in step 2a or 2b. Ensure that the rubber washer and rear spool stopper are resting against the Shuttle Slide Shaft Mount (P.N. 330001H) and retighten the screw in the rear spool stopper when the distance has been achieved.
6. Cycle the machine by rotating the handwheel until the vacuum supply is just OFF. Observe the position of the lead edge of the vacuum feed plate with respect to the center of the feed rollers. The distance measured should be about 1/4". If this is not so, the rear spool stopper will have to be re-adjusted by repeating steps 1 to 5.
7. Replace the vacuum feed plate as per ☞ *To Install a Vacuum Feed Plate*.
8. Cycle the machine with the handwheel and ensure that the vacuum sequencing is correct. If not "finetune" the settings as per the previous instructions until proper sequencing is achieved.

NOTE : Valve spool setting is very important to the smooth operation of the feeder station. Incorrect placement of the front and/or rear spool stopper will result in inconsistent or complete failure of the feeding operation.

An improper front spool stopper setting results in insufficient vacuum being supplied to the vacuum feed plate. The resulting lack of optimal vacuum supply may cause inconsistent material feeding because the vacuum feed plate may not be able to "pull down" and "hold onto" the bottom mailpiece.

If the rear spool stopper is improperly set, it will result in inconsistent or no material feeding since the vacuum feed plate is not depositing the front of the mailpiece between the feed rollers. Damage of the mailpiece may also occur if the vacuum holds on too long to a mailpiece after the feed rollers have engaged.

2.5 Belt Pitch Adjustment

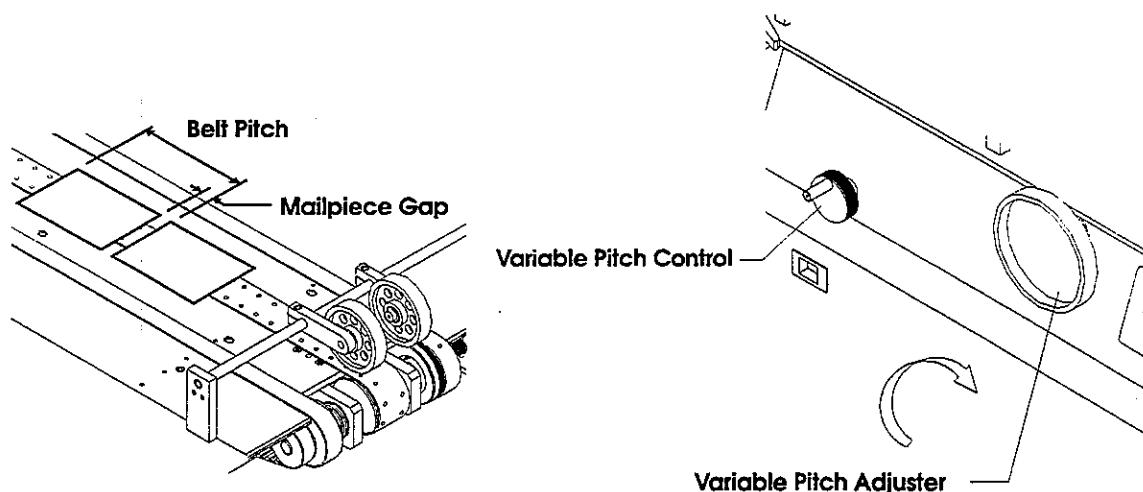


Figure 2.13 - Variable Pitch Control of the transport belts indicating the adjustment point and an illustration of the various definitions..

☞ To Adjust the Belt Pitch to Accomodate a Mailpiece

The Pitch of the transport belts should be adjusted such that a mailpiece gap between 1" and 2" is obtained. This will enable maximum productivity while ensuring that print quality is maintained.

1. Remove any mailpiece which may be present in the feed hopper.
2. Set the machine speed cycle dial between 1 and 2.
3. Turn the inkjet base On by depressing the **Start** pushbutton. Rotate the pitch control knob fully clockwise to arrive at the maximum pitch setting of about 18". Stop the machine when the setting has been attained.
4. Setup the inkjets base's feeder and transport by following the previous instructions explained in section 2.2 *Feeder Setup Instructions* and 2.3 *Skidbar and Transport Side Guide Adjustments*.

2.5 Maintenance Schedule

The maintenance schedule table presented below applies to equipment which is operated daily on an 8 hour basis. If the equipment is to be used more frequently than the aforementioned operating standard, please adjust your schedule accordingly.

Table 2.1 - Maintenance Schedule Table

Period	Maintenance Function
Daily	<p>Wipe table surface clean of paper dust and other accumulated debris</p> <p>Remove the front door and clean any debris which may have fallen into the machine</p> <p>Check the vacuum filters. If they appear to be clogged, remove them from the jars and clean them. If they are beyond cleaning, replace the vacuum filters (P.N. 802036)</p> <p>Wipe away any ink which may have settled on the tabletops, belts, and rollers. Use of Fastdri maintenance spray (P.N. 800814) will facilitate the ink removal procedure.</p>
Monthly	<p>Grease gears accessible through the Rear Gear Cover (P.N. 700030H). <i>See Appendix A, drawing BK600A (pp A1-A2).</i> Special gear grease oil such as Shell Capac lube is recommended.</p> <p>Grease pitch setting gears located at the front of the machine behind the handwheel. These gears are accessed from the inside of the machine by removing the front door. Special gear grease oil such as Shell Capac lube is recommended.</p> <p>Remove vacuum feed plate and clean the vacuum valve assembly removing any dust which may be present (<i>see To Install a Vacuum Feed Plate (Figure 2.3)</i>). This may best be accomplished with a small compressor.</p> <p>Clean vacuum lines and fittings with compressed air.</p>
Semi Annually	<p>Remove tabletops and examine all mechanical drive components for wear. Replace if necessary.</p> <p>Grease all bearings which require it. These bearings are equipped with grease nipples. Use any commercially available grease.</p> <p>Examine the table belts and feed rollers for wear. Replace if necessary.</p> <p>Remove the feeder shuttle plate and clean the exposed shuttle mechanism assembly. <i>See Appendix A, drawing 325005HA (pp A41).</i> Apply grease to the hardened shuttle slide shafts (P.N. 100007H) along the contact area of the linear bearings (P.N. 212030). Use a graphite based grease.</p>

Note : Acquiring a small air compressor is recommended. Compressed air is useful in removing debris and is indispensable in cleaning out the vacuum systems.

3.1 Faceplate Panel Instructions

- Power Rocker Switches
- Offline Function Pushbutton
- Priming System Pushbuttons
- Dual Floppy Drive
- Keyboard Tray

3.2 Computer Assembly

- Motherboard
- Hard Drive
- Super I/O Card
- Video Card
- SIMM Chip
- Driver Board

3.3 Jet Power Supply

- Supply Power
- Driver board Power

3.1. Faceplate Panel Instructions

The BK600 Inkjet Base is equipped with a controller attached to the rear of the base by 4 rubber mounts. This controller provides the user with a complete computer interface as well as an easy to use priming system. All necessary controls are displayed on the centrally located faceplate panel. The controls can be subdivided into 5 distinct classes of functions which are:

- Power Rocker Switches
- Offline Function Pushbutton
- Priming System Pushbuttons
- Dual Floppy Drive
- Keyboard Tray

Note : Refer to the Priming Schematic BK600EL7 for further information.

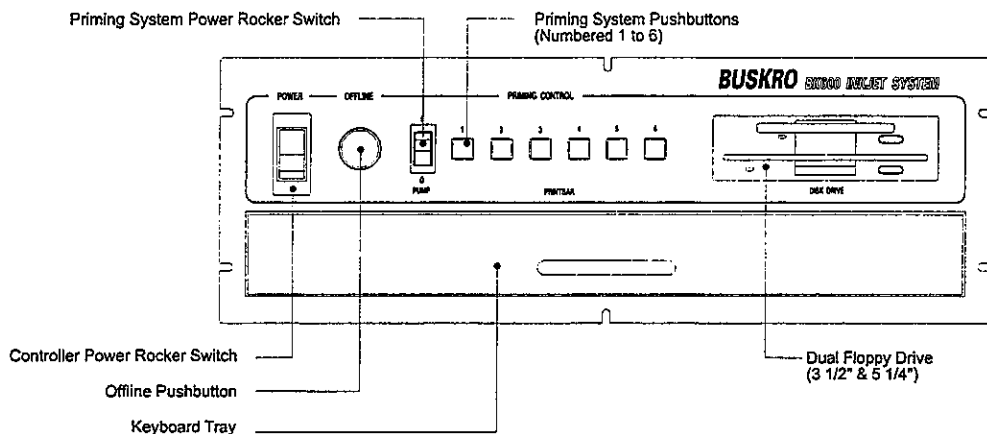


Figure 3.1 - Faceplate Panel Control Illustrating Controller Power Switches, Offline Pushbutton, Priming Switch and Pushbuttons, a Dual Floppy Drive, and a Keyboard Tray.

3.1.1. Power Rocker Switches

The power rocker switches, the two switches providing power to the computer controller and the priming system are located on the far left of the faceplate panel (Controller Power) and to the immediate left of the priming pushbuttons (Priming System Power). The controller switch is equipped with resettable circuit breaker to protect against overload conditions.

3.1.1.1. Controller Power Rocker Switch

The switch which turns on the main power to the computer controller. Upon turning this switch ON, the red rocker switch light should go on indicating that power is now available to all the controller's electrical components. The circuit breaker is rated at 5 Amps (120 VAC) for the BK600 Inkjet System.

3.1.1.2. Priming System Power Rocker Switch

The switch which turns on the power to the priming system. Upon turning this switch ON, the orange rocker switch light should go on indicating that power is available to each of the priming switches.

Note : The priming system rocker switch cannot be engaged if the Power switch has not been turned ON.

3.1.2. Offline Function Pushbutton

The offline function pushbutton is located to the immediate right of the controller rocker switch. This button serves as a "soft stop" for the inkjetting process. That is, the computer will print the remaining records in the print buffer and then stop the base.

If using the Compose V2.36 software, depressing the offline pushbutton will also take the Compose software offline. To begin printing, the software must first be placed back online by left clicking on the green button (denoted Run) on the screen.

If using the Compose V3.0 software, depressing the offline pushbutton will suspend printing after the two records in the print buffer have been printed. There is no online/offline function in the Compose V3.0 software.

3.1.3. Priming System Pushbuttons

These six pushbuttons located between the dual floppy drive and the priming system rocker switch permit priming of the printbars. The pushbuttons are numbered one to six indicating which printbar will be primed when the button is pressed. Instantaneous priming or continuous priming is available for each pushbutton. Instantaneous priming is done by pressing the desired pushbutton and releasing it immediately. Continuous priming is done by pressing the desired pushbutton and holding it for the desired length of time. In either case, a "clicking" noise should be heard indicating that the valve solenoid has energized and the priming valve is open.

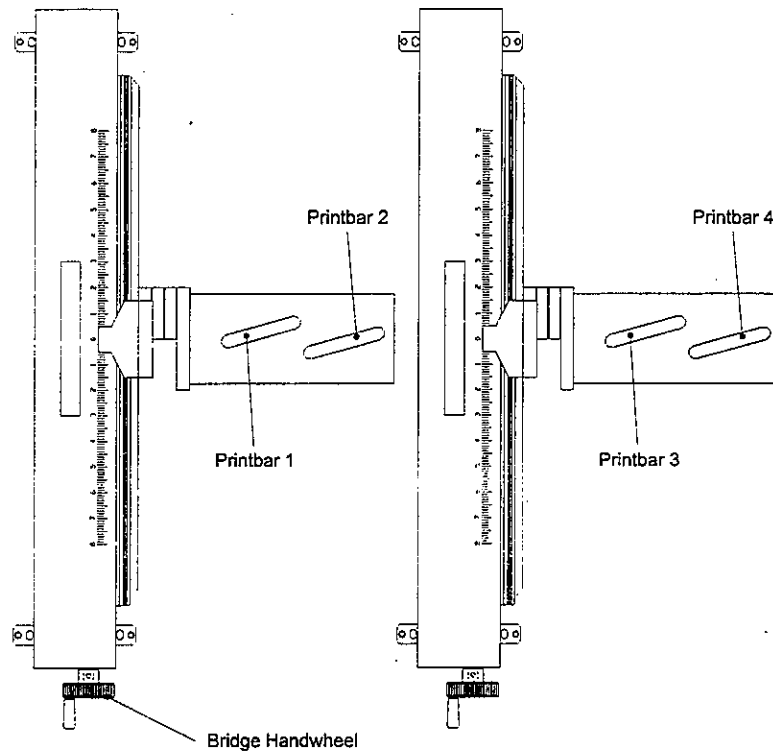


Figure 3.2 - Location of the printbars for the priming system.

3.1.4. Dual Floppy Drive

The dual floppy drive, located on the right side of the faceplate panel, provides an interface between the user and the BK600 Inkjet System's computer. Data can be exchanged by either using the 3½" or 5¼" floppy drive. When the disk is being accessed, the green light located just below the desired drive, should illuminate. The 3½" disk drive is labeled "A:>" and the 5¼" disk drive is labeled "B:>". This can be reversed if desired by the user.

Note : The 3½" drive is labelled "A:" and the 5¼" is labelled "B:".

3.1.5. Keyboard Tray

The BK600 controller provides the user with a keyboard input device should the user need to enter data. The keyboard tray, located just below the pushbuttons, provides a storage space for the keyboard. This tray can be pulled out to access the keyboard or pushed in if the keyboard is not required.

3.2. Computer Assembly

There is a complete computer system mounted in the rear of the Controller. Refer to *page A47* for an isometric view of the computer components. The computer system contains the following components:

- Motherboard
- Hard Drive
- Super I/O Card
- Video Card
- SIMM Chips
- Computer Power Supply
- Driver Board

3.2.1. Motherboard

The motherboard is the heart of the computer system and provides a means of communication between the Jet Driver board, hard drive, floppy drive, modem, video card, and Compose software. Currently, the BK600 motherboards have the following features :

- 486DX4-100 Processor (upgradeable)
- 128 KB Cache memory
- 7 16-bit I/O slots
- 3 VESA Local bus slots
- Keyboard connector
- Four banks of DRAM with memory size to 64 MB

The motherboard is mounted to the computer mounting cage by a combination of 6-32 UNF screws and plastic mounting studs (*see page A47*).

Note : If a new motherboard is installed on the BK600, new holes may need to be drilled to adequately mount the motherboard. In addition, some of the existing PEM studs may need to be removed.

3.2.1.1. Motherboard BIOS (Basic Input/Output System)

Each motherboard is equipped with a BIOS chip to enable the user to specify the settings on the motherboard. Currently, each motherboard comes with the AMI BIOS setup. Enter the AMI BIOS setup main menu as follows.

☞ To Enter the BIOS setup program

1. Reboot the system by pressing <CTRL><ALT> simultaneously. The message "Hit if you want to run SETUP" will appear on the screen.
2. Press the key to enter the BIOS setup program. The BIOS main menu should appear on the screen.
3. Choose "AUTO HARD DISK DETECTION" or "IDE SETUP". The BIOS will attempt to automatically detect your hard drive parameters. Follow the directions that appear on the screen. Return to the main menu screen when completed
4. Choose "STANDARD CMOS SETUP" or "STANDARD". Cursor through the options and modify the date, floppy drive A & B, primary display, and the keyboard so they are set to the following:
 - Date/Time : Current date and time
 - Hard Disk C : *Should display your hard disk parameters.*
 - Hard Disk D : Not installed.
 - Floppy Drive A : 1.44 MB 3½"
 - Floppy Drive B : 1.2 MB 5¼"
 - Primary Display : VGA
 - Keyboard : Installed
5. Return to the main menu screen.
6. Press <F10> to exit the CMOS.
7. Press "Y" when prompted to save the changes.
8. The system will re-boot, proceed through the system checks, and then display the message "Missing Operating System". The hard drive can now be loaded with MS-DOS or Windows 95. Please consult an MS-DOS or Windows 95 manual for instructions.

Note : If the auto detection of the hard drive does not work, then the parameters will have to be entered manually in the Standard setup screen. See the hard drive or the hard drive manual for the drive parameters.

3.2.2. Hard Drive

The hard drive is responsible for storing all information including those files for MS-DOS, Windows™, and Compose. Before the hard drive can interface with the user, MS-DOS must be installed (see an MS-DOS manual for installation instructions). After DOS has been installed, then Windows™ and Compose can be installed (*see Appendix E & F in the Compose V3.0 User's Guide*).

Note : Windows 95 does not require that MS-DOS be installed first. Please consult a Windows 95 manual for installation.

For protection against vibration, the hard drive is mounted on rubber mounts. Ensure that these mounts are installed if the drive is ever replaced.

☞ To Install a Hard Drive

1. Turn the Controller power OFF.
2. Install the hard drive in the hard drive mount using six 6-32 UNF screws (*see page A47*).
3. Install the hard drive mount to the computer cage (*see page A47*).
4. Connect the hard drive ribbon cable to the hard drive. The connector is keyed so it can only be installed one way. Check that the red wire on the ribbon connects to pin 1 on the hard drive connector.
5. Connect one of the power connectors from the computer power supply to the hard drive. It only accepts one type of connector and can only be installed one way.

3.2.3. Super I/O Card

The super I/O card provides a means of communication between the hard drive, floppy drives, and the motherboard. The card fits into any of the motherboard's I/O slots and has two connectors available to connect the hard drive and the floppy drives.

The connector labelled "HDD" or "IDE1" requires a ribbon cable to be attached. The other end of this ribbon cable connects to the hard drive. The connector labelled "FDD" or "FD1" requires a ribbon cable to be attached. The other end of this cable connects to the floppy drives (*see page A50, item #13*).

To Install the Super I/O Card

1. Turn the Controller power OFF.
2. Remove the board from its protective packaging.
3. Gently insert the golden edge of the board into any I/O slot on the motherboard.
4. Secure the board bracket to the cage with a 4-40 UNF screw using a Phillips screwdriver.
5. Connect the hard drive ribbon cable to the connector labelled "HDD" or "IDE1" on the Super I/O card.
6. Connect the floppy drive ribbon cable to the connector labelled "FDD" or "FD1" on the Super I/O card.

Note : When attaching any ribbon cable, make sure that the red wire on the cable is aligned with pin 1 on the board connector. If pin 1 is not aligned, the computer will not boot-up.

3.2.4. Video Card

The video card provides a means of communication between the monitor and the computer. The card fits into any of the motherboards I/O slots and has one connector for the monitor.

☞ To Install a Video Card

1. Turn the Controller power OFF.
2. Remove the board from its protective packaging.
3. Gently insert the golden edge of the board into any I/O slot on the motherboard.
4. Secure the board bracket to the cage with a 4-40 UNF screw using a Phillips screwdriver.
5. Connect the 9-pin DIN connector from the monitor cable to the connector on the video card.

3.2.5. SIMM Chips

The system is expandable to 64 MB of memory by adding single inline memory modules (SIMMs). The motherboard accepts up to four 72-pin SIMM chips in either 1-, 4-, 8-, 16-, and 64-MB SIMMs.

☞ To Install a SIMM Chip

1. Turn the Controller power OFF.
2. Slip a SIMM at a 45° angle into a socket with the component side facing down. Always install SIMMs beginning with Bank 0.
3. Gently push the SIMM up until the pegs of the socket slip into the hole on the SIMM and the holding clips lock the SIMM into a vertical position.

Note : Please refer to the motherboard manual for detailed information on SIMM installation and configurations.

3.2.6. Computer Power Supply

The computer receives its power from the computer power supply (*see page A47, item 7*). The computer power supply is fastened to the cage by the computer power supply bracket (*see page A47, item 16*) and four 10-32 UNF screws. The power supply has 4 identical connectors to provide power to various computer components including the hard drive, and the floppy drive. In addition, there are two identical connectors that provide power to the motherboard. When installing these connectors in the motherboard, make sure that the black wires from each connector are facing each other.

3.2.7. Driver Board

The Driver board controls all of the inkjetting operations. The board fits into any of the motherboard's I/O slots and is secured to the cage with a bracket and screw. The board receives information from the Compose software, creates a print raster, and then processes this information via the cables to produce the image. The Driver board should only be installed/removed or converted by trained personnel. *Figure 3.3* below illustrates the Driver board.

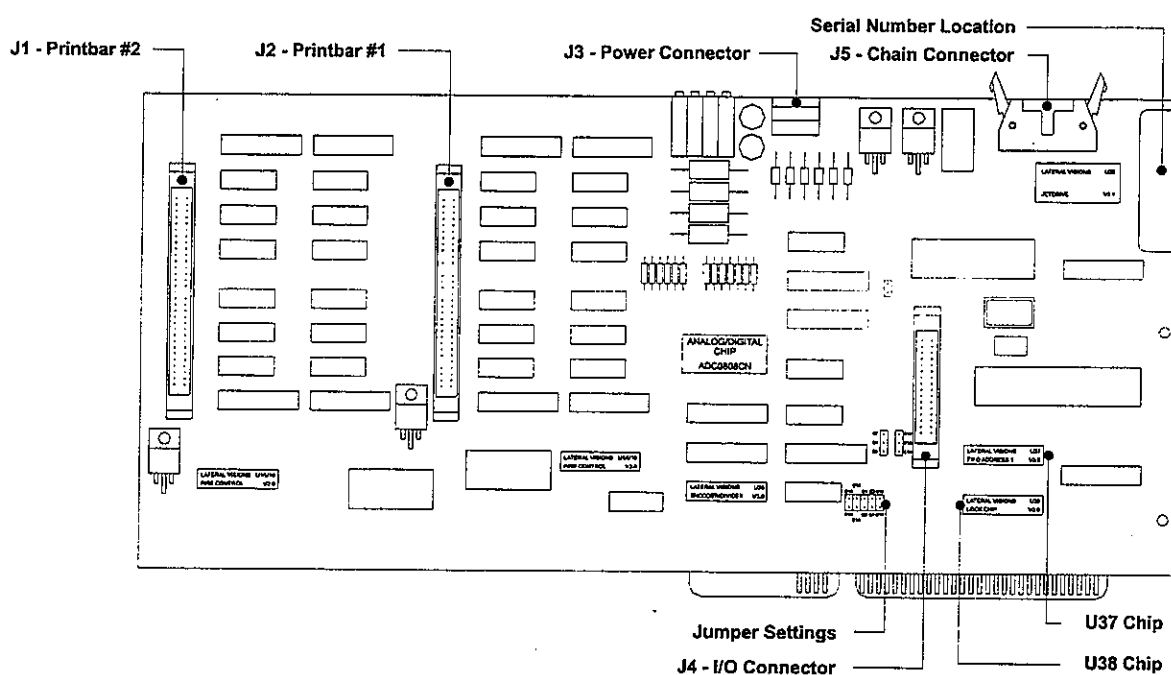


Figure 3.3 - Driver board illustration.

☞ To Install a Driver Board

1. Remove the Driver board from its static-free bag by handling it from its edges as much as possible to reduce the chances of static damage.
2. Choose an available motherboard slot and check to ensure that there are no obstructions. Place the Driver board into the motherboard's I/O slot by gently pushing in the Board's card edge connector into the bus slot.
3. With a screw driver, secure the board by tightening the 6-32 UNF screw against the metal clamping bracket.
4. Connect the 26-pin I/O ribbon cable to the Input/Output connector (J4) on the Driver board. *This is only connected on Driver board #1.*

5. Connect the 44-pin printbar #1 ribbon cable to the printbar #1 connector (J2) on the Driver board.
6. Connect the 44-pin printbar #2 ribbon cable to the printbar #2 connector (J1) on the Driver board.
7. Connect the 3-pin Voltage Cable (orange) to the power connector on the Driver board.
8. Connect the Chain connector ribbon cable between Driver board #1 and Driver board #2 (if applicable).

Note : The Driver board should only be installed or removed by trained personnel.

3.2.7.1 Driver Board Jumper Settings and Chip Assignment

Each Driver board can be configured as a Driver board #1, Driver board #2, or a Driver board #3. To properly configure a Driver board, its jumper settings (see *Figure 3.3 for jumper locations*) must be configured correctly. In addition, chips U37 and U38 (see *Figure 3.3*) must match the Driver board being installed. Refer to *Table 3.1* below for the correct jumper settings and chip assignments.

Table 3.1 - Driver board Jumper and Chip assignments.

Driver Board	Jumpers	U37 Chip	U38 Chip
Board #1	E10 - E11 E15 - E16 E13 - E14 E7 - E8	FIFO Address 1	DP Address 1 (or Lock Chip)
Board #2	E3 - E4	FIFO Address 2	DP Address 2
Board #3	E1 - E2	FIFO Address 3	DP Address 3

Note : The Chain connector ribbon cable, which connects to J5 on the Driver board (see *Figure 3.3*), must be installed between Driver board #1 and #2 (and #3 if installed). If the cable is not installed, print sync errors will occur.

3.3. Jet Power Supply Board

Located in the rear of the Controller is the Jet Power Supply board. The power supply board has one 6-pin connector for the supply power and two 3-pin connectors for the Driver board power. The 6-pin connector provides the power supply board with the voltage required to heat and drive the printbars. *Figure 3.4* below illustrates the Jet Power Supply board.

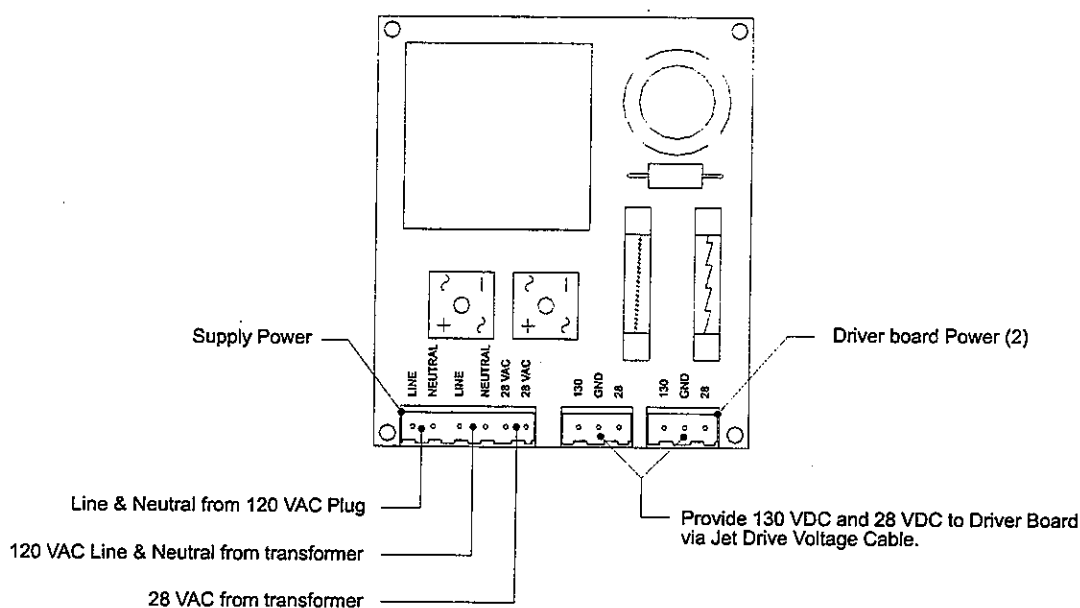


Figure 3.4 - Jet Power Supply board.

3.3.1. Supply Power

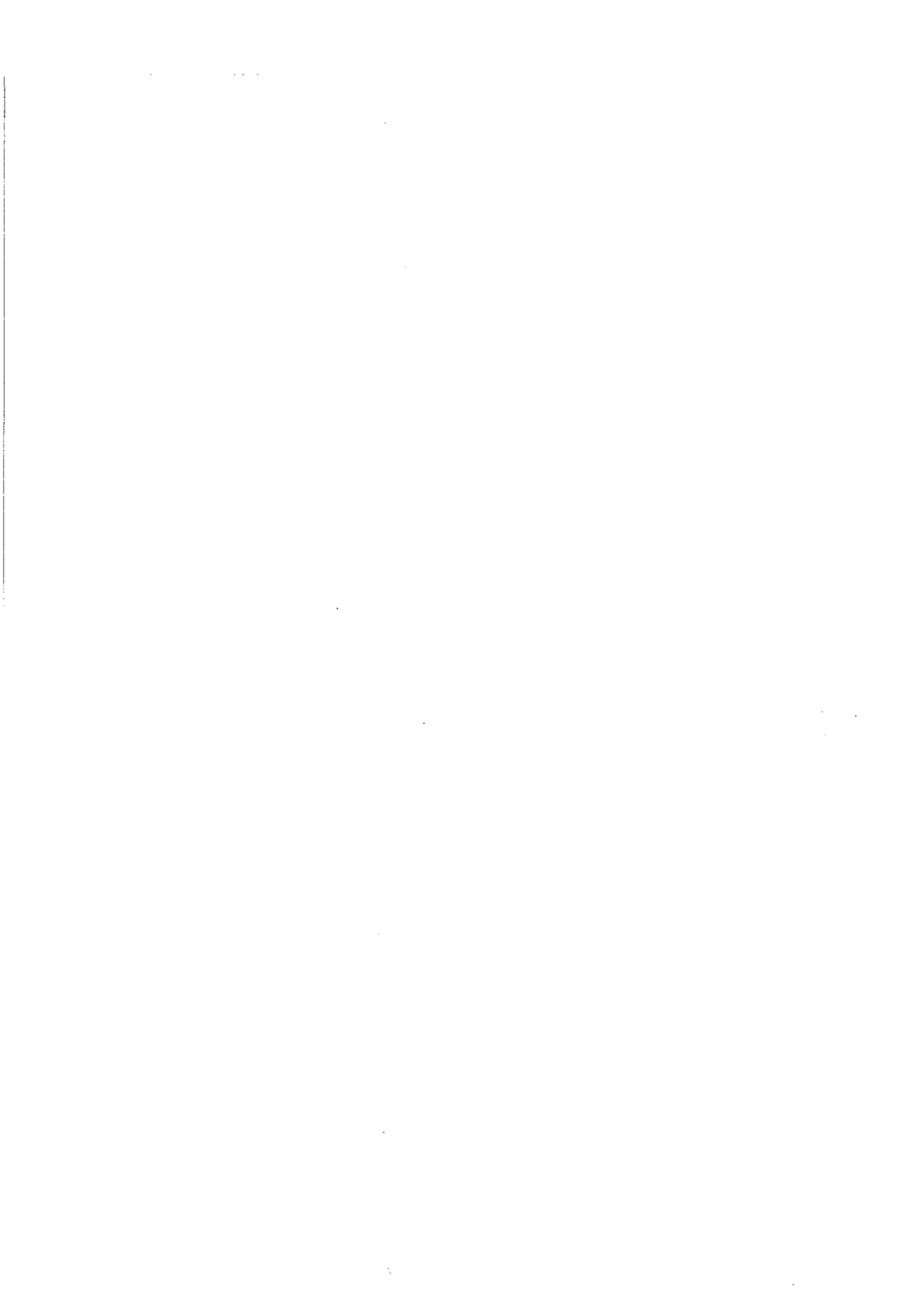
The Jet Power Supply board provides a 6-pin connector for the supply power. The leftmost line and neutral (*see Figure 3.4*) comes from the 120 VAC plug that is plugged into the surge suppressor. The middle line and neutral (*see Figure 3.4*) comes from the transformer (*see page A44 Transformer Mount Plate Assembly*) via two black wires. The 28 VAC comes from the transformer (*see page A44 Transformer Mount Plate Assembly*) via two green wires.

3.3.2. Driver Board Power

The Driver board power connectors supply 130 VDC to and 28 VDC to the Driver board. The power is supplied via the Jet Drive Voltage Cable (*see page A51 Power Supply Assembly*) and connects to J3 on the Driver board (*see Figure 3.3*). The 130 VDC is the supply voltage to drive the printbars and the 28 VDC is the supply voltage to heat the printbars.

The two 3-pin connectors for the outgoing power on the Jet Power Supply board will provide the required supply voltage for two Driver boards. If a third Driver board is added, then an additional Jet power Supply board must be added to the system.

Note : The two 3-pin connectors for the outgoing power are identical. Therefore, either 3-pin connector can supply any Driver board.



4.1. Printbar Installation

4.2. Functional Description

- Ink types, Temperatures, Calibration

4.3. Components

- Ink Reservoir and Printbar components

4.4. Priming and Purging

- Orifice Plate Wiping and Priming techniques

4.5. Technical Overview

- Printbar and ink Reservoir details

4.6. Print Quality

- Printhead Height, Base Speed, Voltage and Temperature

4.7. AllWrite and FastDri Printbars Start-up Considerations

4.8. Check Valves

4.9. Shut Down Procedure for Printheads

- Daily and Weekend Shut Down

4.10. Shipment of Printbars

4.11. Trident Warranty Coverage

4.12. Printbar "Do's"

4.13. Printbar "Don'ts"

4.14. Frequently Asked Questions about the Trident Printbars

4.15. Glossary of Terms

4.1. Printbar Installation

☞ To Setup an Installed Printbar

Follow the steps below to setup a Printbar that is already installed on the Inkjet. Please refer to Figure 4.5 and Figure 4.6 for an illustration of the ink Reservoir and the Printbar.

1. Open the ink Reservoir Vent Cap (*see Figure 4.5*). This cap must remain open when the Printbar is operating.
2. If the Inkjet system is equipped with a Priming system, insert the clear priming hose in the appropriate Reservoir Vent Cap hole. For example, insert the hose from solenoid valve #1 into Reservoir #1.
3. Rotate the Printhead over 180° and remove the Printbar Ship Cap by pulling the Cap tab forward with one hand while holding the sides of the Printhead with the other hand. *See Figure 4.1* below for an illustration of the Ship Cap.

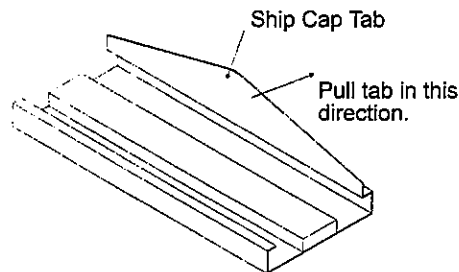


Figure 4.1 - Printbar Ship Cap

4. After removing the Ship Cap, *gently* wipe the face of the Printbar with a lint-free wipe. Place the Ship Cap in a "Ziploc" bag or some other container to keep them as clean as possible.
5. Repeat steps 1-4 for any other Printbars installed on the Inkjet.
6. Turn the Controller power **ON** and wait for the Printbars to come up to operating temperature. A Printbar Temperature low icon will appear in the Alarm box in the Compose software (*refer to page 33 in the Compose V3.0 User's Guide*).
7. Prime the Printbar. Follow the instructions outlined in *Section 4.4 Priming and Purging*.

Note : If the Vent Cap is closed the Printbar will lose prime after a few minutes of operation.

☞ Installation Instructions for a New Printbar

Follow the steps below to install a new Printbar on the Inkjet system. Please refer to *Figure 4.5 and Figure 4.6* for an illustration of the ink Reservoir and the Printbar. The Printbar is shipped in a square box with the serial number on the outside of the box.

1. Open the shipping box and remove the Printbar from the foam packaging.
2. Cut the sealed polybag and remove the Printbar and Ink Reservoir.
3. Slip the Reservoir through the opening in the Inkwell container situated just below the keyboard in the Controller console. The Reservoir can be fastened to the inkwell plate using two 6-32 UNF screws.
4. Open the ink Reservoir Vent Cap (*see Figure 4.5*). This cap must remain open when the Printbar is operating.
5. If the Inkjet system is equipped with a Priming system, insert the clear priming hose in the appropriate Reservoir Vent Cap.
6. Mount the Printbar in the BK602/BK601 head mount using two 6-32 UNF screws. Be sure to insert the brown insulation strip between the head mount and the Printbar (*see Figure 4.2 below for an illustration*).

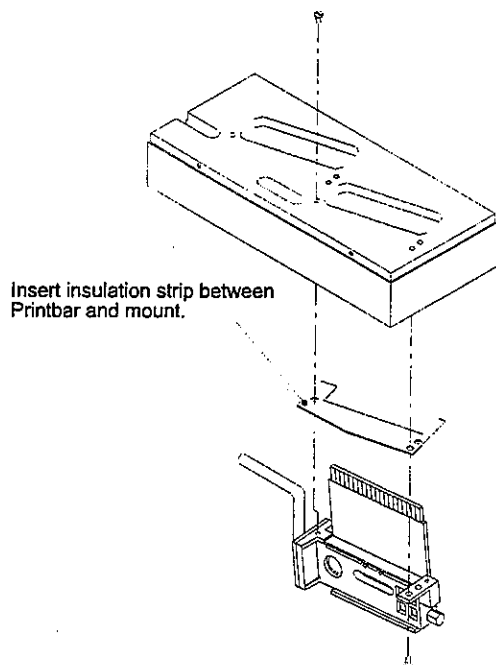


Figure 4.2 - Insulation Strip

7. Attach the blue ribbon cable to the connector on the ink Reservoir and to the connector on the Printbar. This cable senses an "Ink Low" condition.

8. Remove the Printbar Ship Cap by pulling the Cap tab forward with one hand while holding the sides of the Printbar with the other hand.
9. After removing the Ship Cap, *gently* wipe the face of the Printbar with a lint-free wipe.
10. With the Controller power **OFF**, place the 44-pin female connector to the PC board of the appropriate Printbar. The 44-pin connector is keyed so the connector can only be installed one way (see Figure 4.3 below).

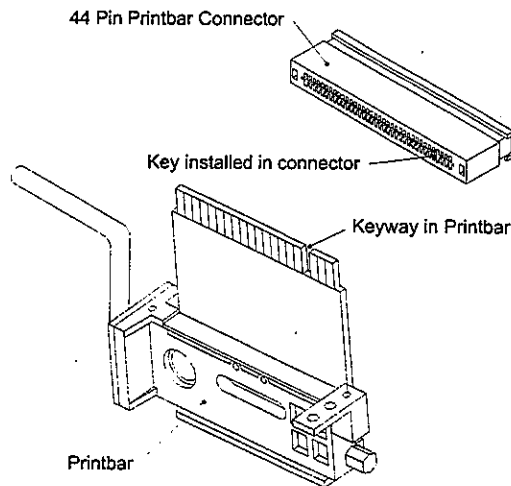


Figure 4.3 - Illustration of Keyway in Printbar.

11. Repeat steps 1-10 for any other Printbars.
12. Turn the Controller power **ON** and wait for the Printbars to come up to operating temperature.
13. Prime the Printbar. Follow the instructions outlined in section 4.4 *Priming and Purging*.

Note : The shipping container and protective foam were designed to protect the Printbar from damage and should be saved for possible returns or other re-shipment.

DO NOT attach the Printbar cables to the Printbar when the Controller is turned ON.

If the Vent Cap is closed the Printbar will lose prime after a few minutes of operation.

4.2. Functional Description

4.2.1. Ink Types¹

Trident produces several oil-based or glycol-based inks which actually do not dry; they penetrate and become part of the paper, assuring stable, long-lasting print which is light-fast, water-fast, and organic-resistant.

Following is a list of some of Trident's inks and the characteristics which make each different.

Table 4.1 - Ink Types and their typical applications.

Ink Type	Application
HiDef™ Ink	Developed for reduced spread on highly porous substrates such as corrugated packaging.
VersaPrint™ Black Ink	Developed to spread less than HiDef, and produce darker print on more absorbent substrates. Ideal for printing or barcoding on corrugated or newspaper stock.
VersaPrint™ Colored Inks	Available in colors such as Red, Blue, Green. The VersaPrint family of inks can be flushed within the same Printbar.
FastDri™ Ink	Designed to penetrate more quickly into magazine-type stocks and coated papers, thus reducing the potential for smearing. While this ink "dries" quickly on coated papers, it still requires some degree of paper absorbency, and, therefore, will not "dry" in a reasonable time on plastics, heavy coated stock, or varnished stocks.
AllWrite™ Ink	Produces darker images onto coated and semi-porous surfaces.

Note : The use of any non-compatible ink or misuse of Trident, Inc., ink voids any and all warranties.

4.2.2. Operation Temperatures for Printbars

Each type of Printbar has its own specified operating temperature. These temperatures are outlined below in Table 4.2.

Table 4.2 - Printbar Operating Temperatures

Printbar Type	Temperature (°C)	Temperature (°F)
HiDef	60 ± 1	140 ± 3
VersaPrint	60 ± 1	140 ± 3
FastDri	30 ± 1	86 ± 2
AllWrite	30 ± 1	86 ± 2

Note : In order to ensure that the Printbars are at the proper operating temperature, it is recommended that a Digital thermometer c/w surface probe be used. When using the surface probe, To prevent scratching of the Printbar orifice plate, place the surface probe on the body of the Printbar (see *Figure 4.4* below).

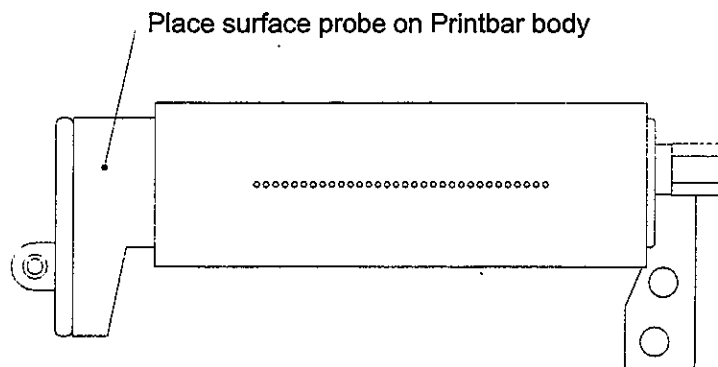


Figure 4.4 - Measuring Printbar temperatures with a surface probe.

4.2.3. Printbar Temperature Calibration

The Compose V3.0 software will display the temperature reading of each Printbar in degrees Celsius in the Diagnostics Window (*see page 131 of the Compose V3.0 User's Guide*). However, these temperature readings may not be correct if the Printbar temperature is not properly calibrated. That is, the Compose V3.0 software must define a base temperature setting for the Printbar so it can properly adjust any temperature increases or decreases. A temperature gauge and surface probe must be used to accurately calibrate the temperature.

For instructions on how to calibrate the Printbar temperature, refer to *To Calibrate a Printbar's Temperature Reading* on page 139 of the Compose V3.0 User's Guide.

Note : The most accurate way to determine the operating temperature of a Printbar is to measure the surface with a temperature probe.

4.2.4 Printbar Voltages

Each Printbar requires a drive voltage to eject the ink from the orifices. This drive voltage is different for each Printbar and is specified on the side of the ink Reservoir. The Compose V3.0 software will display the voltage reading for each Printbar in the Diagnostics Window (*see page 131 of the Compose V3.0 User's Guide*). For additional information on Printbar voltages, refer to section 5.2.1 *Printbar Voltage Monitoring* on page 136 of the Compose V3.0 User's Guide.

Note : It is important that AllWrite Printbars be set as close to the rated voltage as possible. Major deviations from this rated voltage may cause depriming.

4.3. Components

Buskro uses the Trident ULTRAJET™ Inkjet Imaging Subsystem on its Inkjet models. The ULTRAJET™ Subsystem is comprised of a Printbar and an ink Reservoir connected by 48" of Viton tubing. Each component is described in further detail below.

4.3.1. ink Reservoir

The basic components of the ink Reservoir include the Reservoir Cap, Vent Cap, Gasket, Level detect, and Filter. *Figure 4.5* below shows an illustration of the ink Reservoir.

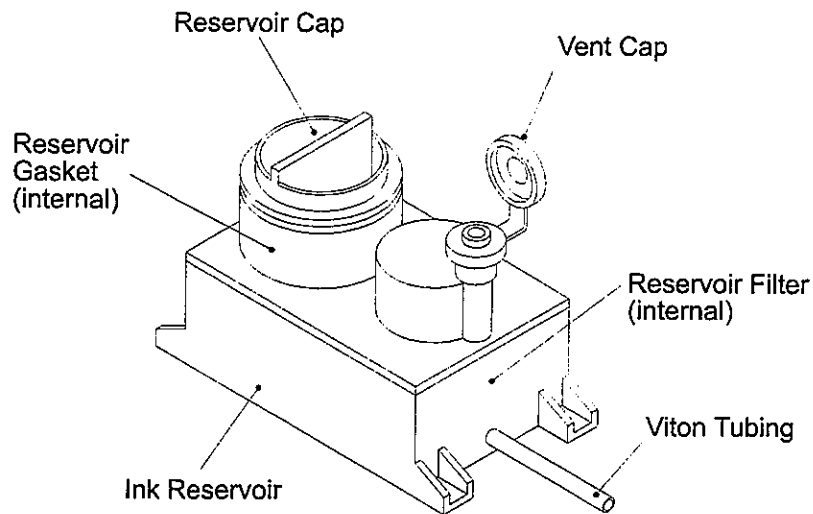


Figure 4.5 - Ink Reservoir.

4.3.1.1. Vent Cap¹

The connected Vent Cap seals the vent hole during shipping. The hole should be open to the atmosphere to allow air to vent inside the Reservoir system when operating the Inkjet system.

4.3.1.2. Level Detect¹

A single flotation level detect indicates when the ink bottle is empty. There is about 2 to 3 ml of ink volume between the time the bottle is empty until the level detect trips, and about another 25 ml until the ink gets dangerously low, possibly resulting in large amounts of air entering the Printbar. Approximately 50,000 addresses can be printed with the 25 ml of ink in the Reservoir.

A 7-pin blue ribbon cable connects the Level Detect to the Printbar and can be detached at both ends for ease of assembly or removal. The ribbon cable connector is keyed for the correct orientation.

4.3.1.3. Reservoir Filter¹

There is a 25 micron stainless steel mesh filter inside the Reservoir to filter out any paper dust and debris entering through the vent hole or through the Reservoir top opening when the bottle is being changed.

4.3.2. Printbar

The basic components of the Printbar including a Filter, Thermal Fuse, and End Cap are described below. *Figure 4.6* shows an illustration of a Printbar.

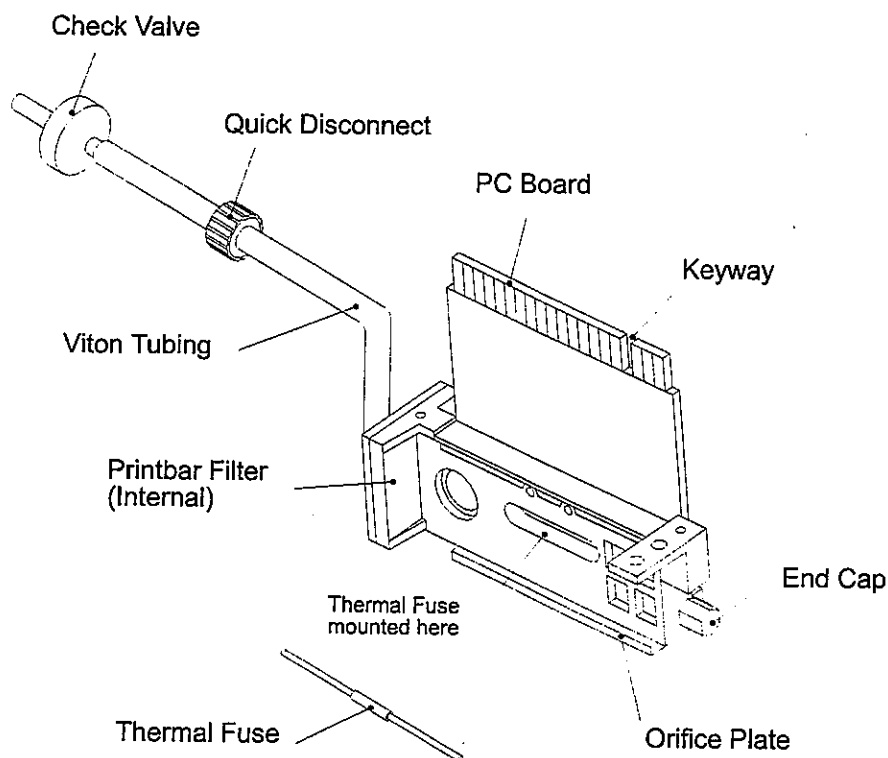


Figure 4.6 - Printbar and components.

4.3.2.1. Viton Tubing¹

The Viton tubing provides for passage of the ink from the ink Reservoir to the Printbar. The Viton tubing is covered with plastic spiral sheathing to reduce the sensitivity.

Note : The Viton Tubing is sensitive to shock and vibration (especially FastDri and AllWrite Printbars). Severe shock to the Tubing will deprive the Printhead.

4.3.2.2. PC Board¹

The PC Board is keyed (*see Figure 4.6*) with a slot to assure proper coupling with the Printbar cabling. The gold-plated edge connector must be kept clean of ink at all times so as to provide a good contact.

Note : The PC Board can be cleaned using Isopropyl alcohol or any certified electronic cleaner.

4.3.2.3. Printbar Filter¹

The Printbar Filter is located at the side of the Printbar, at the end of the Viton Tubing. The Filter itself is a 1" diameter disc of 10-micron sintered stainless steel.

4.3.2.4. Thermal Fuse¹

The Thermal Fuse is installed into the Printbar's body to prevent overheating of the Printbar. The Fuse will open at temperatures of $70^{\circ}\text{C} \pm 1$ ($160^{\circ}\text{F} \pm 2$) for all Printbars. The Fuse is field replaceable by use of a small screwdriver and a soldering iron. Refer to *Figure 4.6* for the location of the Fuse on the Printbar. The fuse leads should not touch the Printbar body on installation.

Note : The fuse leads should not touch the Printbar body on installation.

4.3.2.5. End Cap¹

The End Cap is screwed on with an internal elastomeric seal and is located at the opposite end of the Printbar from the Filter area. The End Cap should only be removed for the purge procedure described in *Section 4.4*. The End Cap must be in place for operation of the Printbar, or depriming will result.

Note : It is suggested that a nut driver, not a wrench, be used to loosen and tighten the End Cap. Only 80 in-oz of torque is required. Over-torquing can break the End Cap stem, which is not repairable. Breakage of the stem will void any warranties.

If using a 1/4" wrench, use extreme CAUTION when loosening or tightening the End Cap. Breakage can **easily** occur with the use of a wrench.

4.3.2.6. Ship Cap

If the Printbar is going to sit unused for 2 days or longer, the Printbar should be properly capped to protect it from debris and ink drying. Refer to section *4.9 Shut Down Procedures for Printbars* for details on how to cap the Printbars.

On a daily basis, it is suggested that the Printbars be left uncapped overnight. By not capping the Printbars, priming can usually be avoided the next morning. The Printbar may need to be wiped with a moist lint-free wipe the next morning to remove any dried ink.

4.4. Priming and Purging

Occasionally, a small gap or void, sometimes followed by stray dots, will be observed in the print. This indicates that the Printbar requires attention. There are basically two types of maintenance that can be performed on the Printbar; wiping and priming. They are described below.

4.4.1. Orifice Plate Wiping¹

In most instances, when a small gap or void appears in the print, a bit of paper dust has either blocked an orifice or has caused the ejected ink to be misaimed. Paper dust will result in the type of gap seen in *Figure 4.7*



Figure 4.7 - Paper dust or debris in an orifice.¹

In this case, the proper procedure is to place a lint-free wipe against the face of the Printbar. Gently wipe upward or along the short dimension of the orifice plate. (Wiping along the long direction, or side to side, may relocate the dust from one orifice into another).

Note : Aggressive wiping must be avoided. It can imbed surface debris into the orifices and scratch the orifice plate.

4.4.2. Priming

On some occasions, dust may have entered through an orifice (as seen in Figure 4.7). On other occasions, an air bubble may be ingested, resulting in a larger gap (as seen in Figure 4.8) in the print than is seen with paper dust blockage which will require priming. Either can be expelled by attempting the following priming techniques outlined below.



Figure 4.8 - Missing Channel due to an air bubble.¹

Things to keep in mind when priming:

- Set a goal to be able to prime a Printbar within 5-10 minutes.
- There are a number of priming techniques outlined below. If one technique is unsuccessful, then try another technique.
- The typical learning curve for priming is about 2 months.
- Try the simplest technique first and then progress to more difficult techniques.
- The Printbar should be heated to its operating temperature before priming.
- Check that the Reservoir Gasket is in place.
- Fill up the Reservoir with ink.
- Remove the ink bottle from the Reservoir before priming.

☞ Technique I - Wipe the Printbar

Always try to wipe the Printbar before doing anything else. This is the simplest technique and will disturb the Printbar the least. To wipe the Printbar, follow the steps below.

1. Tilt the Printhead at 45° angle.
2. Fold a lint-free wipe in half twice and spray it with the appropriate Maintenance Spray.
3. Gently wipe the surface of the Printbar with the moist wipe across the short dimension (see Figure 4.9). *Note: Do not wipe too hard or depriming may occur.*
4. Rotate the Printhead back down to the printing position and resume printing.

☞ Technique II - Prime at a 45° Angle

If wiping is unsuccessful, try to prime the Printbar without rotating the Printhead over completely. Follow the steps below.

1. Tilt the Printhead at 45° angle.
2. Fold a lint-free wipe in half twice and spray it with the appropriate Maintenance Spray.
3. Press the appropriate priming button to prime the Printbar. Wipe the ink with the lint-free wipe across the short dimension of the Printbar. See *Figure 4.9* for an illustration.

Wipe across the short dimension
of the Printbar.

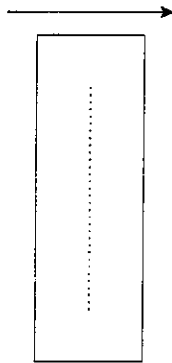


Figure 4.9 - Wiping direction on Printbar orifice plate.

4. Rotate the Printhead back down to the printing position and resume printing.
5. Test fire the channels by using the ForceJet function (☞ *To Test Fire a Printbar* on page 135 of the Compose V3.0 User's Guide). If all 32 channels fire on each Printbar, then continue with the next step. If not, then reprime the Printbar as per steps 1-3.

Note : When using the ForceJet function, there may be an instance where the middle 8-10 channels are missing. Those channels are most likely primed, but did not fire using the ForceJet function. Ignore the missing channels and continue with the next step.

☞ Technique III - Rotate Printhead

If priming at an angle is unsuccessful, it may be necessary to rotate the Printhead and prime the Printbar. Follow the steps outlined below.

1. Slide the Printhead along the bridge rail towards the front of the machine. Stop at the end of the bridge rail. Tighten the locking screw.
2. Rotate the Printhead over 180°.

3. Press the appropriate priming button to prime the Printbar. It is recommended that the button initially be depressed until a steady flow of ink flows from the orifices. Then use short quick bursts to complete the priming procedure.
4. Wipe the ink from the Printbar until the ink flows equally from all 32 channels.
5. Test fire the channels by using the ForceJet function (☞ *To Test Fire a Printbar* on page 135 of the Compose V3.0 User's Guide). If all 32 channels fire on each Printbar, then continue with the next step. If not, then reprime the Printbar as per steps 3 & 4.
6. Simultaneously, rotate and slide the Printhead back over to its printing position and resume printing. Rotate the Printhead as smoothly as possible to avoid depriming.

☞ Technique IV - Raise the Printhead Bridge

This technique is similar to Technique II, but requires that the Printhead orifices face directly upward. This technique will use the natural buoyancy of air bubbles in the ink to allow any air bubbles to easily escape from the channels.

1. Slide the Printhead along the bridge rail towards the front of the machine. Stop at the end of the bridge rail.
2. Rotate the Printhead over 180°.
3. Raise the height of the Printhead by rotating the Bridge Handwheel. Stop when the Printhead can be rotated such that the orifices are facing directly upward.
4. Press the appropriate priming button to prime the Printbar. It is recommended that the button initially be depressed until a steady flow of ink flows from the orifices. Then use short quick bursts to complete priming.
5. Wipe the ink from the Printbar until the ink flows equally from all 32 channels.
6. Test fire the channels by using the ForceJet function (☞ *To Test Fire a Printbar* on page 135 of the Compose V3.0 User's Guide). If all 32 channels fire on each Printbar, then continue with the next step. If not, then reprime the Printbar as per steps 3 & 4.
7. Simultaneously, rotate and slide the Printhead back over to its printing position and resume printing. Rotate the Printhead as smoothly as possible to avoid depriming.
8. Lower the height of the Printhead to its original height by rotating the Bridge Handwheel to obtain the proper quality.

Note : This technique can also be repeated with the Printhead rotated over slightly past 180°.

☞ Technique IV - Using the Priming Bulb

The priming bulb will allow more pressure to be exerted while priming. This increased pressure may be enough to prime out the air bubble or debris. Follow the steps outlined below.

1. Remove the priming hose from the Reservoir Vent Cap (*see Figure 4.5*).
2. Insert the priming bulb into the Reservoir Vent Cap.
3. Repeat Techniques III and IV using the priming bulb instead of the priming system.

Note : Squeeze sides of the priming bulb. Do not cover the hole at the top of the priming bulb.

☞ Technique VI - Gravity Prime

This technique uses gravity to prime the Printbars. It requires raising the ink Reservoir and rotating the Printhead simultaneously and may require two people. Follow the steps outlined below.

1. Slide the Printhead along the bridge rail towards the front of the machine. Stop at the end of the bridge rail.
2. Raise the ink Reservoir several inches above the Printbar height. This can be done by sliding the ink Reservoirs on the slides in the Inkwell container. Gravity should cause ink to flow from all 32 channels. If necessary, remove the 6-32 UNF screws fastening the Reservoirs to the Inkwell plates.
3. Wipe the ink from the Printbar until the ink flows equally from all 32 channels. If desired, the priming system or priming bulb can be used for additional pressure.
4. After one minute, gently lower the ink Reservoir to a level where the ink stops leaking, but still remains at the surface of the orifices.
5. Test fire the channels by using the ForceJet function (☞ *To Test Fire a Printbar* on page 135 of the Compose V3.0 User's Guide). If all 32 channels fire on each Printbar, then continue with the next step. If not, then resume gravity priming.
6. Simultaneously, rotate and slide the Printhead back over to a **45° angle**. Rotate the Printhead as smoothly as possible to avoid depriming. *Note: Because the ink Reservoir is higher than the Printbar, ink will begin to slowly weep from the orifices.*
7. Quickly lower the ink Reservoir to its original level. When lowered, the ink will stop weeping from the Printbar.
8. With the Printhead at a 45° angle, gently wipe any excess ink from the Printbar orifice plate.

9. Gently, rotate the Printhead back down to the printing position and resume printing.

Note : By having ink leak from the orifices when rotating the Printhead, air cannot be ingested into the Printbar.

☞ Technique VII - Ship Cap over Channels

If there are a few stubborn channels that will not prime, isolate these channels using the Printbar Ship Cap. Follow the steps outlined below.

1. Place the Printbar Ship Cap over the primed channels, thereby isolating the unprimed channels.
2. Prime the Printbar using one of the techniques outline above. All of the ink will be forced through the uncapped channels.
3. After one minute of priming, remove the Ship Cap and prime the Printbar using one of the techniques outlined above.

☞ Technique IX - Let Printbar Sit under Temperature

If all other techniques are unsuccessful, let the Printbar sit under operating temperature for 5 to 20 minutes. The heat of the ink may cause the air bubble to dissolve in the fluid. Leave the Printbar in the printing position.

After the Printbar has sat under heat for 20 minutes, first try to print a test pattern (or address) instead of trying to prime. In many cases, the stubborn channel will be primed, and the system will be ready to print. DO NOT first try to rotate the Printhead over and prime.

If the stubborn channel is still missing, then let the Printbar sit undisturbed under heat overnight.

Note : This technique is often effective for VersaPrint and HiDef Printbars. Therefore, upon initial installation, it is suggested that these types of Printbars be left under heat overnight before attempting to prime.

4.4.3. Purge Procedure¹

In rare instances, large amounts of air will have entered the fluidics. This will be difficult to purge from the orifices alone. The air will remain in the chamber plate manifold and cause periodic depriming of channels. Ingestion of this amount of air can take place as the result of extreme shock to the Printhead or because the End Cap has been removed. *Other causes should be correctable with a simple reprime.*

Purging should be a *last resort procedure* before requesting a service call. A purge should only be necessary if the Printbar has sustained a large shock or other occurrence which results in a large degree of air ingestion. Otherwise, standard priming should be sufficient to eliminate air from the system.

In order to purge the systems of excessive air, the following steps should be taken:

☞ To Purge a Printbar

1. Heat the Printhead to the proper operating temperature.
2. Snap the orifice Ship Cap in place.
3. Place an absorbent material (lint-free wipe) strategically under the vent tube and directly under, but not touching, the orifice plate. The material should be lint-free and dust-free, and not liable to contaminate surfaces near the fluidic path. *CAUTION: Avoid the hot heater resistor under each Printbar, as well as all underside wiring.*
4. Raise the ink Reservoir 6 to 12 inches (150 to 600 mm) above the level of the Printbar.
5. Rotate the Printhead 90° so the Printbar orifices are facing sideways. This will prevent any ink from spilling onto the PC Board.
6. The Printbar End Cap (*see Figure 4.6*) should then be unscrewed, using a 1/4" nut driver (or wrench), and removed to purge the ink bubbles trapped in the Printbar manifold. (*CAUTION: Breakage of the End Cap can easily occur using a wrench.*). Pressure must be maintained until a good steady flow of ink can be achieved once the End Cap has been removed.
7. While this flow is being maintained, the End Cap must be replaced. Maintaining the flow of ink is very important; otherwise, an air bubble will be left in the fluid path. Hand-tighten the End Cap. *CAUTION: Do not over tighten or End Cap breakage may occur. The Warranty is voided if the End Cap is broken.*
8. Carefully wipe off the outside of the Printbar and the contacts at the base. Also wipe off any ink on the PC Board with a lint-free wipe. Some Trident inks are conductive. Be certain to remove all ink from the PC Board and back of the Printbar. Take care to see that no wires are damaged. Then carefully wipe the orifice plate with a lint-free wipe.
9. Remove the orifice Ship Cap and follow one of the priming techniques outlined above.

Note : Removal of the Vent Cap exposes the fluidics to contamination. The above procedure is a last resort and should **ONLY** be attempted if repriming does not recover a jet outage. If performed incorrectly, the Printbar may be in worse condition than when the purge procedure was begun.

4.5. Technical Overview

4.5.1. Static Pressure Requirement¹

The Printheads draw ink from the Reservoir through capillary action, the same way branches of trees get the water from the roots. It does not work through gravity feed.

The Printbar draws ink through capillary action. You must position the Printbar so the lowest channel is at least level with the top plane of the ink supply. The uncapped orifices should NOT be raised more than 3" (7.5 cm) above this top plane during handling or deprime of some orifices may occur. A positive pressure must be avoided or *weeping* will result and ink will drip from the orifices.

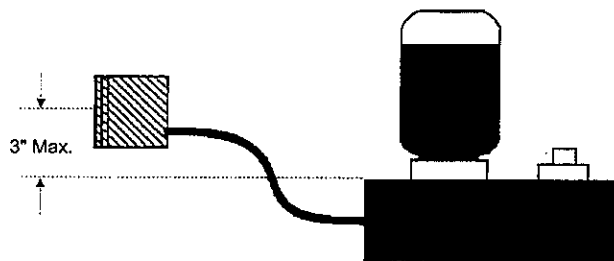


Figure 4.10 - Static Pressure Requirement¹

4.5.2. Ink Dry Time Considerations¹

The image dry time is directly related to:

- The degree of coating on the stock.
- The print resolution (the number of droplets which lie on top of one Printbar).
- The droplet volume (directly related to the drive voltage). Lowering the voltage will decrease the amount of ink that is jetted.
- The temperature of the ambient or stock printed upon. Warm air assist with infrared lamps, or blow drier directed at the printed material prior to or after imaging, can decrease the dry time significantly.

4.5.3. Operating Environment¹

To ensure trouble free operation, it is important that the ink be transported and stored at the proper operating temperatures. Refer to *Table 4.3* below for specifications.

Table 4.3 - Printbar Operating Environments¹

	Operating	Storage	Transit
Temperature (°F)	50 - 110	60 - 110	5 - 110*
Temperature (°C)	10 - 43	15 - 43*	-15 - 43*
% Humidity (non-condensing)	20 - 80	5 - 95	5 - 95

Note : Ink must be at room temperature before use.

*At temperatures below 0°C (32°F), the ink should be permitted to thaw at room temperature for 24 hours prior to use.

4.5.4. Ink Shelf Life¹

Storage shelf life of the Printbar with HiDef, and FastDri ink will be one year, and two years for these ink bottles at room temperature. The expiration date is stamped on the bottle label. The shelf life of these ink bottles decreases as a function of temperature, as follows.

Table 4.4 - Ink Shelf Life¹

Storage at:	Shelf life of:
20°C (68°F)	2 years
30°C (86°F)	1 year
40°C (104°F)	6 months
50°C (122°F)	3 months

4.5.5. Ink Usage Rate¹

125 ml of JetWrite™ ink or other Trident inks will produce:

- 1.7 billion droplets.
- 35 million Courier 10 characters (50 dots/character).
- 1.0 million complete zip + 4 POSTNET barcodes (bars two dots wide).
- 1.6 million half-inch tall alphanumeric characters (1100 dots/character)

Note : Due to reduced orifice diameter, multiply numbers by 1.4 to obtain HiDef Printbar usage rates.

4.5.6. Ink "Pot Life"¹

Trident HiDef inks have a pot life of approximately one to three months when the ink is stagnant, or when ink recirculation is extremely low in the *heated* Printbar. The result will be a jelling of the ink, causing clogging of some orifices to occur, which then typically spreads to the entire Printbar.

In order to avoid this situation, it is suggested that any channels which are not being used be exercised by spraying some drops periodically, thus replenishing the ink.

4.5.7. Printbar Life¹

Due to its lack of moving parts, the Printbars exhibit high reliability. Mean Time Between Repair is typically 9 to 12 months (application dependent), at which time the units may need to be cleaned by Trident. The Mean Time To Failure is approximately 4-5 years, after which the transducer seals may begin to leak from years of pressure priming and printing.

4.5.8. Procedure to Increase Printbar Reliability

Based on discussions with end-users, it has become apparent that end-users who print with the Printbars on a regular basis have fewer debris or clogging problems than those who use the Printbars only every few months.¹

Buskro recommends that, during extended periods of non-use, end-users perform a reprime of the Printbars and print about 1000 test patterns every two weeks. By performing this bi-weekly maintenance on the Printbars, the long term reliability will be increased.

For Printbars that remain on the shelf for extended periods, it is recommended that these Printbars be primed bi-weekly to circulate the ink.

4.6. Print Quality

The three main factors that can affect print quality are Printbar height, speed, and voltage/temperature. Each case is explained in more detail below in order of importance.

4.6.1. Printhead Height

The most common problem associated with poor print quality is due to improper Printhead height. The Printbar ink droplets are elongated during firing, created a spear shape. The distance from the Printbar to the paper determines the amount of tail layover on each character. The greater the distance between the Printbar(s) and the mailpiece, the worse the print quality. The following factors must be considered from the standpoint of Printhead height.

- Printhead must be as close to the mailpiece as possible.
- Ideal height is when there is a slight drag on mailpiece when slid under Printhead by hand.
- Head mount must be square to the tabletops to ensure that each Printbar is equidistant from the mailpiece.
- Printbar orifice plate must be flush with the edges of the Mount cavity.

4.6.2. Base Speed

Another factor in determining print quality is the speed at which the mailpiece travels through the printing area. At higher speeds, the tail of the ink droplet will land in a different location than the head of the droplet and cause the print to look "fuzzy". As the base speed increases, the print quality will decrease.

- With a 1" gap between pieces and the Printhead height properly adjusted, speed will begin to affect print quality around 22,000 PPH (around 170 cm/s) for No. 10 envelopes.
- At speeds greater than this, there may be a "shadowing" effect in the characters causing the print to look "fuzzy".

4.6.3. Voltage and Temperature

Another factor in determining print quality is the voltage and temperature settings of the Printbar. The voltage and temperature settings should only be adjusted by experienced trained personnel. Temperature and voltage will affect print quality in the following ways.

- At low voltage, Printbar does not "jet" enough ink to form character. Result is character looks distorted or "fuzzy".
- At lower (colder) temps, ink is too thick to flow smoothly and there is not enough ink "jetted" to form character. Result is similar to low voltage, where characters are distorted.
- Low temps not usually a problem with FastDri or AllWrite Printbars as operating temp of Printbar (30 °C) is close to ambient temps. HiDef and VersaPrint Printbars are more likely to have print quality problems at colder temps.

4.7. AllWrite and FastDri Printbars Start-Up Considerations

"Start-up problem" is defined as weak or non-printing orifice following a period of non-firing which, due to evaporation or an ink component, leaves another thicker ink component behind in the orifices. The end result is that the print demonstrates missing dots.¹

To remedy this, Buskro has incorporated "sub-jetting" which continually activates the channels when the Printbar is at operating temperature and not firing. This "sub-jetting" is implemented in the Compose software and has been found to be highly effective in inhibiting the start-up problem.

For those rare situations in which the software may be OFFLINE while the Printhead is still being heated, the orifices can be recovered by simply wiping with AllWrite or FastDri Maintenance Spray. The procedure for the use of the spray is as follows:¹

☞ How to apply Maintenance Spray to a Printbar

1. Spray several times on a lint-free wipe.
2. Gently, wipe the orifices with the moist part of the wipe, then with a dry section.

Table 4.5 outlines the conditions under which start-up problems can be expected with AllWrite and FastDri inks. All channels can be recovered from the start-up problems by wiping the surface of the Printbar with the appropriate Maintenance Spray.

Table 4.5: AllWrite and FastDri Start-Up Conditions¹

Condition	Start-up Problem Observed After:
Printbar not at operating temperature, but uncapped and not firing.	3 days or longer unfired.
Printbar at operating temperature, but uncapped and not firing.	10 to 15 minutes unfired.
Printbar at operating temperature, uncapped and not firing, but with sub-jetting implemented.	3 days or longer unfired.

4.8. Check Valves

Check Valves are available to insert in-line to reduce the sensitivity of the FastDri Printbars. Testing has indicated that Check Valves greatly improve the priming process on FastDri and AllWrite Printbars by preventing air from being ingested when the Printhead is rotated.

There are two different sizes of Check Valves. The small Check Valve (PN 800825) is for FastDri and AllWrite Printbars. If required, there is a larger Check Valve (PN 800826) available for VersaPrint and HiDef Printbars. Currently, Buskro does not install Check Valves on HiDef or VersaPrint Printbar at the factory. Make sure that you install the correct Check Valve on your Printbar.

☞ To Install a Check Valve

Please follow the steps outlined below to install a Check Valves on a Printbars.

1. Turn the Controller power **OFF**.
2. Disconnect the Printbar cable(s) and remove the stainless steel cover on the Printhead by loosening the 6-32 UNF screws using a 3/32" Allen key.
3. Remove the tubing from the plastic clip on the Printhead swivel mount.
4. Remove the 2 screws mounting each Printbar to the Mount Block.
5. Trim back the plastic spiral wrap about 6-8" on the tubing.
6. Cut the tubing 3" from the Printbar inlet.
7. Fit the tubing on the valve stems located on each side of the check valve. Make sure the tapered end of the valve (with the letters "VAC") is facing the Printbar.
8. Secure the tubing on the valve with Tie-raps.
9. With the Printbar still removed from the Mount Block, open the end cap and purge the Printbar. Purge the ink until there is no more air in the system (*see section 4.4.3 Purge Procedure*).
10. Reinstall the end cap. **DO NOT** over tighten the End Cap as it will break. Finger tight is fine.
11. Remount the Printbars in the Mount Block.
12. Re-clamp the tubing with the plastic clip on the Printhead swivel mount.
13. Re-tape the tubing together with the blue ribbon cables.
14. Reinstall the stainless steel cover on the Printhead.

15. Re-attach the Printbar cable.
16. Turn the Controller power ON.

There are two important factors to consider when installing the Check Valves.

- DO NOT spill any ink on the circuit boards on the Printbars. You should not get a lot of ink spillage, but you will get some. Wrap the circuit board with a cloth or wipe.
- The slot opening in the Mount Block for the tubing from Printbar #2 is not wide enough to allow the Check Valve to fit through. Therefore, in order to be able to easily remove the Printbar from the Mount Block, the Check Valve must be kept inside the Mount Block. Make sure that there is still a "smooth" bend in the hose from the Check Valve to the Printbar. Any kind of "sharp" bend will cause kinking in the hosing. In order to keep this "smooth" bend the hose may need to be cut 4" from the Printbar.

Note : The Check Valve will maintain applied priming pressure to the Printbar and therefore ink will continue to weep from the orifices for up to 30 seconds after completion of the priming process. Please wipe the orifices clear of residual ink before commencing printing.

4.9. Shut Down Procedure for Printheads

4.9.1. Daily Shut-Down

There are two shut down procedures for the Printbars. On a daily basis, the Printbars can be left *uncapped* at the end of the day. When starting the system the following day, simply turn the machine ON and print about 10-15 test patterns before printing any addresses. AllWrite and FastDri Printbars may require the use of Maintenance Spray to remove any dried ink on the orifice plate.

☞ Daily Shut-Down Procedure

1. Gently tilt each Printhead at a 45° angle.
2. Turn the Controller power OFF.

Note : DO NOT leave material underneath the Printbar(s) overnight. If the material touches the orifices, it will slowly draw all of the ink from the Printbar and Reservoir.

4.9.2. Weekend Shut-Down

If the Printbar is going to sit unused for 2 days or longer, the Printbar should be properly capped with the Ship Cap to protect it from debris and ink drying. When the Ship Cap is removed to resume printing, the Printbar will have to be primed.

☞ Ship Cap Installation

1. Spray a small amount of Maintenance Spray across the Printbar orifices. This will help dissolve any dried ink on the orifice plate and maintain the image quality. Use the proper Maintenance Spray for you Printbar.
 - AllWrite Printbar AllWrite Maintenance Spray
 - FastDri Printbar FastDri Maintenance Spray
 - VersaPrint Printbar VersaPrint Maintenance Spray
 - HiDef Printbar No Spray available

Note : If you use the wrong type of Maintenance Spray, the ink may jell and clog the orifices.

2. Spray some Maintenance Spray on the Printbar Ship Cap and wipe with a lint-free wipe until it appears to be clean. Again, use the proper Maintenance Spray.

-
3. Snap the Ship Cap into place on the Printbar. The Cap is easier to remove if it is attached with the tab facing the front of the machine (when the Printhead is turned over). If the Ship Cap becomes delaminated, it's important that it be replaced with a new one immediately (*see Figure 4.1*).
 4. Rotate the Printhead so it is sitting at a 45° angle and let it sit overnight.

Note : DO NOT swap the FastDri Ship Caps with Caps placed on HiDef or VersaPrint Printbars. Clogging of the orifices could result.

Close the Vent Cap on the ink Reservoir during extended periods of non-use (more than one week).

4.10. Shipment of Printbars

To prevent breakage, the original Trident Printbar shipping container and foam packaging or equivalent must be used. Appropriate care must be taken to prevent additional breakage or leakage due to improper packaging.

- The Printbar Ship Cap must be in place. Failure to do so will result in ink leakage and severe deprime. In addition, the orifice plate will become susceptible to scratches. *Any Printbars shipped back without the Ship Cap installed will immediately be returned.*
- The ink Reservoir Vent Cap must be closed and the Reservoir Shipping Gasket must be inserted. Failure to do so will result in severe ink leakage and deprime.
- The Printbar must be placed in the original plastic bag (or a "Ziploc" plastic bag).
- Fill out the Return Form, including a description of the problem and print samples.
- Please return Printbars without wipe cards, level detect cables, priming bulbs, and other accessories as they will not be returned.

4.11. Trident Warranty Coverage¹

Trident, Inc. strives to provide the most reliable, dependable product possible. Trident, Inc. warrants its ULTRAJET™ and will repair any problems falling within the warranty conditions at Trident's expense. Following are the conditions of this warranty.

4.11.1. Printbar Conditions which void the warranty:

1. Using any other ink other than Trident's or using improper Trident Ink for specified Printbar (i.e.) using HiDef™ Ink in a FastDri™ unit.
2. Disconnection of the Printbar from the ink Reservoir without sealing the Printhead at the filter inlet.
3. Orifice plate/chamber missing, changed, or damaged. The plate is bonded in some configurations and would require a great shear force to tear it off. (If a poor bonding has occurred, Trident will be able to tell by examining the orifice plate).
4. Orifice Plate coating abraded. This occurs only from extreme abrasion to the orifice plate. (It appears as a dull or rough area on the plate).
5. Broken transducers. Transducers require a shock to crack.
6. Cooked ink. Solidified ink which is determined by Trident to have resulted from an over-temperature condition.
7. Electrical/electric wiring removed, changed, or broken.
8. Any other "extreme" physical damage.
Examples : Broken End Cap or broken Foot Body Leg.

4.12. Printbar "Do's"

1. DO open the Vent Cap on the ink Reservoir first.
2. DO remove the Ship Cap on the Printbar when mounted in your system.
3. DO use approved lint-free wipes when priming the Printbar.
4. DO attempt all priming procedures before purging.
5. DO purge ink/air throughout the Printbar End Cap if orifices do not weep during gravity prime. (This is a last resort technique if priming doesn't recover all the channels.)
6. DO check that the Reservoir Gasket is installed before priming. Sometimes this gasket will stick to the ink bottle.
7. DO print test patterns bi-weekly during extended periods of non-use.
8. DO cap Printbars with the Ship Cap if they will not be used for 2 days or longer.
9. DO ensure that the Reservoir gasket is installed before priming.

4.13. Printbar "Don'ts"

1. DO NOT move the Printbar without installing the proper Ship Caps.
2. DO NOT install or remove the bottle halfway or ink will overflow the Reservoir.
3. DO NOT over tighten the ink bottle. Torque the bottle as if installing a light bulb.
4. DO NOT operate with the Reservoir Vent Cap closed.
5. DO NOT SQUEEZE THE INK BOTTLE. A stiff bottle was chosen for the Reservoir to eliminate problems caused by bottle squeezing.
 - Squeezing the ink bottle overfills the ink supply.
 - Squeezing the ink bottle with the Reservoir Vent Cap closed can cause serious deprime.
 - Squeezing the ink bottle with all surfaces capped will pressurize the system, causing overflow and Printbar weeping.
6. DO NOT leave the Reservoir Cap unscrewed from the Reservoir for any length of time. The ink supply should not be exposed to airborne debris.
7. DO NOT prime with the ink bottle installed. This will result in massive ink spillage.
8. DO NOT leave any materials under the Printhead while the machine is idle. If any material touches the surface of the Printbar, it will draw all of the ink out of the system.
9. DO NOT leave Printbars under heat without printing for more than 1 week.
10. DO NOT use compressed air to try to clean the Printbars. You may break the transducers.

4.14. Frequently Asked Questions about the Trident Printbars¹

1. Can I use any type of Maintenance Spray on any type of Printbar? For example, can FastDri Maintenance Spray be used on HiDef Printbars? If not, what can be used?

Answer : DO NOT use the Maintenance Spray on anything but the type of Printbar that it is designed for. FastDri Maintenance Spray on HiDef Printbars will result in a chemical reaction causing clogged orifices. AllWrite, FastDri, and VersaPrint Printbars have their own Maintenance Spray. HiDef ink, due to its oil-based components, should never dry in the orifices. Therefore, no maintenance spray is needed.

2. Can the ink be intermixed?

Answer : Except for the VersaPrint inks, absolutely not. If the FastDri ink is mixed with any other ink, a tar-like substance will form.

3. How often are thermal fuses on the Printbar subject to failure?

Answer : Not very often. For the fuse to blow it requires that either pin 40 (Head Heater Return) shorts to ground; or pin 41 (sense resistor voltage) shorts to pin 40 sending high voltage through the fuse; or some other high voltage source connects across the thermal fuse. Typically, about one spare thermal fuse will cover 10 Printbars or more for one year.

4. What can be used to clean the Printbar and ink supply?

Answer : If you mean the outside, then alcohol will work well. Make sure the Ship Caps are in place. The inside of the Printbar should not be touched unless you are trained and are in clean room type conditions.

5. What is field replaceable without affecting the warranty?

Answer : The thermal fuse.

6. How often is maintenance necessary?

Answer : That depends on the particular application and Printbar implementation. In most cases when a print anomaly is noticed, a mild wiping with a lint-free wipe will remove paper dust from the orifices, and correct the problem. Otherwise, a reprime will eliminate air which may have entered the channels. The frequency of these steps varies greatly.

7. Do the Printbar orifices need to be capped every evening?

Answer : Capping all Printbars prior to evening shut-down is a good habit to stress. However, the Printbars may be left uncapped overnight to reduce priming time the next morning. It must be noted that a "skin" of ink may dry on the orifice plate of the FastDri and AllWrite Printbars which a wipe with a moist lint-free wipe may remove. HiDef, and VersaPrint Printbars do not need to be capped nightly as these inks do not exhibit any dryout. It is recommended that all Printbars be capped when they will sit unused for 2 days or longer. This will prevent accumulation of paper dust on the orifices or possible ink drying.

8. What will cause air to get into the channels?

Answer : A paper jam in from the orifices; a severe shock to the Printbar while uncapped; a shock to the hose between the Printbar and the Reservoir; or by removing the orifice Ship Cap while having the Reservoir Vent Cap in the "Closed" position can all result in air entering the channels.

9. Can handling of the circuitry attached to the Printbar result in a shock hazard?

Answer : Technically it is a potential shock hazard because it is above the 42 Volt maximum safety level set by many of the safety agencies. The current and power outputs to the Printbar are extremely low, but caution should be taken. In addition, the heater under the Printbar can get very hot and should not be touched.

10. Why can't the pressure generated by the transducer expel the air bubbles along with the ink?

Answer : The air bubbles can be highly detrimental in the micro-inch world of the inkjet chamber. As the transducer pulses and pressurizes the micro-chamber, the air bubbles shrink in diameter and act as energy absorbers, resulting in insufficient energy to eject the droplets. Pressure priming with the priming bulb, or by lowering the Printbar below the ink supply is therefore necessary.

11. Is there any other technique for getting a stubborn channel to prime?

Answer : If all else fails, allow the Printbar to sit at operating temperature overnight. Typically, any stubborn air bubbles will dissolve into the ink, and be gone the next morning.

12. Do the filters in the ink Reservoir and Printbar need periodic replacing?

Answer : No. The filters were designed to have an extra large surface area to allow adequate flow even after years of operation. None of the units sold ever failed due to a clogged filter.

13. Should we be concerned about the routing on the hose between the Printbar and the ink Reservoir? In other words, if the hose dips very low relative to the Printbar, could air be ingested through the orifices?

Answer : No, you need not be concerned over the routing. The important point is the relative positions of the orifices to the ink level inside the Reservoir.

4.15. Glossary of Terms¹

Channel	One of the units comprised of a piezoelectric transducer, restrictor and associated chamber/orifice plate. There are 32 individual Channels in the Printbar.
Crosstalk	The reduction of droplet frequency in a channel due to the effect of adjacent jetted Channels. Crosstalk effects are usually caused by fluidic, mechanical, and electrical coupling. Since the middle Channels have the most channels printing on either side of them, the degree of crosstalk on these middle channels is the greatest. As a result, in extreme cases, the print appear lighter in there middle Channels.
Debris	A solid material which blocks an orifice or entire channel. It can be generated either externally, (paper dust) or in rarer cases, internally (metal chips).
End Cap	The Printbar cap at the furthest end of the ink path. When removed, the Printbar can then be purged of air and ink.
Leaky Feet	A break-down in the elastomeric seal around the transducer foot over time resulting in the ability of air to enter the channel and thereby prevent printing. An unrepairable situation which typically occurs only after years of printing and pressure priming.
Orifice	One of the openings at the end of each channel from which the ink droplet(s) are ejected. There are three orifices per channel in the Printbar.
Piezoelectric Crystal	The transducer element which contracts, then relaxes, printing the droplets.
Prime	The process of evacuating ink and air out of the Channel Orifices.
Purging	The process of evacuating ink and air out of the Printbar End Cap.
Reservoir	Bottle supplied ink Reservoir with internal level detect system.
Restrictor Plate	The narrow fluidic path which controls the flow of ink into the chambers.
Start-Up	During periods of non-printing, the effect of evaporation of some ink components out of the orifices, leaving thicker ink components behind, resulting in reduction in droplet velocity and droplet volume.

Transducer	See "Piezoelectric Crystal".
Transducer Foot	A circular plastic attachment to the rectangular Piezoelectric crystal in order to increase the surface area contacting the ink.
Trim Pack	A group of 31 selected resistors connected to the Printbar which adjust or "trim" the voltage of each transducer to obtain the same drop velocity across all 32 Channels. Used when the Channel to Channel voltage variations exceed a predetermined range specification.
Vent Cap	The ink Reservoir cap where the priming bulb or priming hose is inserted.

4.15. Endnotes

¹ ULTRAJET™ IMAGING SUBSYSTEM User's Guide

Note : Many sections in this chapter have been taken from the ULTRAJET™ IMAGING SUBSYSTEM User's Guide. Any information used from this manual has been noted with a ¹ at the end of the heading or sentence.

BK600A, Inkjet Base Assembly

100447A, Base Mechanical Assembly

300325A, Base Mechanical Assembly

- 100302A, Idler Shaft Assembly**
- 100303A, Mainshaft Assembly**
- 106305A, Vacuum Belt Drive Assembly**
- 106323A, Table Belt Takeup Roller Assembly**
- 116310A, Feeder Bridge Assembly**
- 300301A, Left Sideframe Assembly**
- 300302A, Right Sideframe Assembly**
- 300328A, Base Frame Assembly**
- 325005HA, Shuttle Feeder Assembly**
- 325305A, Vacuum Belt Tabletop Assembly**

325301A, Tabletop Assembly

- 100314A, Outfeed Roller Assembly**
- 325011A, Rear Table Assembly**
- 330350A, Skidbar Assembly**

603415A, Instrument Panel Assembly

713310A, BK600 Base Cabinet Assembly

- 713300A, Ringcone Assembly**
- 711300A, BK600 Electrical Box Assembly**

706301A, BK600 Electrical Panel Assembly

- 615001A, BK600 Terminal Block 1 Assembly**
- 615002A, BK600 Terminal Block 2 Assembly**

- 800002A, Motor Assembly**
- 802070A, Vacuum Distributor Assembly**

713312A, Controller Console Assembly

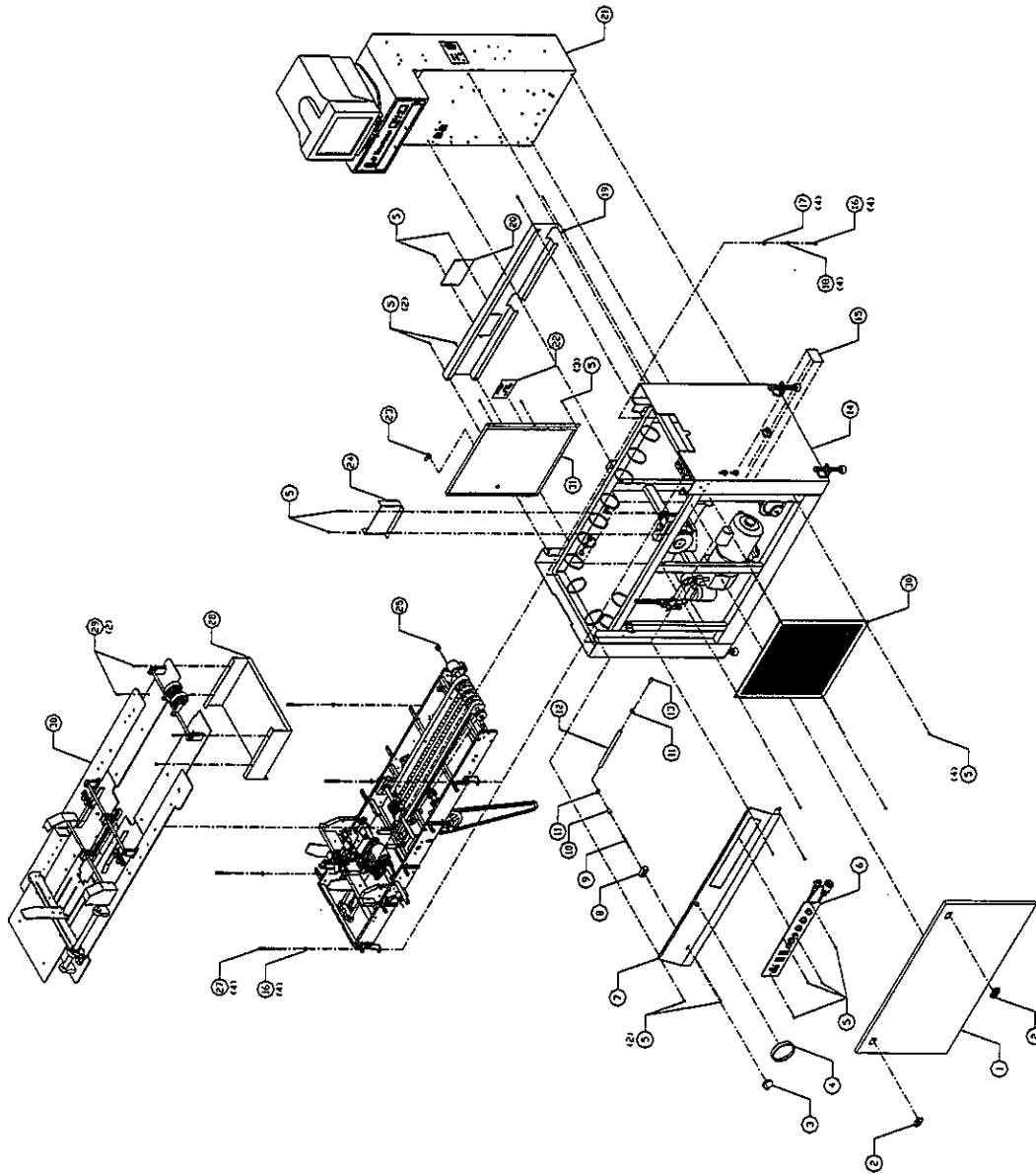
- 310316A, Inkwell Assembly**
- 325311A, Transformer Mount Plate Assembly**
- 325312A, Priming System Assembly**
- 600313A, Computer Cage Assembly**
- 700313A, Computer Access Door Assembly**
- 706315A, Faceplate Assembly**
- 706322A, Power Supply Assembly**

713311A, Printhead Bridge Assembly

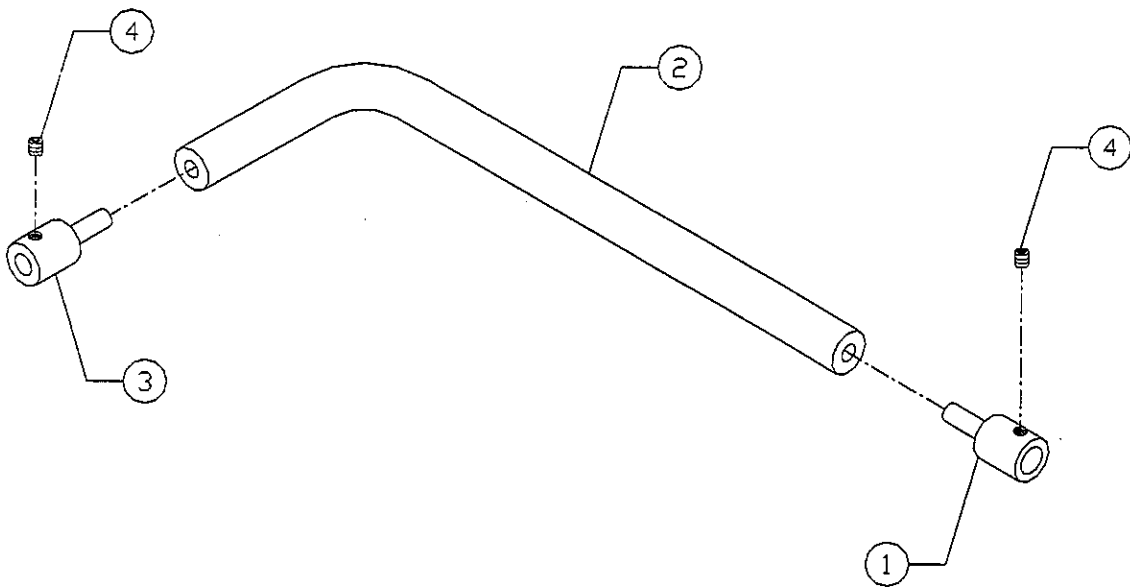
BK602 (H,V,F,A), Twin Printhead

BK601 (H,V,F,A), Single Printhead

BK600A, Inkjet Base Assembly



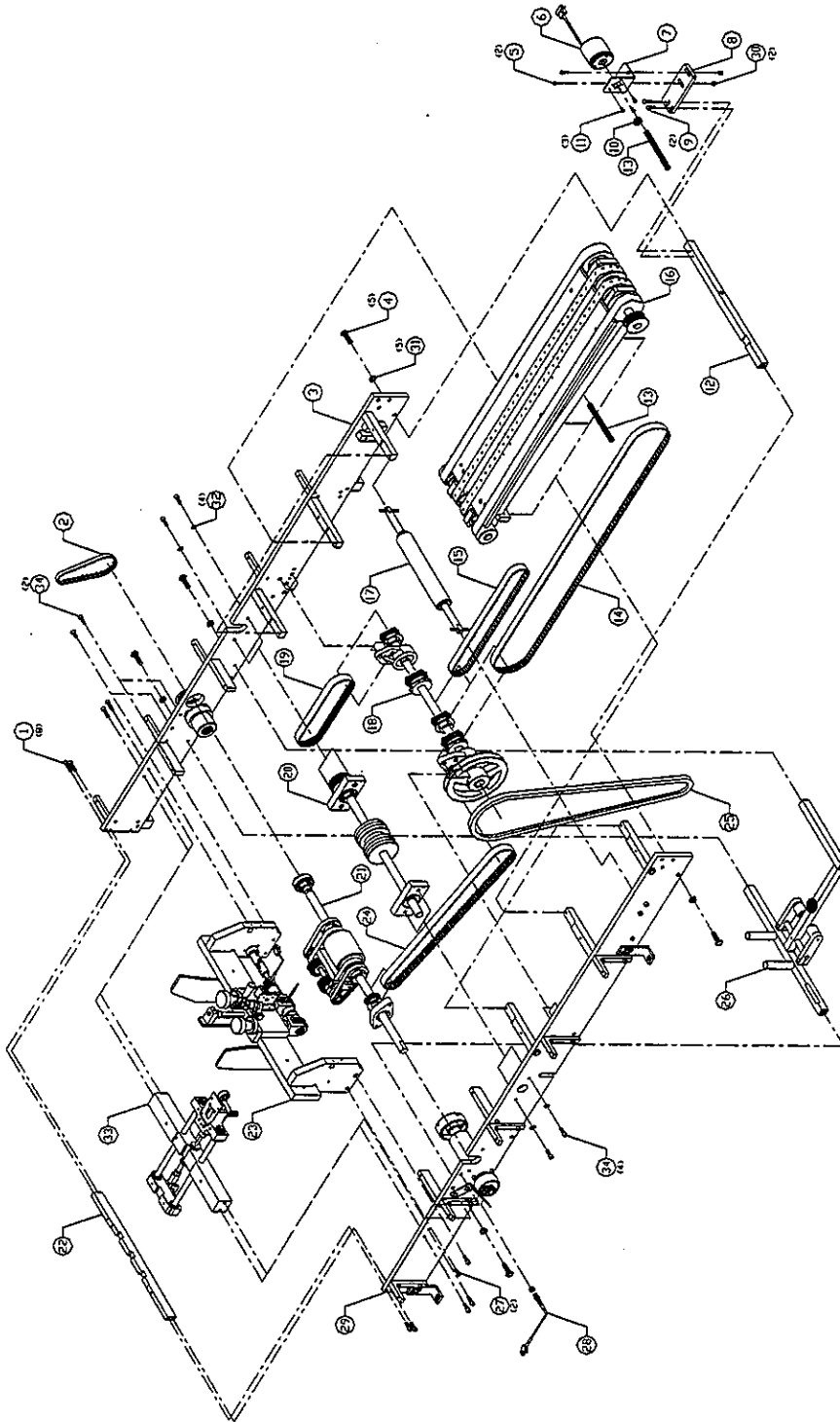
NO.	PART NO.	QTY.	DESCRIPTION	REFERENCE
1	700046H	1	BK600 BASE CABINET DOOR	
2	446000	2	SLIDE LATCH	
3	438311A	1	BRIDGE HANDWHEEL ASSEMBLY	
4	127300	1	HANDWHEEL	
5	404520	1	SCREW, BHCS, 10-32 UNF X 1/2"	
6	603415A	1	INSTRUMENT PANEL ASSEMBLY	Page A29-A30
7	700301	1	BASE INSTRUMENT PANEL	
8	212327	1	RINGCONE HANDWHEEL BLOCK	
9	100327	1	RINGCONE HANDWHEEL SHAFT	
10	122256	1	HANDWHEEL HOSE COUPLING	
11	444001	1	HOSE CLAMP	
12	802600	1	RINGCONE HOSE	
13	122255	1	RINGCONE HOSE COUPLING	
14	713310A	1	BK600 BASE CABINET ASSEMBLY	Page A31-A32
15	803001	1	BUSKRO NAMEPLATE	
16	440020	1	WASHER, 3/8" I.D.	
17	420020	1	NUT, 3/8-16 UNC	
18	439020	1	LOCKWASHER, 3/8" I.D.	
19	700300	1	REAR TOP COVER	
20	700030H	1	REAR GEAR COVER	
21	713312A	2	CONTROLLER CONSOLE ASSEMBLY	Page A41-A42
22	803010	2	WARNING LABEL, "HIGH VOLTAGE"	
23	615313	2	CAM LOCK, 5/8"	
24	700333	2	PULLEY GUARD COVER	
25	300325A	4	BASE MECHANICAL ASSEMBLY	Page A5-A6
26	407290	4	SCREW, SHCS, 3/8-16 UNC X 3"	
27	700304	4	EXTENDED BASE LOWER COVER	
28	404030	4	SCREW, FHCS, 10-32 UNF X 1/2"	
29	325301A	4	TABLETOP ASSEMBLY	Page A23-A24
30	700041	6	PROTECTIVE SCREEN	
31	711301	1	ELECTRICAL BOX DOOR	
32	505054	1	BUSHING, 5/16" I.D. X 3/8" LONG	
33	120339	1	TIMING BELT, 390L075	

100447A, Ringcone Hose Assembly

NO	PART NO	QTY	DESCRIPTION	REFERENCE
1	122255	1	RINGCONE HOSE COUPLING	
2	802600		RINGCONE HOSE X 21" LONG	
3	122256	1	HANDWHEEL HOSE COUPLING	
4	404805	2	SCREW, SHSS, 10-32 UNF X 1/8"	

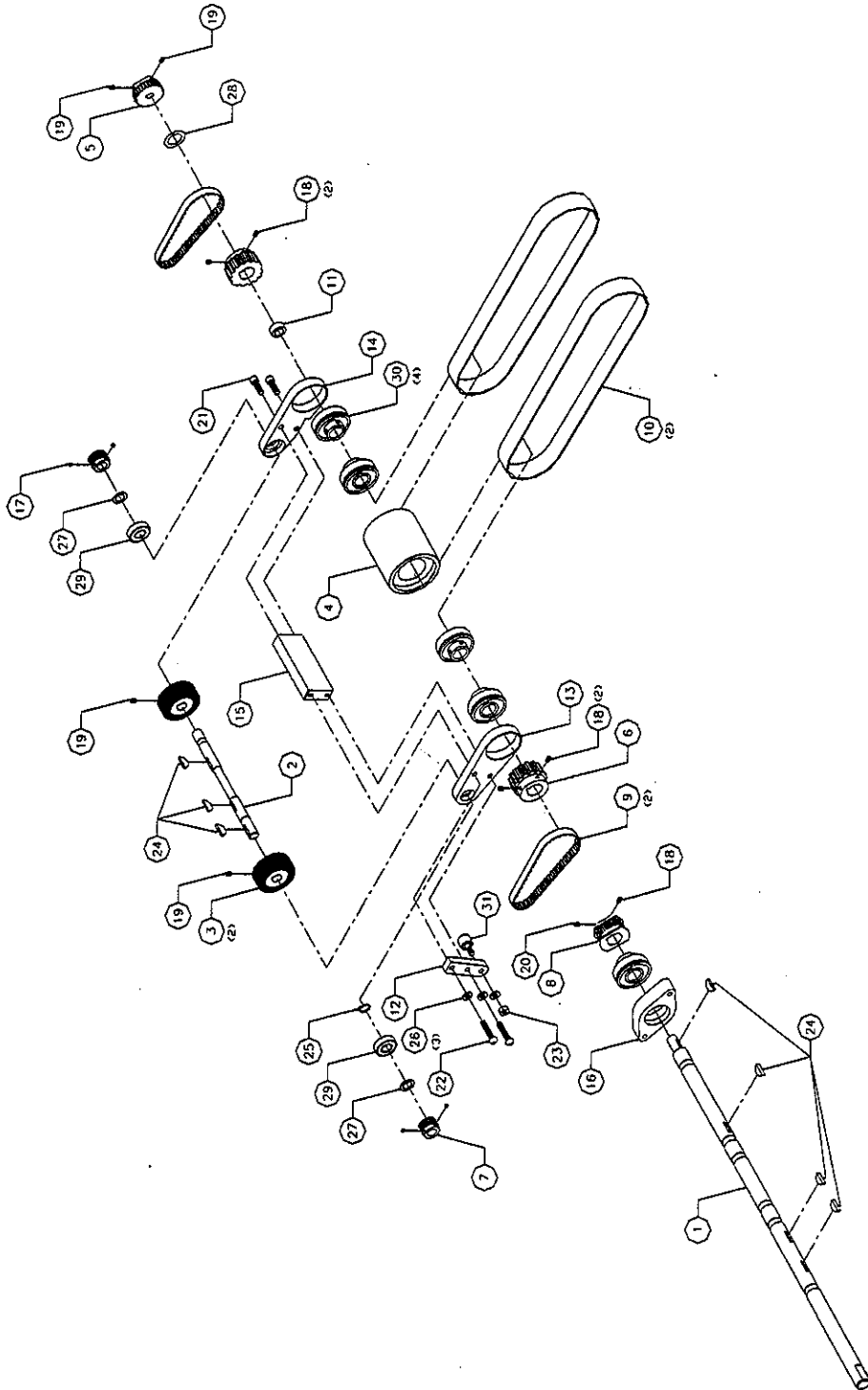


300325A, Base Mechanical Assembly



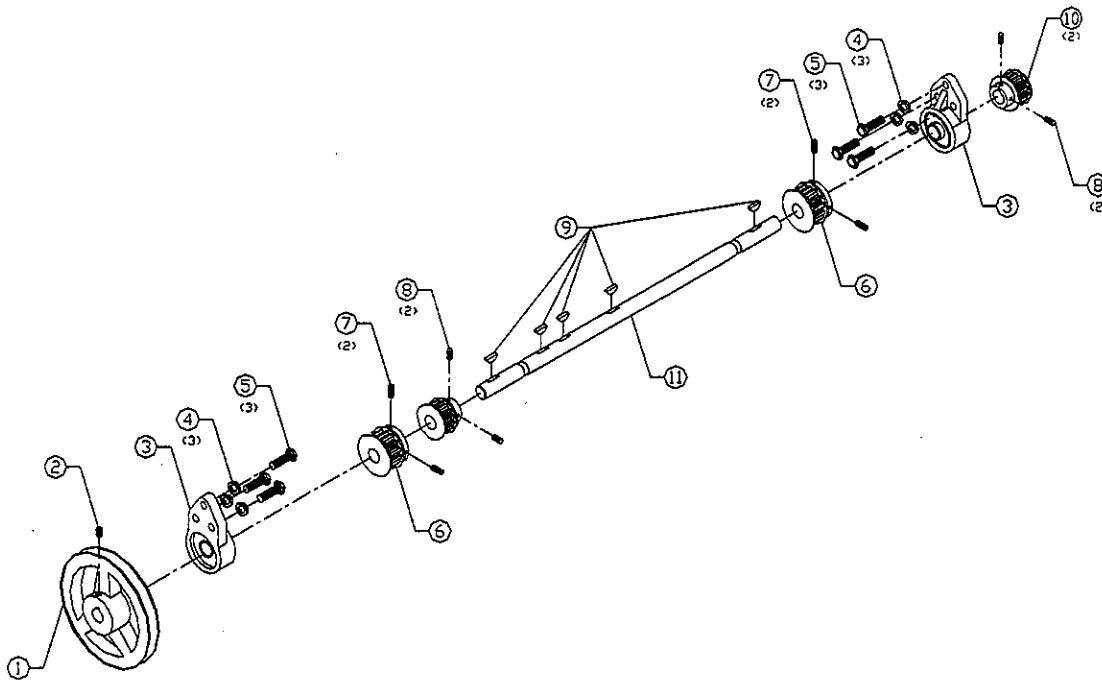
NO.	PART NO.	QTY.	DESCRIPTION	REFERENCE
1	405270	8	SCREW, SHCS, 1/4-20 UNC X 1"	
2	120214	1	TIMING BELT, 140XL037	
3	300301A	1	LEFT SIDEFAME ASSEMBLY	Page A15-A16
4	407675	5	SCREW, HHMS, 3/8-16 UNC X 1 1/4"	
5	404550	2	SCREW, BHCS, 10-32 UNF X 3/4"	
6	630301A	1	SHAFT ENCODER ASSEMBLY	
7	330303	1	SHAFT ENCODER BRACKET	
8	330308	1	ENCODER MOUNT	
9	405550	2	SCREW, BHCS, 1/4-20 UNC X 3/4"	
10	444001	1	HOSE CLAMP, GEAR TYPE	
11	410315	3	SCREW, PHMS, M4 x 10	
12	300325	1	REAR CROSSMEMBER	
13	802047	2	HOSE, CLEARFLEX, 1/4" I.D. X 2" LONG	
14	120360	1	TIMING BELT, 600L075	
15	120328	1	TIMING BELT, 285L075	
16	325305A	1	VACUUM BELT TABLETOP ASSEMBLY	Page A21-A22
17	106323A	1	TABLE BELT TAKEUP ROLLER ASSEMBLY	Page A11
18	100303A	1	MAINSHAFT ASSEMBLY	Page A9
19	120322	1	TIMING BELT, 225L075	
20	106305A	1	VACUUM BELT DRIVE ASSEMBLY	Page A10
21	100302A	1	IDLER SHAFT ASSEMBLY	Page A7-A8
22	320001H	1	REAR FRAME SPACER	
23	116310A	1	FEEDER BRIDGE ASSEMBLY	Page A13-A14
24	120342	1	TIMING BELT, 420L075	
25	120303	1	MACHINE DRIVE BELT, "V" BELT	
26	300328A	1	BASE FRAME ASSEMBLY	Page A17-A18
27	405030	2	SCREW, FHCS, 1/4-20 UNC X 1/2"	
28	630004A	1	CYCLE PROXIMITY SWITCH ASSEMBLY	
29	300302A	1	RIGHT SIDEFAME ASSEMBLY	
30	420009	2	LOCK NUT, 10-32 UNF	
31	439020	5	LOCKWASHER, 3/8" I.D.	
32	440031	4	WASHER, 1/4" I.D., 0.032" THICK	
33	325005HA	1	SHUTTLE FEEDER ASSEMBLY	Page A20
34	405250	6	SCREW, SHCS, 1/4-20 UNC X 3/4"	

100302A, Idler Shaft Assembly



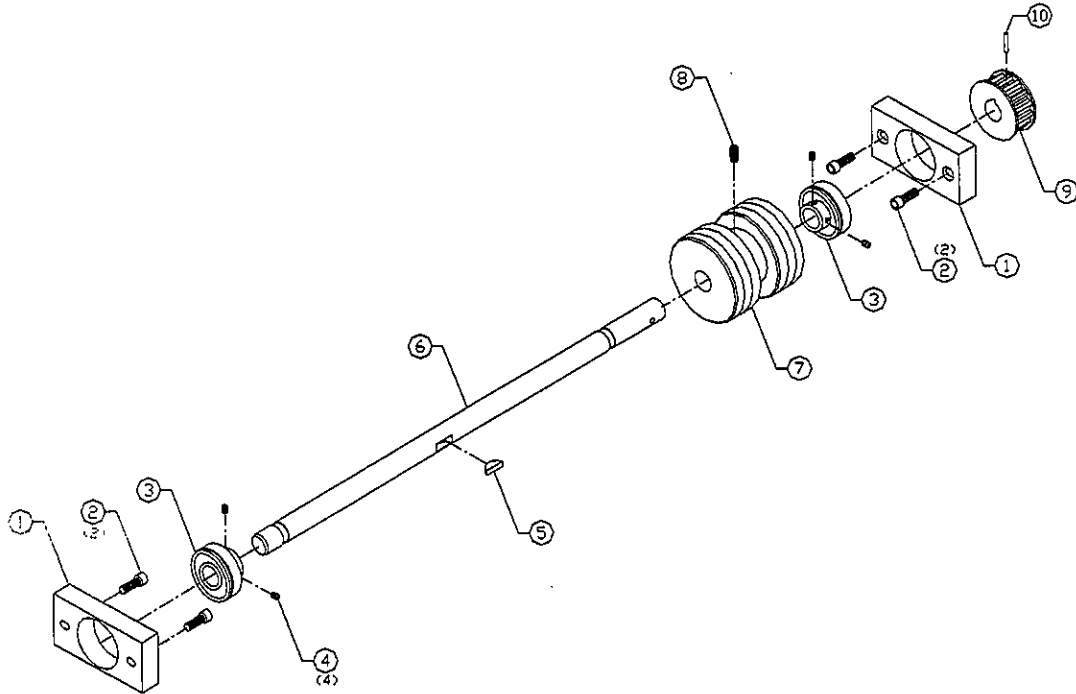
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1	100302	1	IDLER ROLLER SHAFT	
2	100304	1	LOWER FEED ROLLER SHAFT	
3	106300	2	LOWER FEED ROLLER	
4	106302	1	VACUUM BELT IDLER ROLLER	
5	110005H	1	GEAR, NSS1632 X 1/2"	
6	116005H	2	PULLEY, 32XL037 X 3/4"	
7	116009H	2	PULLEY, 18XL037 X 1/2"	
8	116306	1	PULLEY, 15LF075 X 3/4"	
9	120212	2	TIMING BELT, 120XLB037	
10	120300	2	FRONT TABLE BELT, (1" x 29 7/8")	
11	123301	1	LOWER FEED SHAFT SPACER	
12	203005H	1	HOPPER EXTENSION ARM	
13	203308	1	LEFT HOPPER ARM	
14	203309	1	RIGHT HOPPER ARM	
15	320006H	1	HOPPER ARM SPACER	
16	330042-2H	1	BEARING HOUSING, UBR204	
17	403805	4	SCREW, SHSS, 8-32 UNF x 1/8"	
18	404810	5	SCREW, SHSS, 10-32 UNF x 1/4"	
19	404830	4	SCREW, SHSS, 10-32 UNF x 3/8"	
20	404807	1	SCREW, SHSS, 10-32 UNF X 3/16"	
21	405250	2	SCREW, SHCS, 1/4-20 UNC x 3/4"	
22	405575	2	SCREW, HHMS, 1/4-20 UNC x 1 1/4"	
23	420012	1	NUT, 1/4-28 UNF	
24	433002	7	KEY, WOODRUFF, #406	
25	437500	1	RETAINING RING, 1/2" I.D., EXTERNAL	
26	439010	3	LOCKWASHER, 1/4" I.D.	
27	440030	2	WASHER, 1/2" I.D., 0.032" THICK	
28	440050	1	WASHER, 3/4" I.D.	
29	500030	2	BEARING, R8, 1/2" I.D.	
30	500055	5	BEARING, UBR204-12S, 3/4" I.D.	
31	510040	1	CAM FOLLOWER, 1/2" O.D.	

100303A Mainshaft Assembly



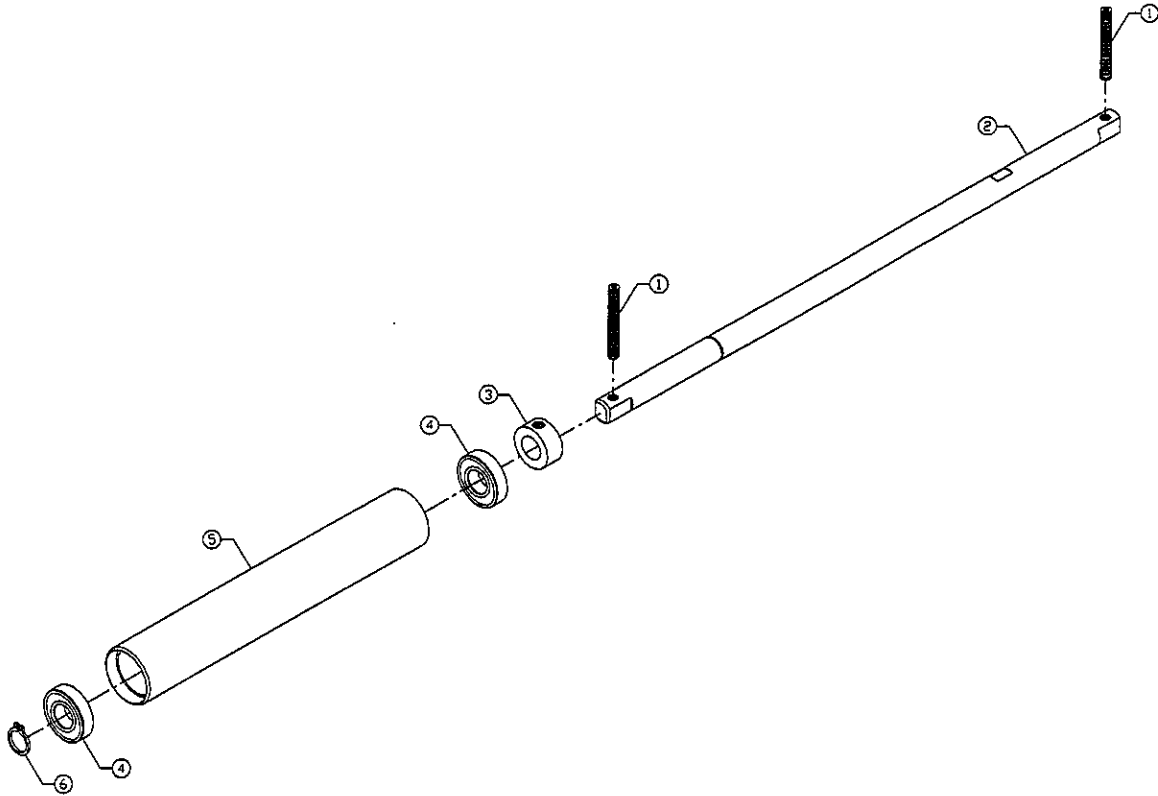
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1	116305	1	MACHINE DRIVE SHEAVE, AK64 X 3/4"	
2	406820	1	SCREW, SHSS, 5/16-18 UNC X 3/8"	
3	500300	2	BEARING, 3/4" I.D., UCFK204-12S	
4	439020	6	LOCKWASHER, 3/8" I.D.	
5	407675	6	SCREW, HHMS, 3/8-16 UNC X 1 1/4"	
6	116308	2	PULLEY, 22LB075 X 3/4"	
7	405830	4	SCREW, SHSS, 1/4-20 UNC X 1/2"	
8	405820	4	SCREW, SHSS, 1/4-20 UNC X 3/8"	
9	430250	5	KEY, WOODRUFF, #606	
10	116301	2	PULLEY, 18LB075 X 3/4"	
11	100303	1	MAINSHAFT	

106305A, Vacuum Belt Drive Shaft Assembly



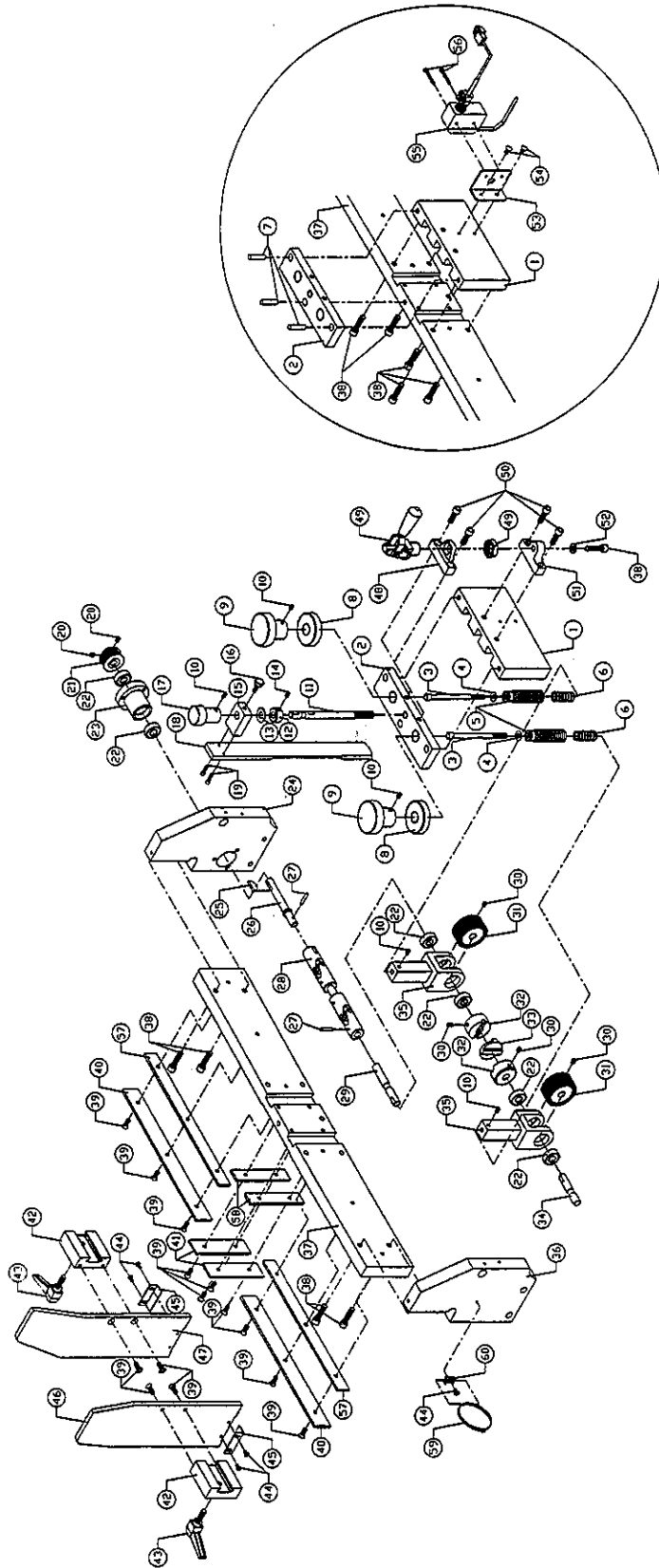
NO	PART NO	QUANTITY	DESCRIPTION	REFERENCE
1	330305	2	UBR204 BEARING BLOCK	
2	405270	4	SCREW, SHCS, 1/4-20 UNC X 1"	
3	500055	2	BEARING, 3/4" I.D., UBR204-125	
4	405805	4	SCREW, SHSS, 1/4-20 UNC X 1/8"	
5	430250	1	KEY, WOODRUFF, #606	
6	100312	1	TABLE PULLEY DRIVESHAFT	
7	106305	1	TWIN VACUUM BELT DRIVE PULLEY	
8	405820	1	SCREW, SHSS, 1/4-20 UNC X 3/8"	
9	116309	1	DRIVE PULLEY, 18LB075 X 3/4"	
10	436051	1	SPRING PIN, 3/16" DIA. X 2"	

106323A, Table Belt Takeup Roller Assembly



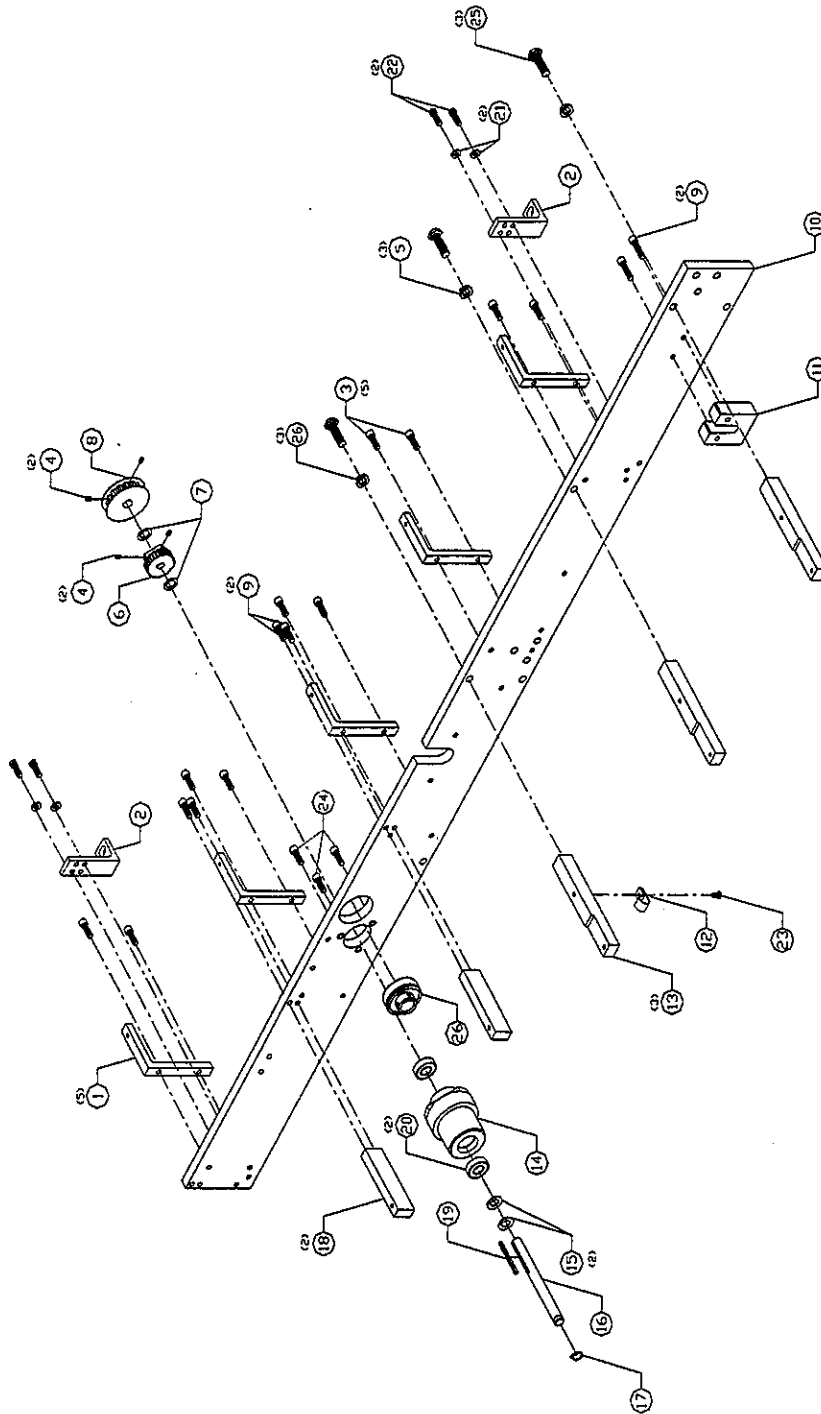
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1	405880	2	SCREW, SHSS, 1/4-20 UNC X 1 1/2"	
2	100325	1	TABLE BELT TAKEUP SHAFT	
3	131040	1	COLLAR, 5/8" I.D.	
4	500040	2	BEARING, R10, 5/8" I.D.	
5	106323	1	TABLE BELT TAKEUP ROLLER	
6	437040	1	RETAINING RING, 5/8" I.D. EXTERNAL	

116310A, Feeder Bridge Assembly



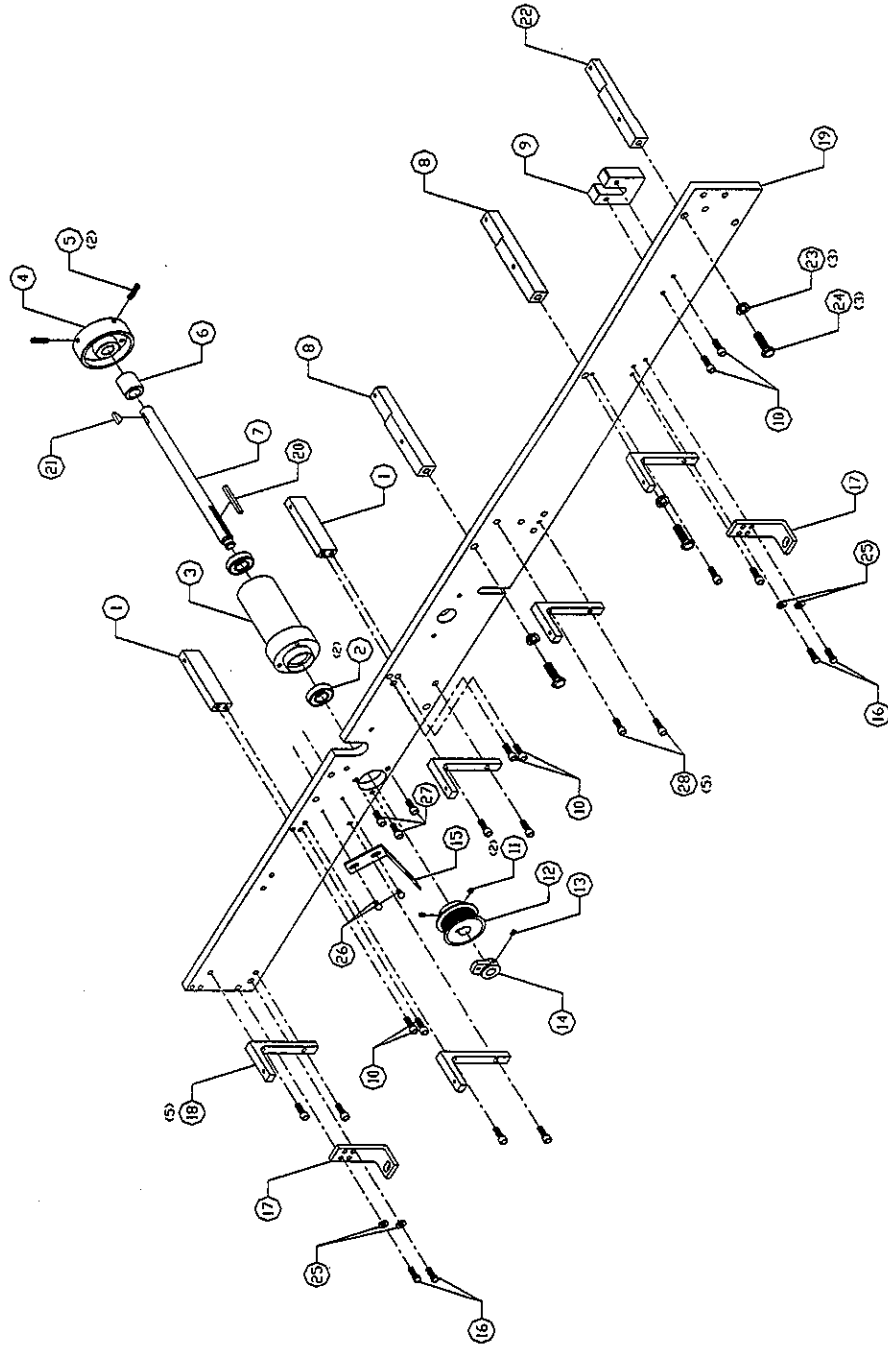
NO.	PART NO.	QTY.	DESCRIPTION	REFERENCE
1	212008H	1	BRIDGE SLIDE MOUNT	
2	340010H	1	GATE ADJUSTER PLATE	
3	405295	2	SCREW, SHCS, 1/4-20 UNC X 3 1/2"	
4	440011	2	WASHER, BRASS, 1/4" I.D. X 9/16" O.D.	
5	330007H	2	UPPER ROLLER ADJUSTER	
6	209007	2	UPPER FEED ROLLER SPRING	
7	436313	3	DOWEL PIN, 1/4" DIA. X 1"	
8	438008	2	UPPER ROLLER LOCKNUT	
9	438007H	2	UPPER ROLLER KNOB	
10	404810	4	SCREW, SHSS, 10-32 UNF X 1/4"	
11	429009H	1	GATE ADJUSTMENT SCREW	
12	131020	1	COLLAR, 3/8" I.D.	
13	440021	1	WASHER, BRASS, 3/8" I.D. X 0.69" O.D.	
14	405805	1	SCREW, SHSS, 1/4-20 UNC X 1/8"	
15	330011H	1	MATERIAL GATE BLOCK	
16	438171	1	THUMBSCREW, 10-32 UNF X 3/8"	
17	438010	1	GATE ADJUSTMENT KNOB	
18	212011H	1	MATERIAL GATE	
19	402230	2	SCREW, SHCS, 6-32 UNF X 1/2"	
20	403805	2	SCREW, SHSS, 8-32 UNF X 1/8"	
21	116310	1	PULLEY, 20XL037 X 3/8"	
22	500020	6	BEARING, 3/8" I.D.	
23	330008H	1	BRIDGE BEARING BLOCK	
24	300008H	1	LEFT BRIDGE FRAME	
25	430150	1	KEY, WOODRUFF, #406	
26	100018H	1	UPPER ROLLER DRIVE SHAFT	
27	436050	2	SPRING PIN, 1/8" DIA. X 3/4" LONG	
28	122010HA	1	UNIVERSAL ASSEMBLY	
29	100020H	1	LEFT UPPER ROLLER SHAFT	
30	404820	4	SCREW, SHSS, 10-32 UNF X 3/8"	
31	106007H	2	UPPER FEED ROLLER	
32	122007H	2	COUPLING COLLAR	
33	122006	1	COUPLING SPIDER	
34	100019H	1	RIGHT UPPER ROLLER SHAFT	
35	212009H	2	UPPER ROLLER HOLDER	
36	300007H	1	RIGHT BRIDGE FRAME	
37	310008H	1	FEEDER BRIDGE	
38	405270	10	SCREW, SHCS, 1/4-20 UNC X 1"	
39	404030	14	SCREW, FHCS, 10-32 UNF X 1/2"	
40	340008H	2	SIDE GUIDE RAIL, 1" X 1/8"	
41	340009H	2	MATERIAL GATE SLIDE	
42	212006	2	SIDE GUIDE CLAMP BLOCK	
43	206010	2	SIDE GUIDE LOCKING LEVER	
44	402310	5	SCREW, PHMS, 6-32 UNF X 1/4"	
45	707009	2	SIDE GUIDE BOTTOM PLATE	
46	707007H	1	RIGHT SIDE GUIDE	
47	707008H	1	LEFT SIDE GUIDE	
48	330010	1	QUICK RELEASE BRACKET	
49	206012	1	RELEASE LEVER C/W NUT	
50	405250	4	SCREW, SHCS, 1/4-20 UNC X 3/4"	
51	330014	1	QUICK RELEASE ANCHOR	
52	439010	1	LOCKWASHER, 1/4" I.D.	
53	615005	1	MICROSWITCH BRACKET	
54	402520	2	SCREW, BHCS, 6-32 UNF X 3/8"	
55	603020A	1	JAM STOP MICROSWITCH ASSEMBLY	
56	402370	2	SCREW, PHMS, 6-32 UNF X 1"	
57	340007H	2	SIDE GUIDE RAIL SPACER, 3/4" X 1/8"	
58	340006H	2	MATERIAL GATE SLIDE SPACER, 3/4" X 1/8"	
59	615140	3	LASHING TIE	
60	615101	1	TIE MOUNT	

300301A, Left Sideframe Assembly



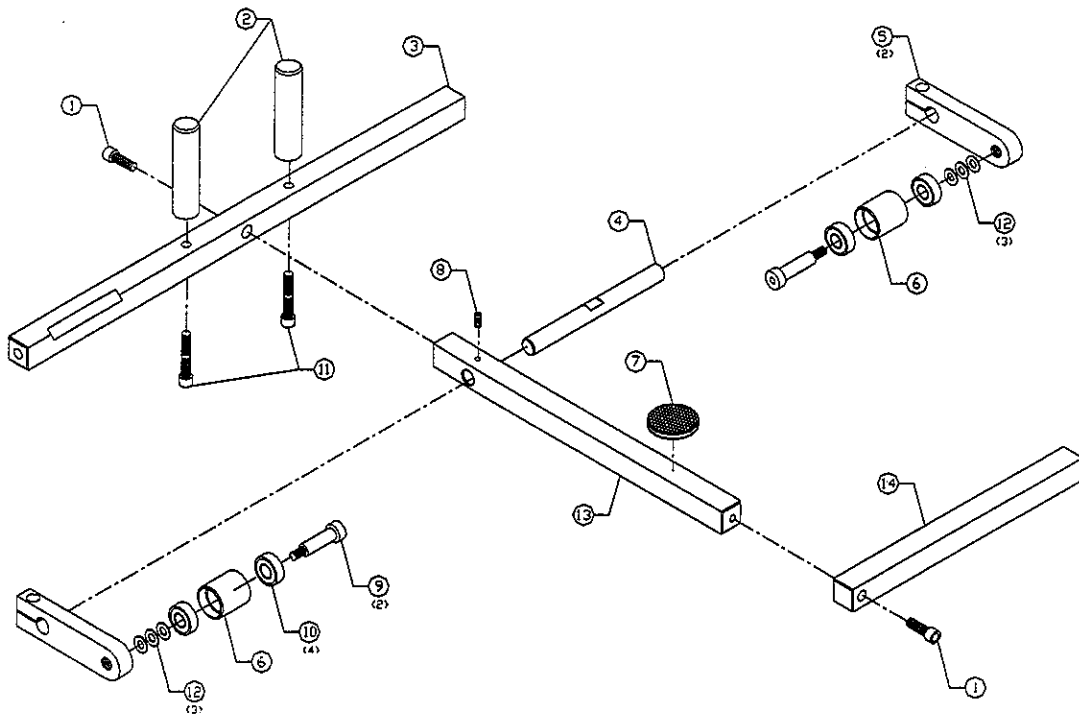
NO.	PART NO.	QUANTITY	DESCRIPTION	REFERENCE
1	330013	5	SKIRT SUPPORT	
2	330023H	2	FRAME MOUNTING FOOT	
3	405250	10	SCREW, SHCS, 1/4-20 UNC X 3/4"	
4	404810	4	SCREW, SHSS, 10-32 UNF X 1/4"	
5	439020	3	LOCKWASHER, 3/8" I.D.	
6	110005H	1	GEAR, NSS1632	
7	440030	2	WASHER, 1/2" I.D., 0.032" THICK	
8	116300	1	PULLEY, 42XLB037	
9	405270	4	SCREW, SHCS, 1/4-20 UNC X 1"	
10	300301	1	LEFT SIDEFAME	
11	330215	1	TAKEUP ROLLER BLOCK	
12	615107	1	CABLE CLAMP, 1/2"	
13	300320	3	TABLETOP SUPPORT	
14	330101	1	UPPER ROLLER DRIVESHAFT HOUSING	
15	320306	2	DRIVESHAFT ARBOR SPACER	
16	100305	1	UPPER ROLLER DRIVESHAFT	
17	437500	1	RETAINING RING, 1/2" I.D., EXTERNAL	
18	320003H	2	TABLETOP RIB	
19	432320	1	KEY, 1/8" X 1/8" X 2"	
20	500030	2	BEARING, 1/2" I.D., R8	
21	439010	4	LOCKWASHER, 1/4" I.D.	
22	405650	4	SCREW, HHMS, 1/4-20 UNC X 3/4"	
23	404520	1	SCREW, BHCS, 10-32 UNF X 3/8"	
24	405240	3	SCREW, SHCS, 1/4-20 UNC X 5/8"	
25	407675	3	SCREW, HHMS, 3/8-16 UNC X 1 1/4"	
26	500055	1	BEARING, UBR204-12S, 3/4" I.D.	

300302A, Right Sideframe Assembly



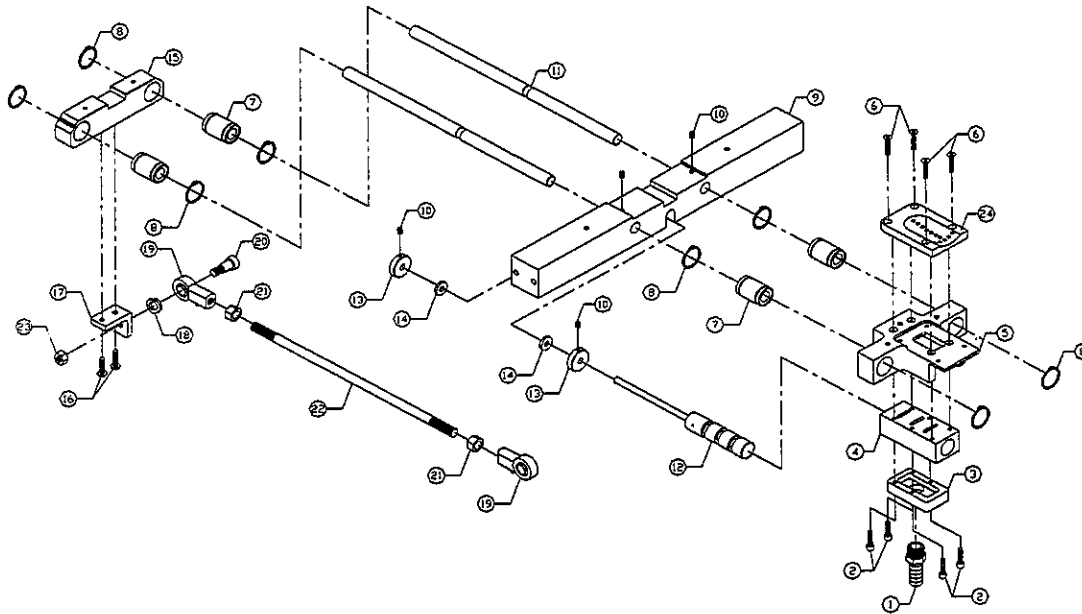
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1	320003H	2	TABLETOP RIB	
2	500040	2	BEARING, 5/8" I.D., R10	
3	330004	1	CRANKSHAFT HOUSING	
4	109010H	1	LOWER ROLLER HOPPER CAM	
5	405250	7	SCREW, SHSS, 1/4-20 UNC X 3/4"	
6	123003H	1	CRANKSHAFT SPACER	
7	100004H	1	SHUTTLE CRANK SHAFT	
8	300320	2	TABLETOP SUPPORT	
9	330215	1	TAKEUP ROLLER BLOCK	
10	405270	6	SCREW, SHCS, 1/4-20 UNC X 1"	
11	405807	2	SCREW, SHCS, 1/4-20 UNF x 3/16"	
12	116303	1	PULLEY, 16LF075	
13	404810	1	SCREW, SHSS, 10-32 UNF X 1/4"	
14	109050	1	SENSOR CAM	
15	615325	1	CYCLE SWITCH BRACKET	
16	405650	4	SCREW, HHMS, 1/4-20 UNC X 3/4"	
17	330023H	2	FRAME MOUNTING FOOT	
18	330013	5	SKIRT SUPPORT	
19	300302	1	BK600 BASE RIGHT SIDEFAME	
20	433310	1	KEY, 3/16" X 3/16" X 1 15/16"	
21	430250	1	KEY, WOODRUFF, #606	
22	300319	1	TABLETOP SUPPORT C/W BELT CLEARANCE	
23	439020	3	WASHER, 3/8" I.D.	
24	407675	3	SCREW, HHMS, 3/8-16, UNC X 1 1/4"	
25	439010	4	LOCKWASHER, 1/4" I.D.	
26	404520	2	SCREW, BHCS, 10-32 UNF X 3/8"	
27	405240	3	SCREW, SHCS, 1/4-20 UNC X 5/6"	
28	405250	10	SCREW, SHCS, 1/4-20 UNC X 3/4"	

300328A, Base Frame Assembly



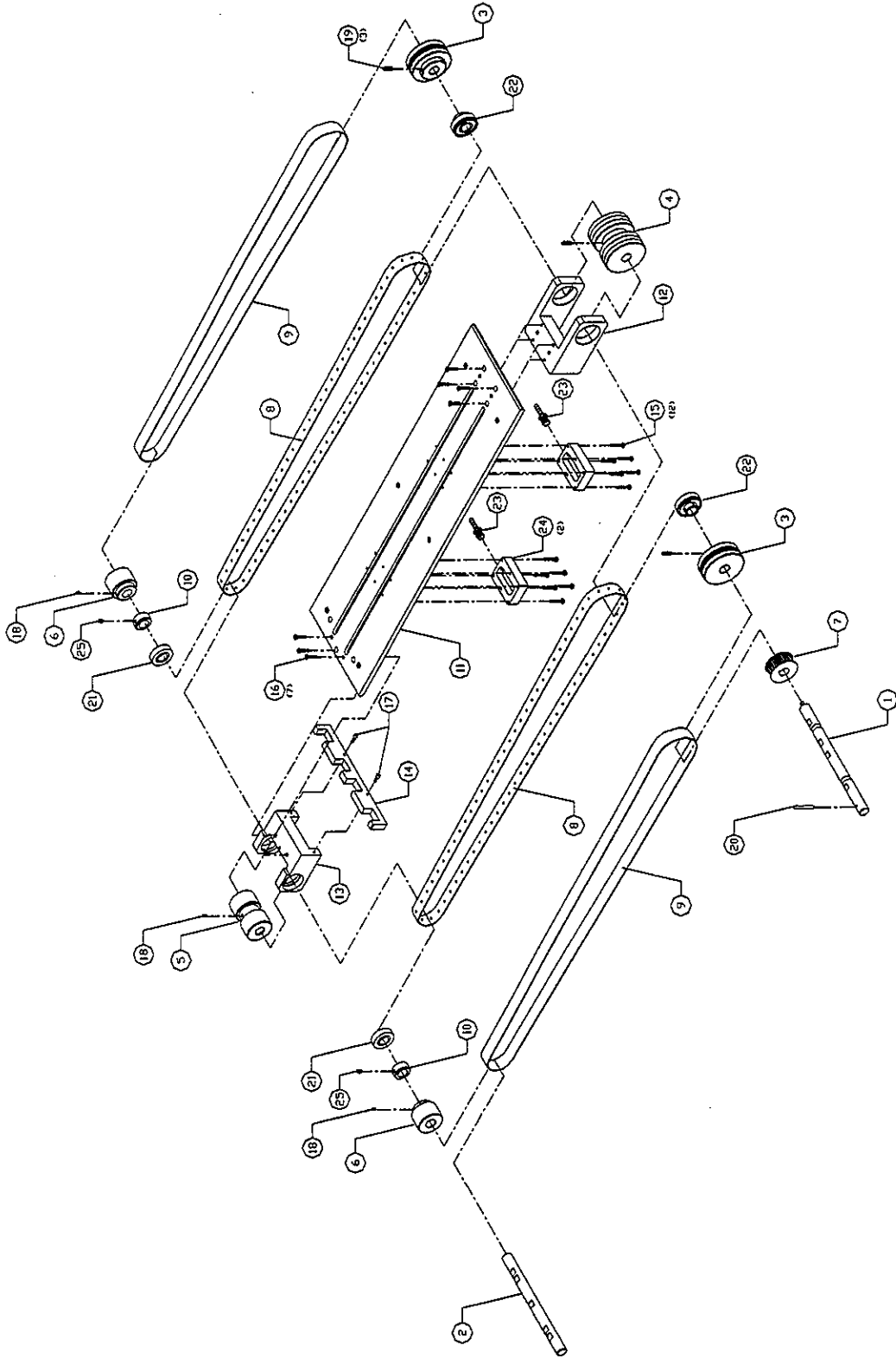
NO	PART NO	QTY	DESCRIPTION	REFERENCE
1	405250	2	SCREW, SHCS, 1/4-20 UNC X 3/4"	
2	320301	2	VACUUM BELT GUIDE	
3	300328	1	FRONT CROSSMEMBER	
4	310312	1	TAKEUP STUD	
5	203302	2	OUTFEED ROLLER ARM	
6	106100	2	BELT ALIGNMENT TUBE	
7	630003	1	REFLECTOR, 35mm DIA.	
8	403810	1	SCREW, SHSS, 8-32 UNF X 1/4"	
9	415075	2	SHOULDER BOLT, 5/16-18 UNC X 1 1/4"	
10	500020	4	BEARING, 3/8" I.D., R6	
11	405280	2	SCREW, SHCS, 1/4-20 UNC X 1 1/2"	
12	440010	6	WASHER, 1/4" I.D.	
13	300326	1	CROSSMEMBER LINK	
14	300327	1	MIDDLE CROSSMEMBER	

325005HA, Shuttle Feeder Assembly



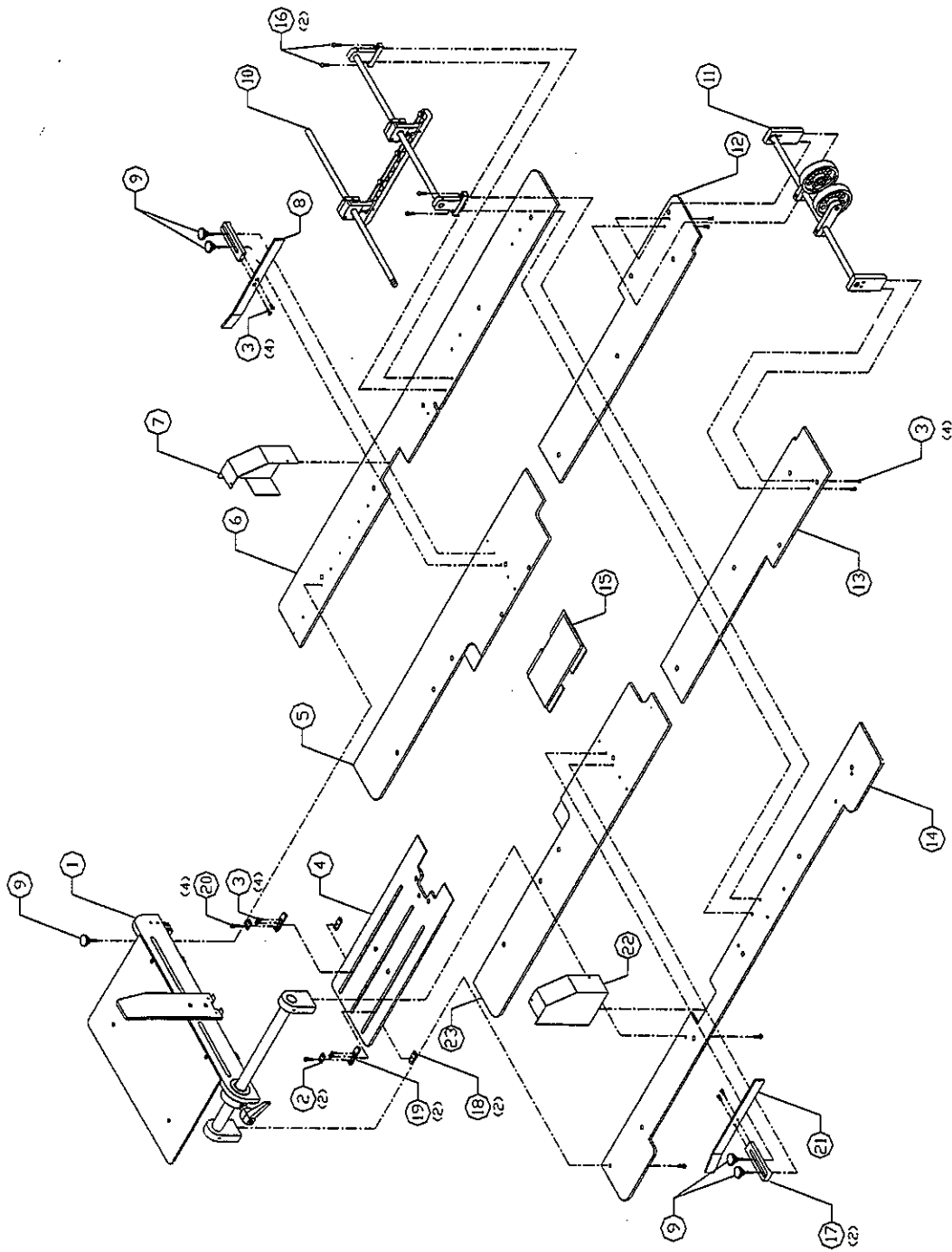
NO	PART NO	QTY	DESCRIPTION	REFERENCE
1	802058	1	BARB VACUUM HOSE FITTING, 3/8" NPT X 1/2"	
2	403250	4	SCREW, SHCS, 8-32 UNF X 3/4"	
3	802007H	1	VACUUM FITTING BLOCK	
4	802004H	1	VACUUM VALVE BODY	
5	212004H	1	VACUUM SHUTTLE BODY	
6	403050	4	SCREW, FHCS, 8-32 UNF X 3/4"	
7	212030	4	LINEAR BEARING, 7/8" I.D.	
8	437060	8	RETAINING RING, 7/8" I.D. EXTERNAL	
9	330001H	1	SHUTTLE SLIDE SHAFT MOUNT	
10	404810	4	SCREW, SHSS, 10-32 UNF X 1/4"	
11	100007H	2	SHUTTLE SLIDE SHAFT	
12	802005HA	1	VACUUM VALVE ASSEMBLY	
13	212012	2	SHUTTLE STOPPER	
14	440510	2	RUBBER WASHER, 1/4" I.D.	
15	212002H	1	REAR SHUTTLE BLOCK	
16	404550	2	SCREW, BHCS, 10-32 UNF X 3/4"	
17	212003H	1	REAR SHUTTLE BRACKET	
18	439020	1	LOCKWASHER, 3/8" I.D.	
19	200009	2	ROD END, 3/8" I.D. C/W LUBRICATING FITTING	
20	416140	1	SHOULDER BOLT, 5/16-18 UNC X 5/8"	
21	420025	2	NUT, 3/8-24 UNF	
22	200010H	1	SHUTTLE CRANK LINK	
23	420015	1	NUT, 5/16-18 UNC	
24	310034H	1	CONCAVE FEED PLATE	
24	310033H	1	FLAT FEED PLATE	
24	310035H	1	CONVEX FEED PLATE	

325305A, Vacuum Belt Tabletop Assembly



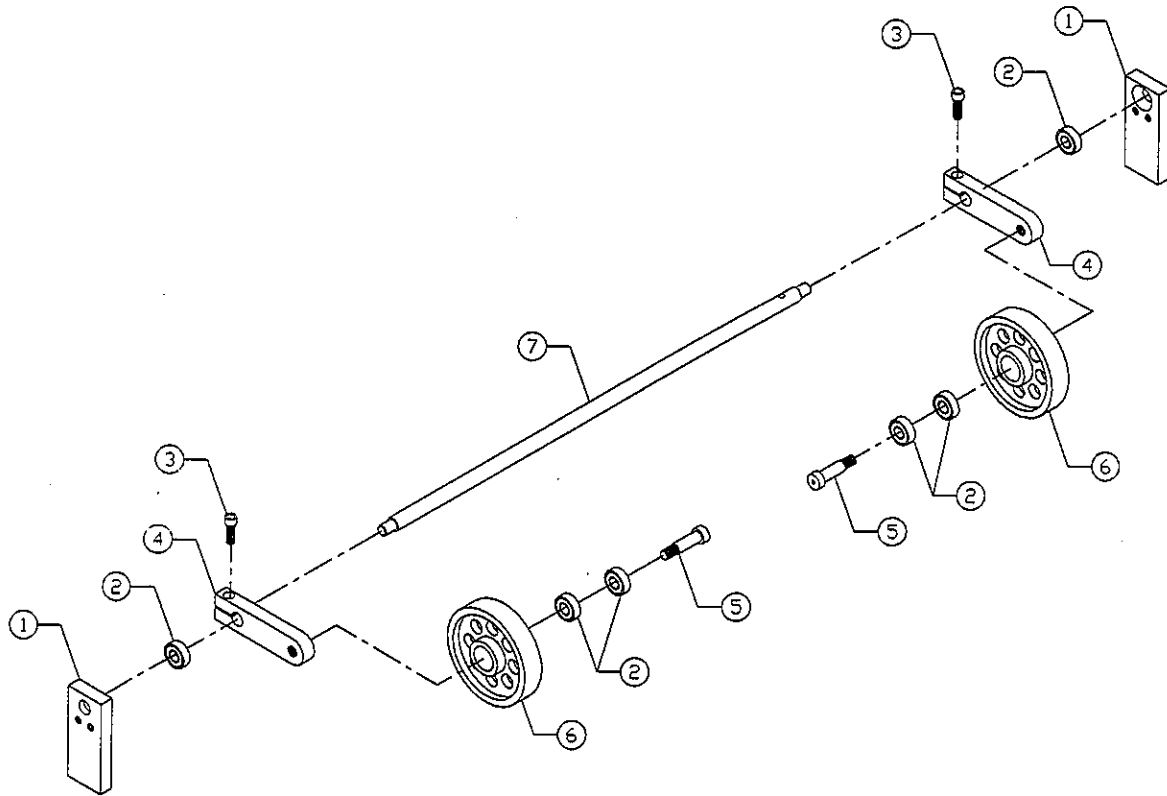
NO	PART NO	QTY	DESCRIPTION	REFERENCE
1	100301	1	VACUUM BELT DRIVESHAFT	
2	100313	1	VACUUM BELT TAKEUP SHAFT	
3	106301	2	VACUUM BELT DRIVE PULLEY	
4	106305	1	TWIN VACUUM BELT DRIVE PULLEY	
5	106306	1	TWIN VACUUM TAKEUP ROLLER	
6	106307	2	VACUUM TAKEUP ROLLER	
7	116309	1	PULLEY, 18LB075 X 3/4"	
8	120301	2	INKJET VACUUM BELT, c/w HOLES, 1" X 69 3/4"	
9	120302	2	INKJET EXTENDED BASE BELT, 1" X 69 3/4"	
10	131050	2	COLLAR, 3/4" I.D.	
11	325305	1	VACUUM BELT TABLETOP	
12	330306	1	DRIVE PULLEY BLOCK	
13	330307	1	VACUUM BELT TAKEUP BLOCK	
14	343300	1	VACUUM BELT GUIDE	
15	403570	12	SCREW, BHCS, 8-32 UNF X 1"	
16	404051	7	SCREW, FHCS, 10-32 UNF X 3/4"	
17	404250	2	SCREW, SHCS, 10-32 UNF X 3/4"	
18	404820	3	SCREW, SHSS, 10-32 UNF X 3/8"	
19	405830	3	SCREW, SHSS, 1/4-20 UNC X 1/2"	
20	436300	1	SPRING PIN, 3/16" DIA. X 1 3/4" LONG	
21	500050	2	BEARING, 3/4" I.D., R12	
22	500055	2	BEARING, 3/4" I.D., UBR204-12S	
23	802051	2	BARB VACUUM HOSE FITTING, 1/4"NPT X 1/4"	
24	802301	2	VACUUM PLATE FITTING	
25	405810	2	SCREW, SHSS, 1/4-20 UNC X 1/4"	

325301A, Tabletop Assembly



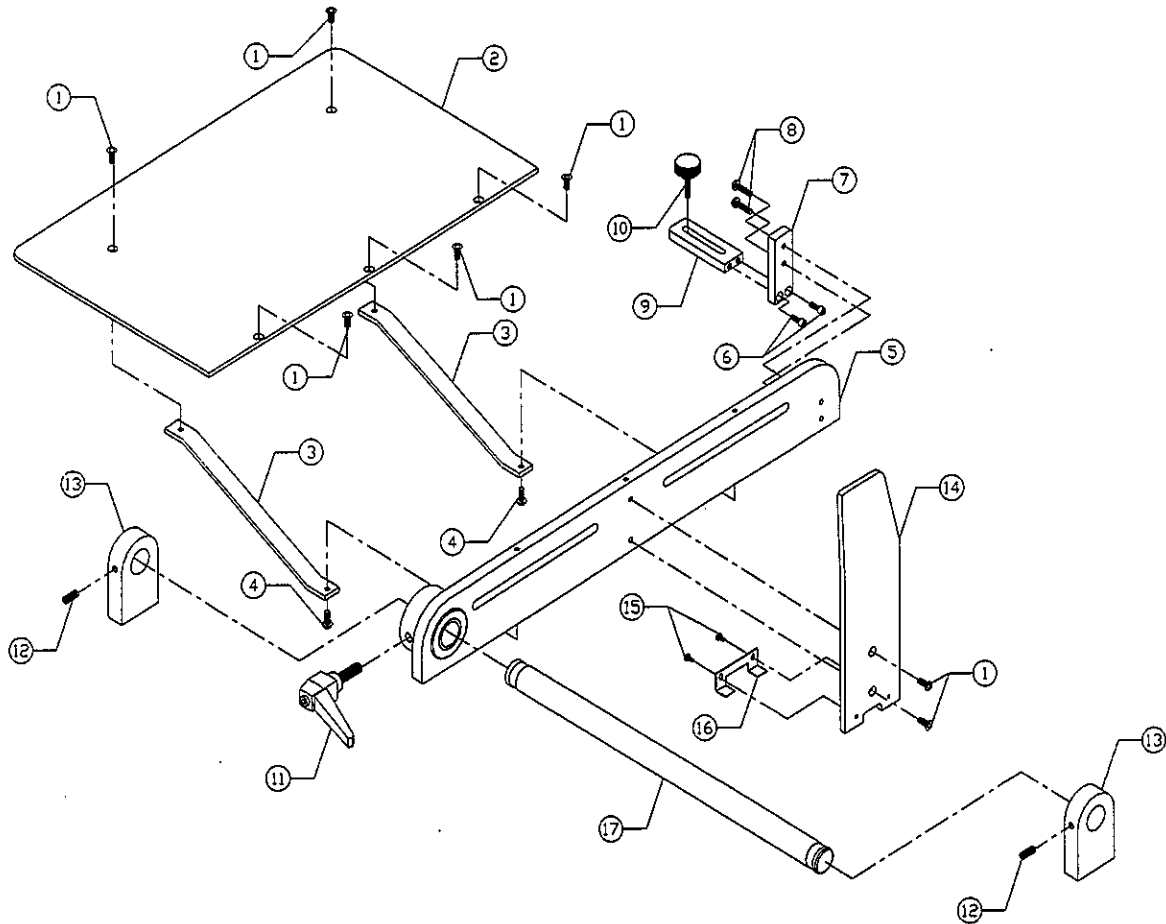
NO.	PART NO.	QTY.	DESCRIPTION	REFERENCE
1	325011A	1	REAR TABLE ASSEMBLY	Page A26
2	206007	2	AJUSTABLE PUSHER	
3	404030	12	SCREW, FHCS, 10-32 UNF X 1/2"	
4	325005H	1	FEEDER SHUTTLE PLATE	
5	325302	1	LEFT TABLETOP	
6	325301	1	LEFT TABLE SKIRT	
7	700008H	1	LEFT BRIDGE COVER	
8	212300	1	LEFT MATERIAL GUIDE	
9	438110	5	SIDE GUIDE KNOB	
10	330350A	1	SKIDBAR ASSEMBLY	Page A27
11	100314A	1	OUTFEED ROLLER SHAFT ASSEMBLY	Page A25
12	325307	1	EXTENDED TABLE LEFT SKIRT	
13	325308	1	EXTENDED TABLE RIGHT SKIRT	
14	325304	1	RIGHT TABLE SKIRT	
15	325306	1	FRONT TABLE PLATE	
16	404550	4	SCREW, BHCS, 10-32 UNF X 3/4"	
17	330321	2	SIDE GUIDE BRACKET	
18	206006	2	PUSHER SCREW PLATE	
19	206005	2	PUSHER BODY	
20	404540	2	SCREW, BHCS, 10-32 UNF 5/8"	
21	212301	1	RIGHT MATERIAL GUIDE	
22	700009H	1	RIGHT BRIDGE COVER	
23	325303	1	RIGHT TABLETOP	

100314A, Outfeed Roller Assembly



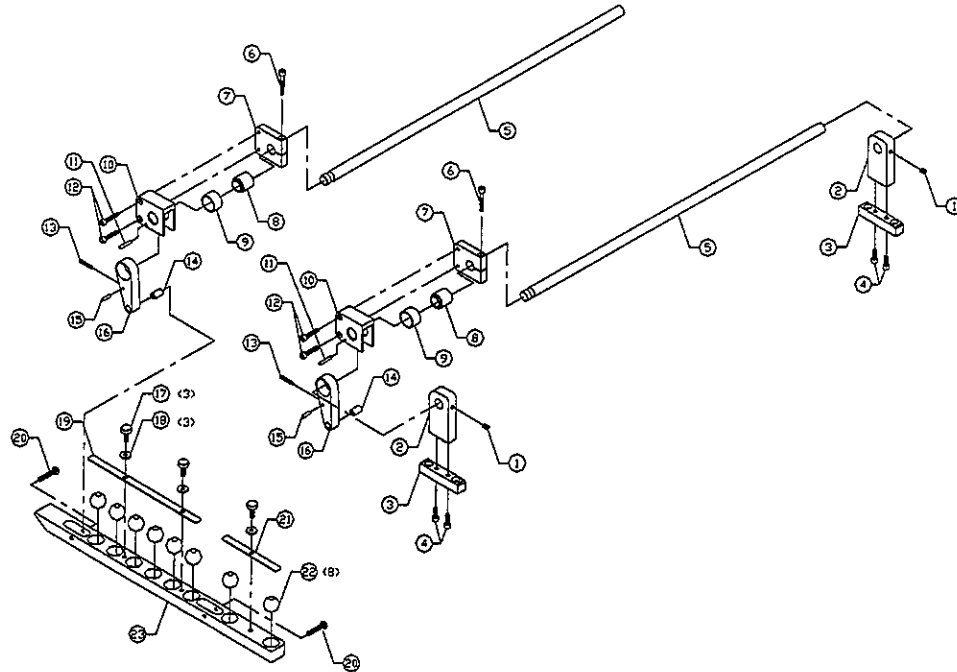
NO	PART NO	QTY	DESCRIPTION	REFERENCE
1	330309	2	OUTFEED ROLLER BRACKET	
2	500020	6	BEARING, 3/8" I.D.	
3	405250	2	SCREW, SHCS, 1/4-20 UNC X 3/4"	
4	203302	2	OUTFEED ROLLER ARM	
5	413070	2	SCREW, SHOULDER 3/8" DIA. X 1"	
6	106182	2	PRESSURE ROLLER	
7	100314	1	OUTFEED ROLLER SHAFT	

325011A, Rear Table Assembly



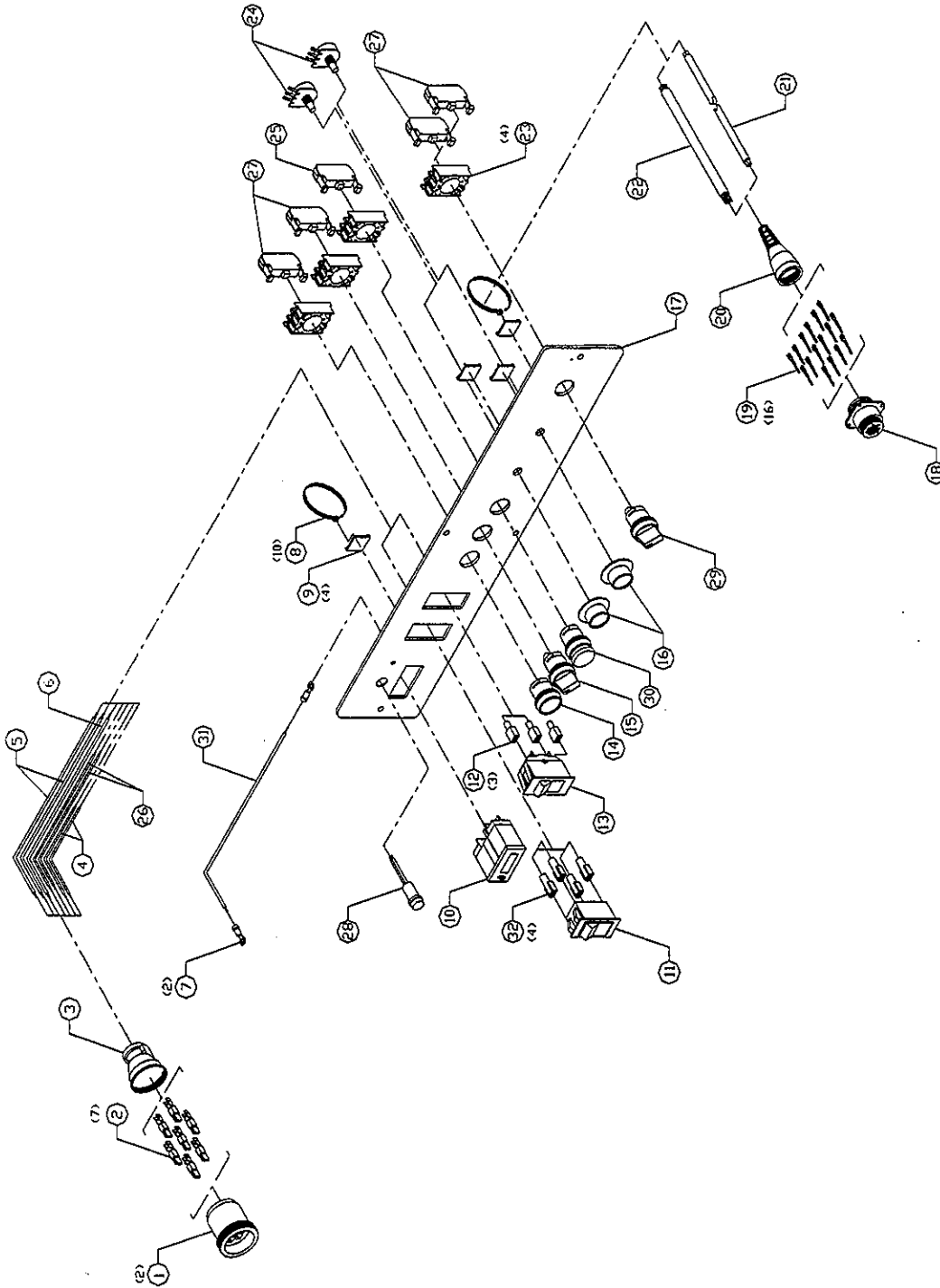
NO.	PART NO.	QUANTITY	DESCRIPTION	REFERENCE
1	404030	7	SCREW, FHCS, 10-32 UNF X 1/2"	
2	325011	1	REAR TABLE	
3	310011	2	REAR TABLE SUPPORT BAR	
4	404530	2	SCREW, BHCS, 10-32 UNF X 1/2"	
5	310010A	1	REAR TABLE CROSSMEMBER ASSEMBLY	
6	404230	2	SCREW, SHCS, 10-32 UNF X 1/2"	
7	310046	1	REAR TABLE CLAMP MOUNT PLATE	
8	404550	2	SCREW, BHCS, 10-32 UNF X 3/4"	
9	310045	1	REAR TABLE CLAMP MOUNT PLATE	
10	438011H	1	REAR TABLE LOCK KNOB	
11	206011	1	REAR TABLE LOCKING LEVER	
12	405830	2	SCREW, SHSS, 1/4-20 UNC X 1/2"	
13	330002	2	SLIDE SHAFT HOLDER	
14	707011H	1	REAR TABLE GUIDE	
15	402310	2	SCREW, PHMS, 6-32 UNF X 1/4"	
16	707010H	1	REAR GUIDE BOTTOM PLATE	
17	100012	1	REAR TABLE SLIDE SHAFT	

330350A, Skidbar Assembly



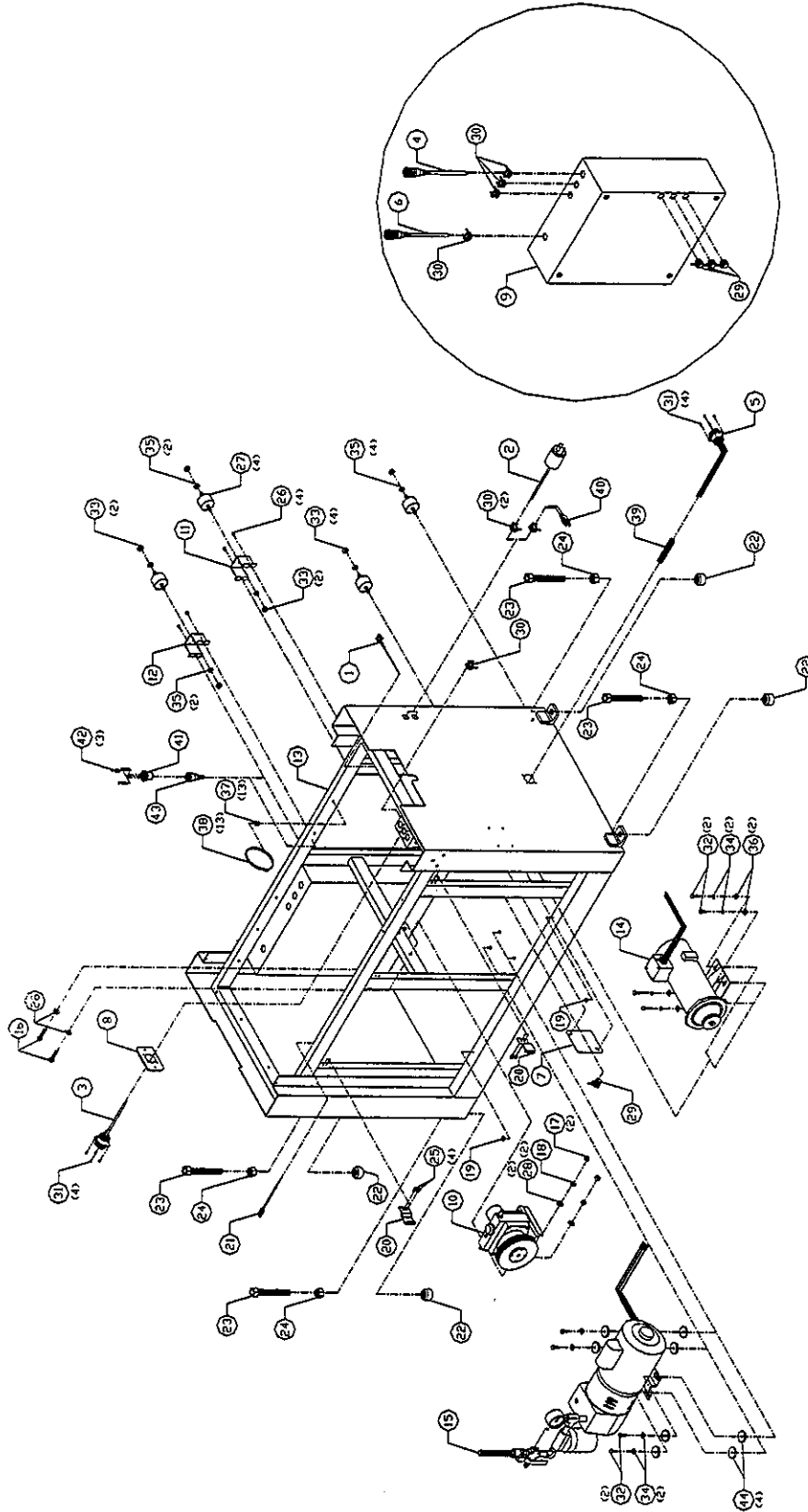
NO	PART NO	QTY	DESCRIPTION	REFERENCE
1	404820	2	SCREW, SHSS, 10-32 UNF X 3/8"	
2	330302	2	SKIDBAR BRACKET	
3	330304	2	SKIDBAR BRACKET BASE	
4	404250	2	SCREW, SHCS, 10-32 UNF X 3/4"	
5	100021H	2	FRONT SKIDBAR SHAFT	
6	403275	2	SCREW, SHCS, 8-32 UNF X 1 1/4"	
7	34006	2	SKIDBAR HOLDER CLAMP	
8	100026	2	HOLLOW SKIDBAR SHAFT	
9	505004	2	BUSHING, 3/4" I.D. X 1/2" LONG	
10	330018H	2	SKIDBAR HOLDER	
11	436050	2	SPRING PIN, 1/8" DIA, X 3/4" LONG	
12	403270	4	SCREW, SHCS, 8-32 UNF x 1"	
13	209003	2	SPRING, 1/2", EXTENSION X 11" LONG	
14	505003	2	BUSHING, 3/4" I.D. X 1/2" LONG	
15	436030	2	SPRING PIN, 1/8" DIA, X 1/2" LONG	
16	203003	2	SKIDBAR ARM	
17	438171	3	THUMBSCREW, 10-32 UNF X 3/8"	
18	440008	3	WASHER, No. 10	
19	707315	1	BALL RETENTION SPRING PLATE, 7.13"	
20	404570	4	SCREW, BHCS, 10-32 UNF X 1"	
21	707316	1	BALL RETENTION SPRING PLATE, 3.63"	
22	500211	8	SKIDBAR BALLBEARING, 3/4" O.D.	
23	330350	1	SKIDBAR BODY	

603415A, Instrument Panel Assembly



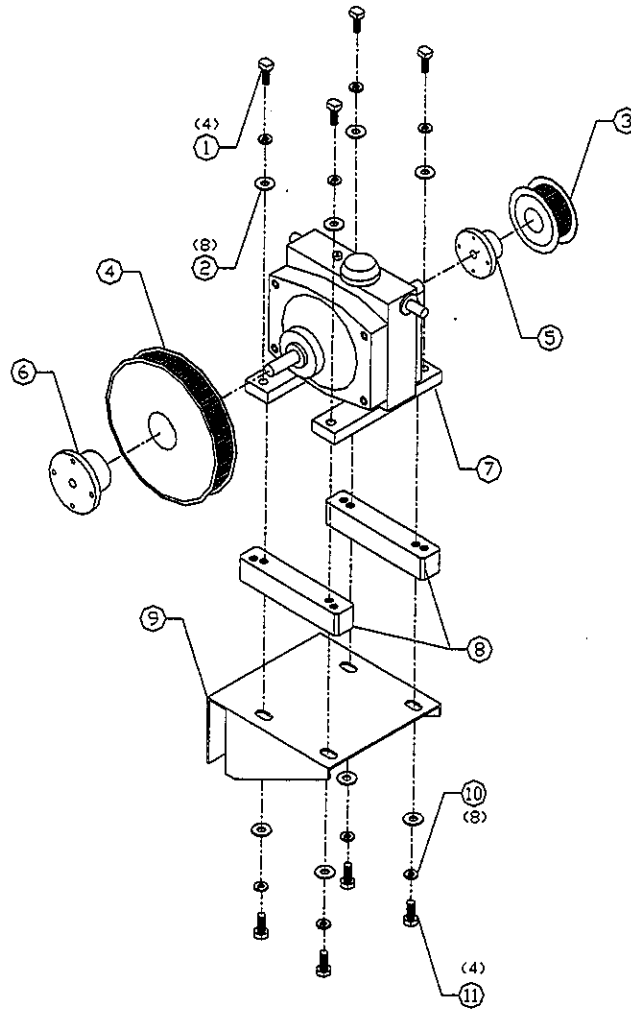
NO	PART NO	QTY	DESCRIPTION	REFERENCE
1	614105	1	RECEPTACLE PLUG, 23-7	
2	614109	7	MALE CONTACT, PIN	
3	614113	1	CABLE CLAMP	
4	606010	2	WIRE, #14, BLACK, HOOKUP X 28" LONG	
5	606000	2	WIRE, #16, BLACK, HOOKUP X 28" LONG	
6	606009	2	WIRE, #16, WHITE, HOOKUP X 28" LONG	
7	609111	2	RING TONGUE TERMINAL	
8	615140	10	LASHING TIE	
9	615100	4	ADHESIVE BACKED TIE MOUNT	
10	600100	1	COUNTER	
11	603415	1	CIRCUIT BREAKER SWITCH, 15A, 2 POLE	
12	609110	3	CONNECTOR, PUSH BUTTON	
13	603118	1	CIRCUIT BREAKER SWITCH, 10A, 1 POLE	
14	603120	1	SWITCH, GREEN PUSH BUTTON	
15	603122	1	SWITCH, 2 POSITION ROTARY KNOB	
16	613002	2	KNOB, 36mm SKIRTED	
17	706335	1	INSTRUMENT PANEL PLATE	
18	614101	1	RECEPTACLE, 17-16	
19	614107	16	MALE CONTACT, PIN, YELLOW	
20	614111	1	CABLE BOOT, FLEXIBLE	
21	606030		CABLE, #18-3, UNSHIELED X 32" LONG	
22	606016		CABLE, #22-15, SHIELED X 32" LONG	
23	603125	4	SWITCH LOCKING COLLAR	
24	600011	2	POTENTIOMETER, W/DART 600005	
25	603127	1	BLOCK, N.C. CONTACT	
26	606008	2	WIRE, #14, WHITE, HOOKUP X 28"	
27	603126	4	BLOCK, N.O. CONTACT	
28	612101	1	PILOT LIGHT, GREEN, 250V, 1/2W	
29	603123	1	SWITCH, 3 POSITION ROTARY KNOB	
30	603121	1	SWITCH, RED MUSHROOM PUSH BUTTON	
31	606005		WIRE, #16, GREEN, HOOKUP X 18"	
32	609113	4	TERMINAL	

713310A, BK600 Base Cabinet Assembly



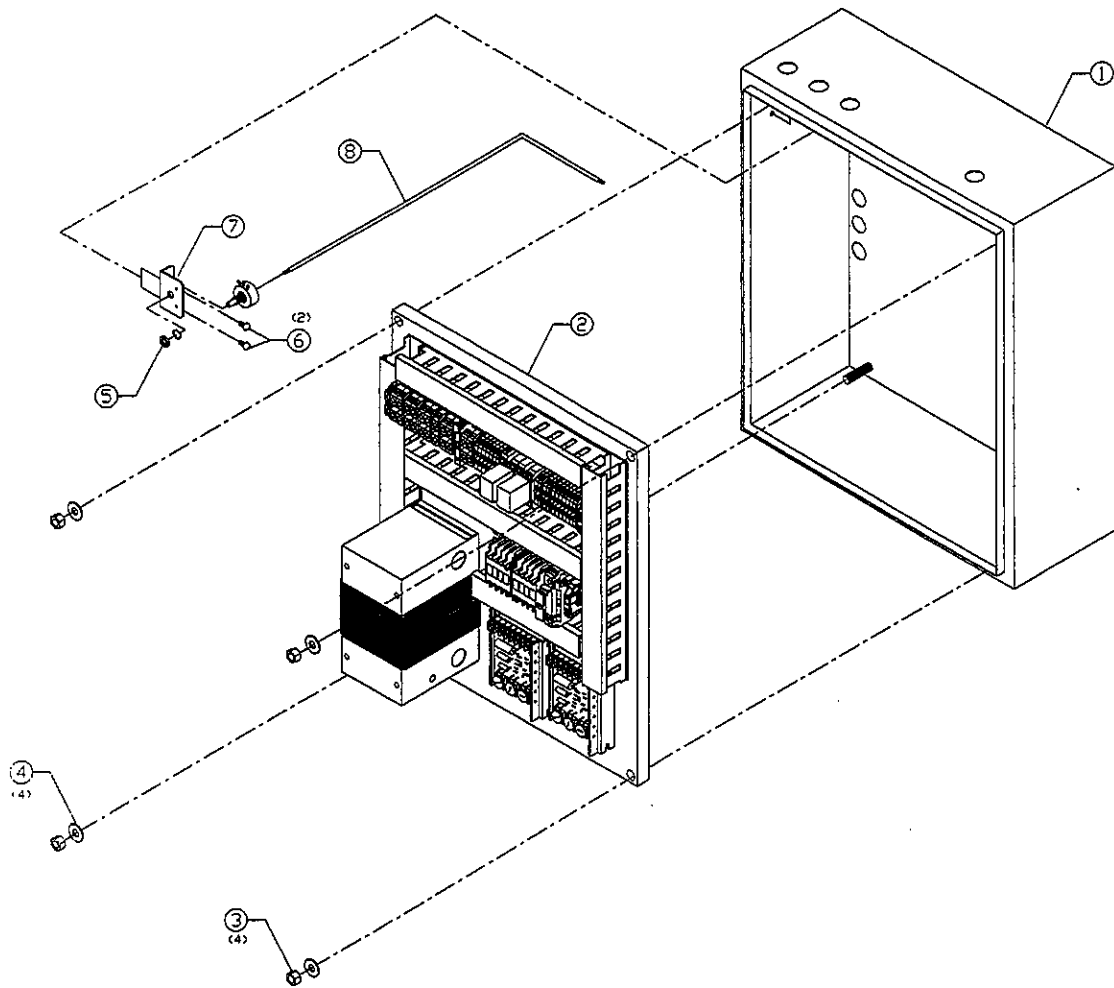
NO.	PART NO.	QTY.	DESCRIPTION	REFERENCE
1	606300A	1	SHAFT ENCODER CABLE	
2	614015A	1	BASE POWER CABLE	
3	614050A	1	MAIN POWER CABLE	
4	614051A	1	BK600 INSTRUMENT CONTROL CABLE	
5	614056A	1	CONVEYOR CABLE	
6	614066A	1	CONTROLLER I/O CABLE	
7	615153	1	BOX COVER, 4" X 4"	
8	615154	1	RECEPTACLE COVER, W/CUTOUT	
9	711300A	1	ELECTRICAL BOX ASSEMBLY	Page A34
10	713300A	1	RINGCONE ASSEMBLY	Page A33
11	713302	1	CONSOLE ANCHOR, OFFSET	
12	713308	1	CONSOLE ANCHOR	
13	713309A	1	BASE CABINET SHELL ASSEMBLY	
14	800002A	1	MOTOR ASSEMBLY	
15	802070A	1	VACUUM DISTRIBUTOR ASSEMBLY	
16	407585	2	SCREW, HHMS, 3/8-16 UNC X 2"	
17	420020	2	NUT, 3/8-16 UNC	
18	439020	2	LOCKWASHER, 3/8" I.D.	
19	440510	2	RUBBER WASHER, 1/4" I.D.	
20	717050	2	BASE DOOR CATCH	
21	614061A	3	JAM/PROXI/POTOCUE CABLE	
22	343010	4	BASE MOUNTING FOOT	
23	343015	4	BASE MOUNTING LEG	
24	343016	4	JAM NUT, 3/4-10 UNC	
25	404120	4	SCREW, BHMS, 10-32 UNF X 3/8"	
26	405130	4	SCREW, BHMS, 1/4-20 UNC X 1/2"	
27	426300	4	RUBBER MOUNT	
28	440020	4	WASHER, 3/8" I.D.	
29	615130	4	BOX CONNECTOR, 3/8", CONDUIT	
30	615131	7	BOX CONNECTOR, 3/8" CABLE	
31	402320	8	SCREW, PHMS, 6-32 UNF X 3/8"	
32	406650	8	SCREW, HHMS, 5/16-18 UNC X 3/4"	
33	421010	8	NUT, METRIC, 10mm	
34	439015	8	LOCKWASHER, 5/16" I.D.	
35	439110	8	LOCKWASHER, METRIC, 10mm	
36	440015	8	WASHER, 5/16" I.D.	
37	615103	13	TIE WRAP MOUNT	
38	615141	13	LASHING TIE	
39	609100		CONDUIT, BLACK, 3/8" X 41" LONG	
40	606330		REPLACEMENT CORD, #16-3 X 15' LONG	
41	614104	1	PLUG CONNECTOR, 17-3, STANDARD	
42	614110	3	FEMALE CONTACT, SOCKET	
43	614111	1	CABLE BOOT, FLEXIBLE	
44	440511	8	RUBBER WASHER, 5/16 X 1 1/2 X 1/4	

713300A, Ringcone Assembly



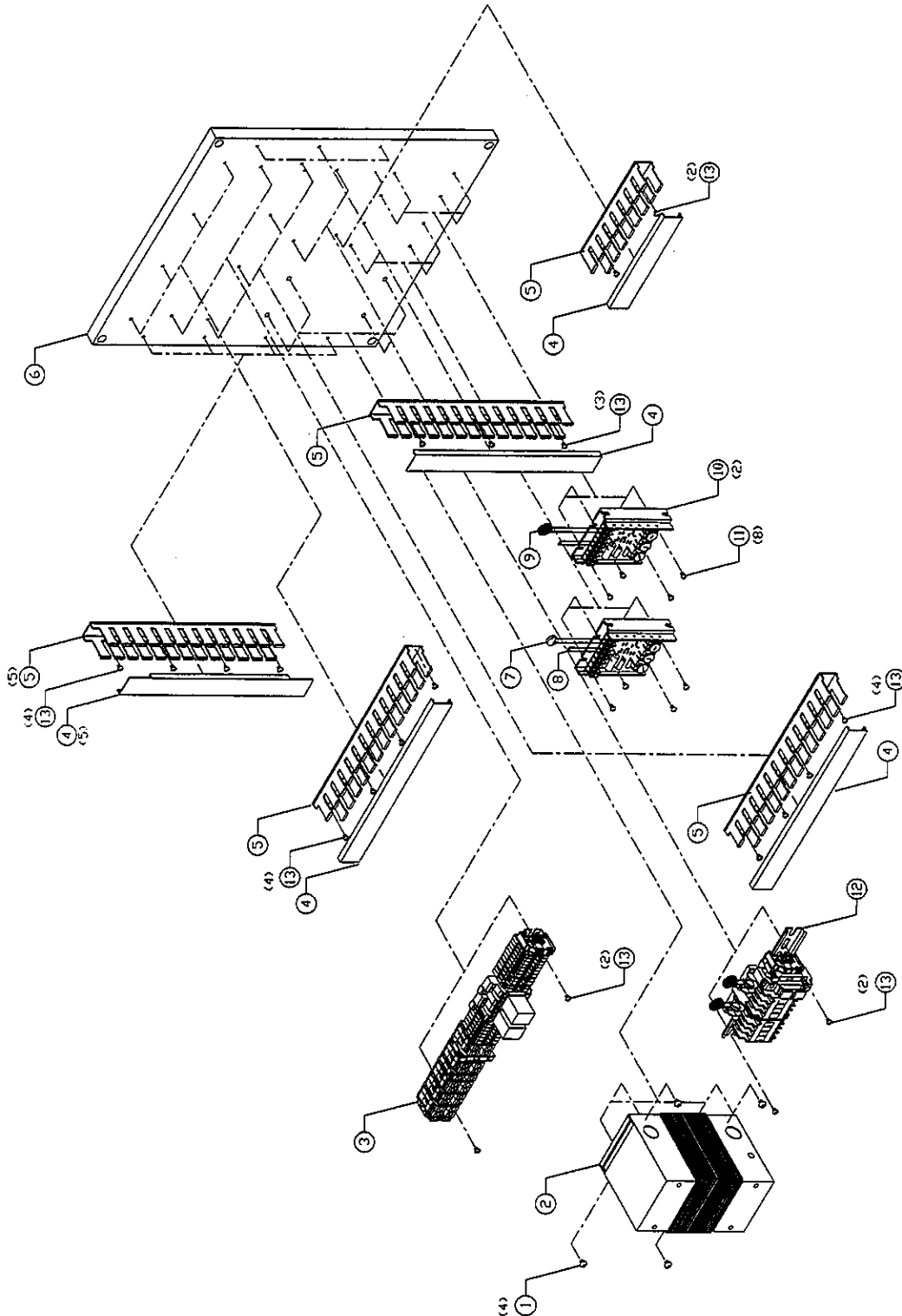
NO	PART NO	QTY	DESCRIPTION	REFERENCE
1	406670	4	SCREW, HHMS, 5/16-18 UNC X 1"	
2	440015	8	WASHER, 5/16" I.D.	
3	116324	1	PULLEY, 18LG075	
4	116323	1	PULLEY, 48LH075	
5	127324	1	BUSHING, SPLIT TAPER, G 12mm	
6	127323	1	BUSHING, SPLIT TAPER, H 14mm	
7	800021	1	RINGCONE 1/2 HP	
8	330456	2	RINGCONE MOUNT	
9	713300	1	VARIABLE DRIVE MOUNT	
10	439015	8	LOCKWASHER, 5/16" I.D.	
11	406650	4	SCREW, HHMS, 5/16-18 UNC X 3/4"	

711300A, Electrical Box Assembly



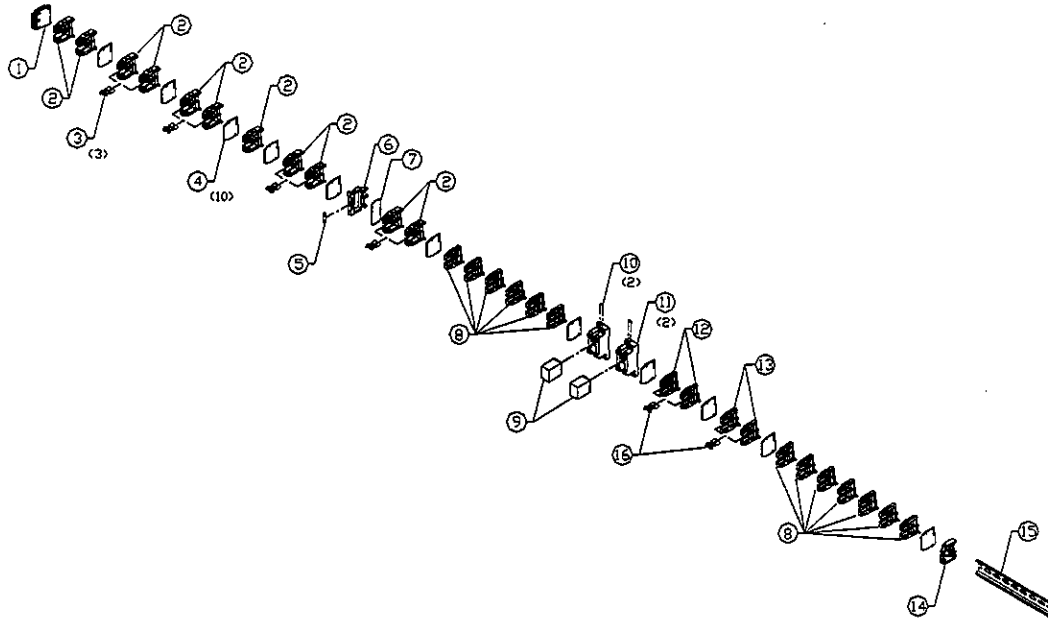
NO.	PART NO.	QUANTITY	DESCRIPTION	REFERENCE
1	711300	1	BASE ELECTRICAL BOX	
2	706301A	1	BK600 ELECTRICAL PANEL ASSEMBLY	Page A35-A36
3	420020	4	NUT, 3/8-16 UNC	
4	440020	4	WASHER, 3/8" I.D.	
5	600007	1	POTENTIOMETER, 5K, Ohm, 1/4 WATT	
6	404520	2	SCREW, BHCS, 10-32 UNF X 3/8"	
7	615005	1	MICROSWITCH BRACKET	
8	606013		CABLE, #22-3, SHIELDED, 40" LONG	

706301A, BK600 Electrical Panel Assembly



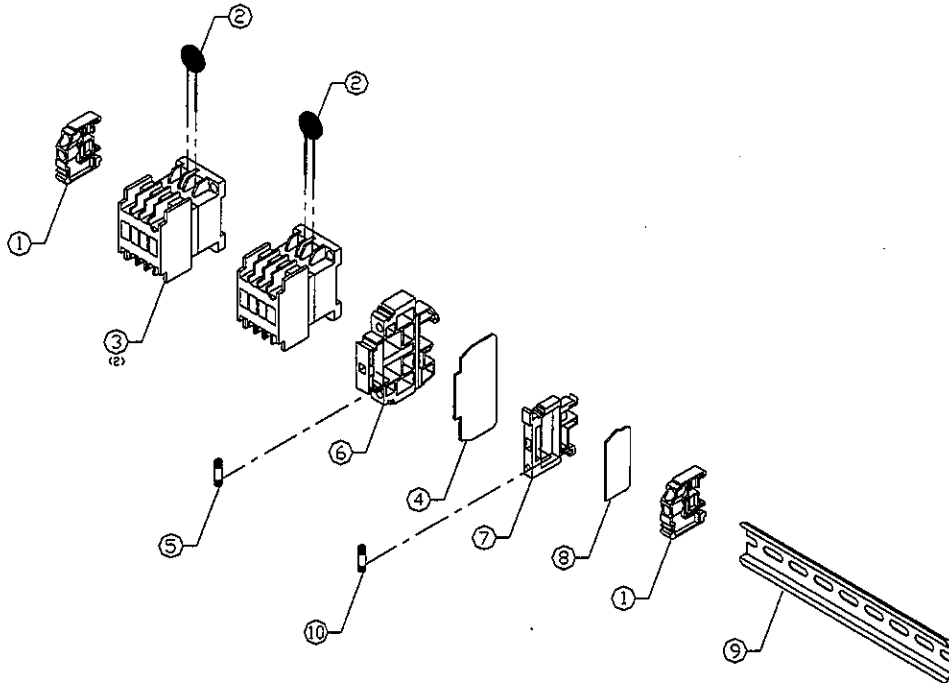
NO	PART NO	QTY	DESCRIPTION	REFERENCE
1	405520	4	SCREW, BHCS, 1/4-20 UNC X 3/8"	
2	640001	1	TRANSFORMER, SINGLE PHASE, 240/120	
3	615001A	1	TERMINAL BLOCK 1 ASSEMBLY	Page A37
4	615210		WIRING DUCT COVER, 1", X 62" LONG	
5	615220		WIRING DUCT, 1" X 1", 62" LONG	
6	706301	1	ELECTRICAL PANEL	
7	640302	1	METAL OXIDE VARISTOR, 250 VAC	
8	640301	2	ZENER DIODE	
9	640300	1	METAL OXIDE VARISTOR, 120 VAC	
10	600005	2	DC CONTROLLER, 90 VDC	
11	403320	8	SCREW, PHMS, 8-32 UNF X 3/8"	
12	615002A	1	TERMINAL BLOCK 2 ASSEMBLY	Page A38
13	403310	21	SCREW, PHMS, 8-32 UNF X 1/4"	

615001A, Terminal Block 1 Assembly



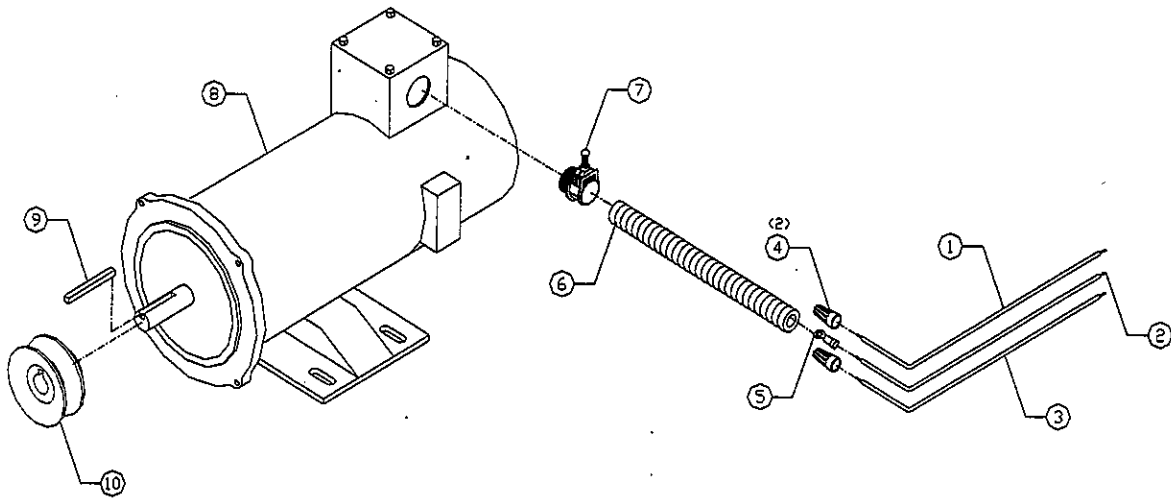
No	Part No	Qty	Description	REFERENCE
1	615018	1	GROUND BLOCK, 10mm	
2	615003	11	TERMINAL BLOCK, GREY, 10mm	
3	615006	4	JUMPER BAR, 10mm	
4	615012	11	END SECTION, GREY, 1mm	
5	646001	1	FUSE, 5 x 20, 5A	
6	615001	1	FUSE HOLDER, GREY, 8mm, 6.3 A	
7	615011	1	END SECTION, GREY, 1.5mm	
8	615002	13	TERMINAL BLOCK, GREY, 6mm	
9	610102	2	RELAY, 12 VDC	
10	640301	2	ZENER DIODE	
11	615004	2	RELAY BASE	
12	615025	2	TERMINAL BLOCK, BLACK, 6mm	
13	615000	2	TERMINAL BLOCK, BLUE, 6mm	
14	615016	1	END STOP, 9.1mm	
15	615021		T-RAIL, DIN, 13" LONG	
16	615022	2	JUMPER BAR, 6mm	

615002A, Terminal Block 2 Assembly



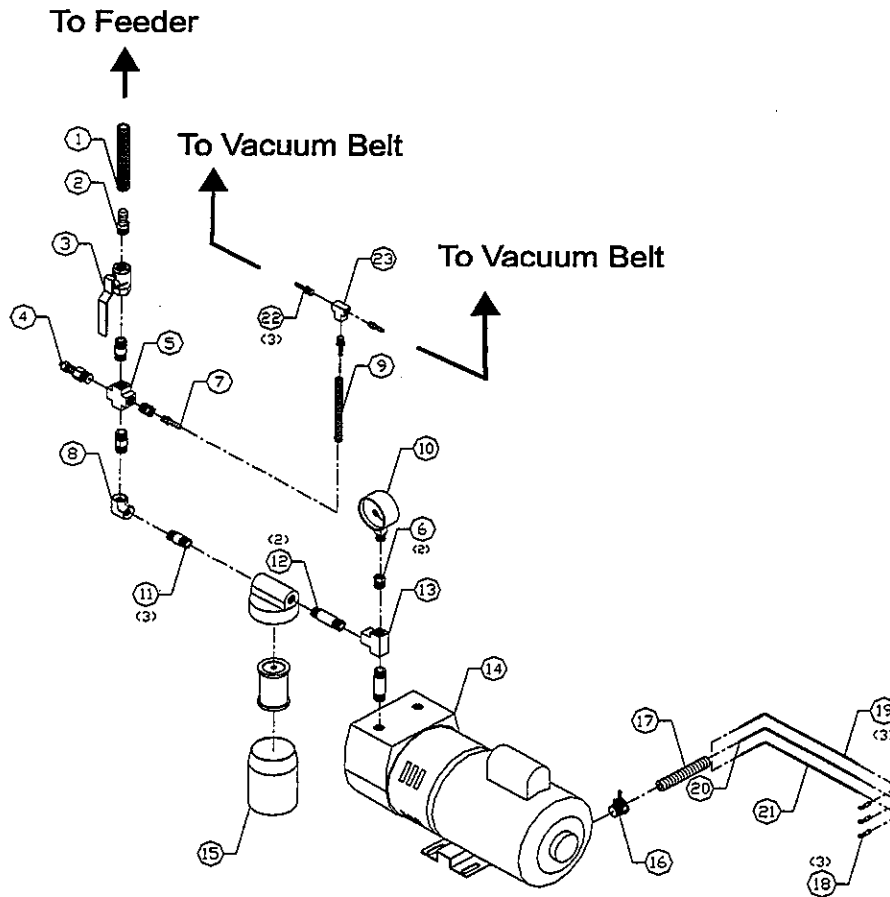
NO	PART NO	QTY	DESCRIPTION	REFERENCE
1	615016	2	END STOP, 9.1mm	
2	640300	2	METAL OXIDE VARISTOR, 120 VAC	
3	610001	2	3 POLE CONTACTOR, 9A, 120V	
4	615023	1	END SECTION, BLACK, 1.5mm	
5	646002	1	FUSE, 5 x 20, 10 A	
6	615024	1	FUSE HOLDER, 10mm 16 A 60	
7	615001	1	FUSE HOLDER, GREY, 8mm 6.3 A	
8	615011	1	END SECTION, GREY, 1.5mm	
9	615021		T-RAIL, DIN, 6" LONG	
10	646001	1	FUSE, 5 X 20, 5 A	

800002A, Motor Assembly



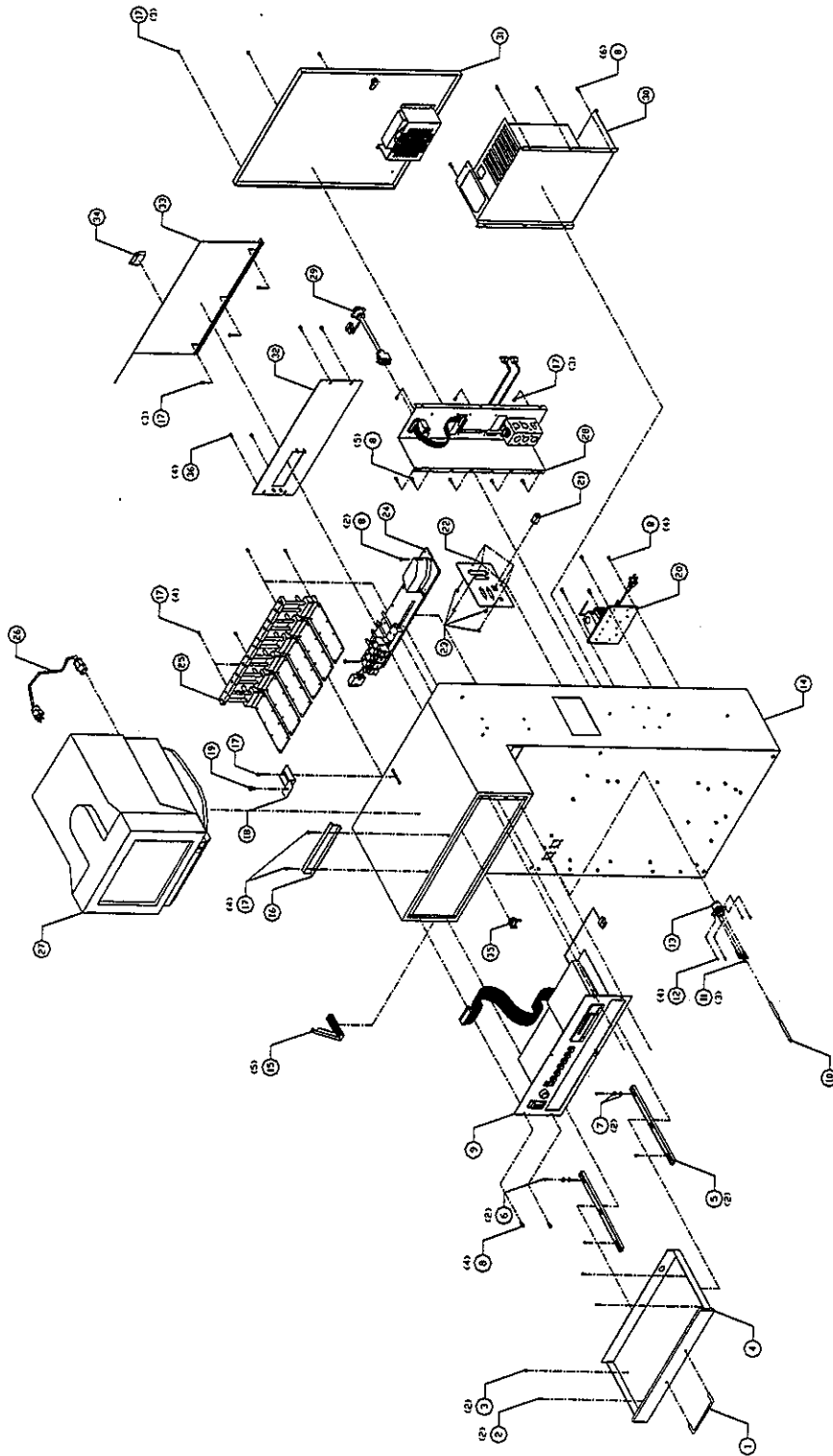
NO	QTY	DESCRIPTION	REFERENCE
1		WIRE, #16, BLACK, HOOKUP, 78" LONG	
2		WIRE, #16, GREEN, HOOKUP, 40" LONG	
3		WIRE, #16, WHITE, HOOKUP, 78" LONG	
4	2	MARETTE, ORANGE, 14-22	
5	1	RING TONGUE TERMINAL	
6		MOTOR CONDUIT, BLACK, 3/8" X 24" LONG	
7	1	BOX CONNECTOR, 3/8", CONDUIT	
8	1	MOTOR, 1/2 H.P., 180 VDC	
9	1	KEY, 3/16" X 3/16" X 2" LONG	
10	1	MOTOR SHEAVE, AK25 X 5/8"	

802070A, Vacuum Distributor Assembly



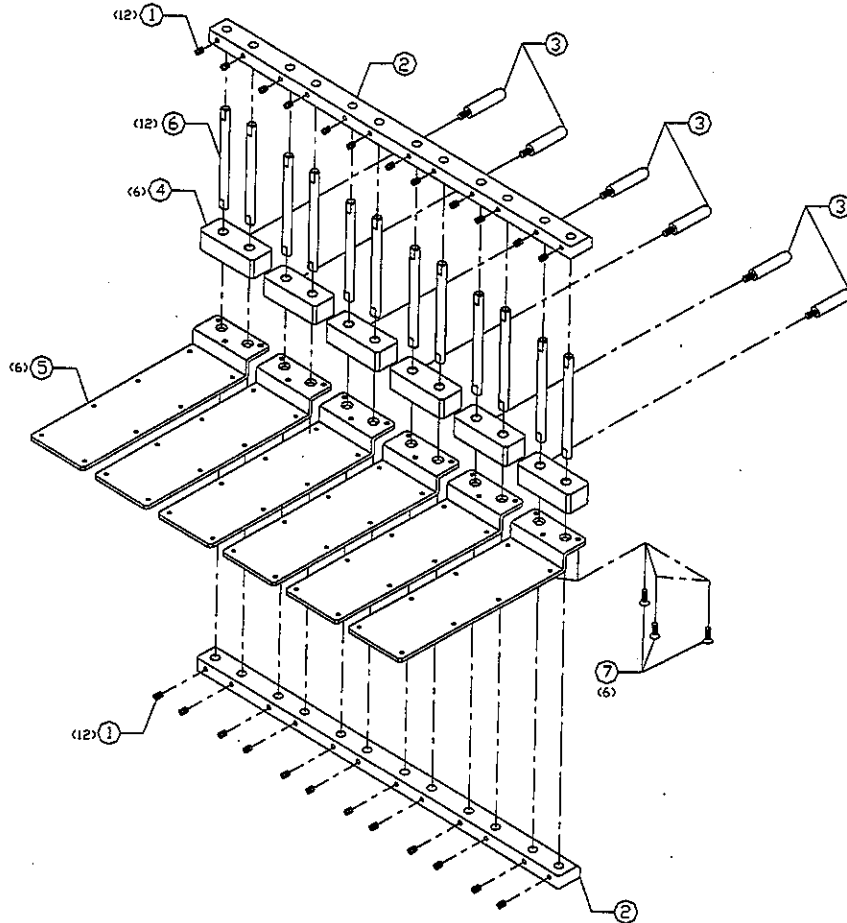
NO.	PART NO.	QTY.	DESCRIPTION	REFERENCE
1	802046		HOSE, CLEARFLEX, 1/2" I.D., 24" LONG	
2	802058	1	BARB VACUUM HOSE FITTING, 3/8"NPT X 1/2"	
3	802045	1	SHUTTLE FEEDER VALVE, 3/8" NPT	
4	802035	1	VACUUM RELIEF VALVE, 3/8" NPT	
5	802081	1	BRASS CROSS, 3/8" NPT	
6	802065	2	REDUCING BUSHING, 3/8" - 1/4" NPT	
7	802051	1	BARB VACUUM HOSE FITTING, 1/4"NPT X 1/4"	
8	802060	1	ELBOW FITTING, FEMALE, 3/8" NPT	
9	802047		HOSE, CLEARFLEX, 1/4" I.D., 48" LONG	
10	802030	1	VACUUM GAUGE, 1/4" NPT	
11	802010	3	EXTENSION PIPE, 3/8" NPT X 1 1/2"	
12	802013	2	EXTENSION PIPE, 3/8" NPT X 2 1/2"	
13	802071	1	PIPE TEE, 3/8" NPT	
14	801102	1	VACUUM PUMP	
15	802036	1	FILTER ASSEMBLY, AB 599	
16	615130	1	BOX CONNECTOR, 3/8", CONDUIT	
17	609100		MOTOR CONDUIT, BLACK, 3/8", 18" LONG	
18	609111	3	RING TONGUE TERMINAL	
19	606005		WIRE, #16, GREEN, HOOKUP, 36" LONG	
20	606000		WIRE, #16, BLACK, HOOKUP, 36" LONG	
21	606009		WIRE, #16, WHITE, HOOKUP, 36" LONG	
22	802050	3	BARB VACUUM HOSE FITTING, 1/8"NPT X 1/4"	
23	802070	1	PIPE TEE, 1/8" NPT	

713312A, Controller Console Assembly



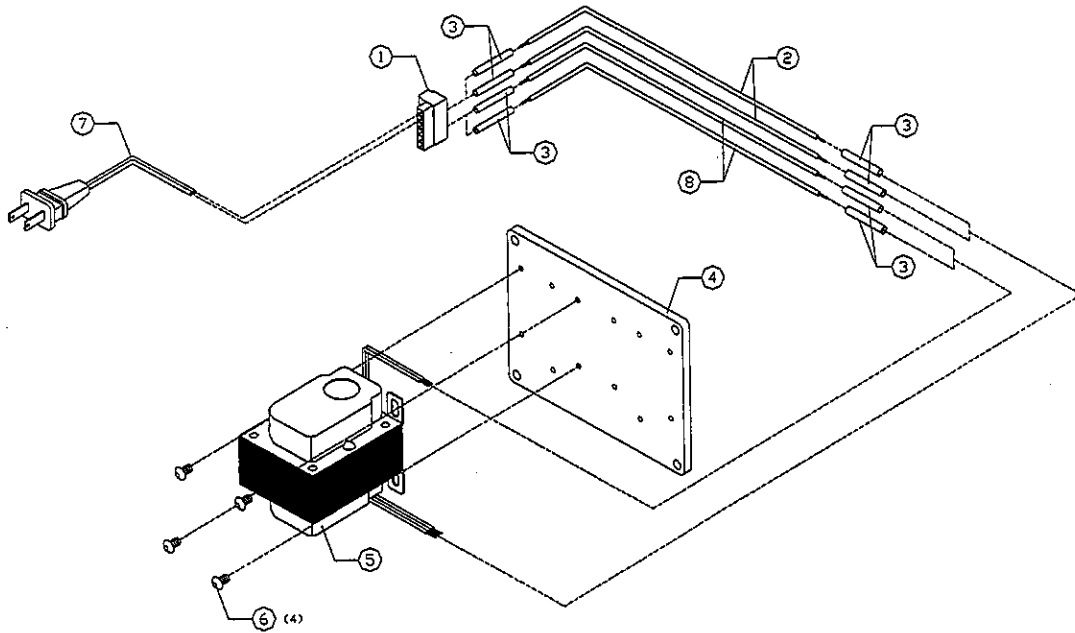
NO	PART NO	QTY	DESCRIPTION	REFERENCE
1	438313	1	INKWELL CONTAINER HANDLE	
2	402320	2	SCREW, PHMS, 6-32 UNF X 3/8"	
3	402310	2	SCREW, PHMS, 6-32 UNF X 1/4"	
4	212312	1	KEYBOARD DRAWER	
5	212313	1	SLIM LINE DRAWER SLIDES 12 1/4" PAIR	
6	403310	4	SCREW, PHMS, 8-32 UNF X 1/4"	
7	440008	4	WASHER, No.10	
8	404530	4	SCREW, BHCS, 10-32 UNF X 1/2"	
9	706315A	1	FACEPLATE ASSEMBLY	Page A50
10	606030		CABLE, #18-3 UNSHIELDED, 55" LONG	
11	614109	3	MALE CONTACT, PIN	
12	401310	4	SCREW, PHMS, 4-40 UNC X 1/4"	
13	614102	1	RECEPTACLE, 17-3	
14	713312	1	CONSOLE	
15	609300	5	RIBBON CABLE TIE MOUNT	
16	707310	1	FRONT MONITOR MOUNT	
17	404520	16	SCREW, BHCS, 10-32 UNF X 3/8"	
18	707311	1	REAR MONITOR MOUNT	
19	438171	1	THUMBSCREW, 10-32 UNF	
20	325311A	1	TRANSFORMER MOUNT PLATE ASSEMBLY	Page A44
21	652002	1	CONNECTOR, BULKHEAD MODEM	
22	706318	1	PORT/TAPE DRIVE PLATE	
23	420008	4	NUT, 10-32 UNF	
24	325312A	1	PRIMING SYSTEM ASSEMBLY	Page A45
25	310316A	1	INKWELL ASSEMBLY	Page A43
26	606322	1	MONITOR POWER CORD, 1" LONG	
27	803308	1	COMPUTER MONITOR, 14" SVGA/BLACK	
28	706322A	1	POWER SUPPLY ASSEMBLY	Page A51
29	614321A	1	JET DRIVE I/O DISTRIBUTION CABLE	
30	600313A	1	COMPUTER CAGE ASSEMBLY	Page A47-A48
31	700313A	1	COMPUTER ACCESS DOOR ASSEMBLY	Page A49
32	706316	1	CONTROLLER REARPLATE	
33	700312	1	INKWELL DOOR	
34	446000	1	SLIDE LATCH -A3	
35	615131	1	BOX CONNECTOR, 3/8" CABLE	
36	404510	4	SCREW, BHCS, 10-32 UNF X 1/4"	

310316A, Inkwell Assembly



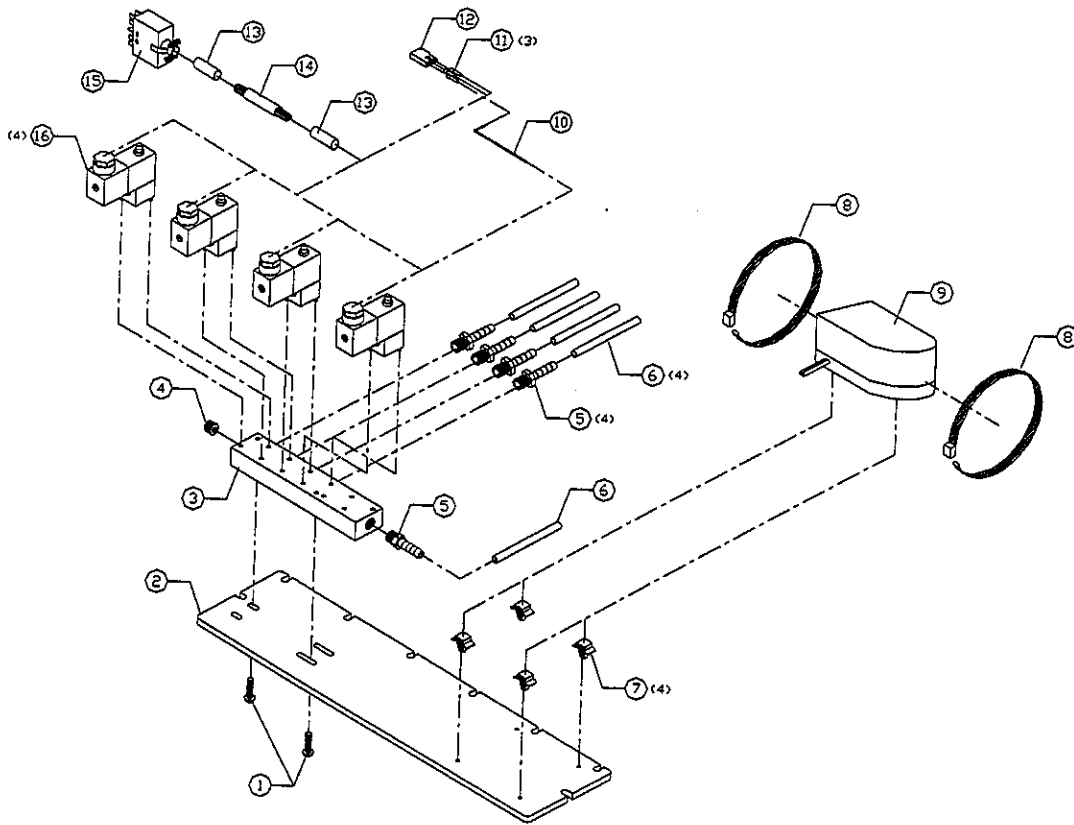
NO	PART NO	QTY	DESCRIPTION	REFERENCE
1	404807	24	SCREW, SHSS, 10-32 UNF X 3/16"	
2	310316	2	INKWELL RACK FRAME	
3	438312	6	INKWELL HANDLE	
4	212314	6	INKWELL SLIDE BLOCK	
5	706314	6	INKWELL PLATE	
6	310315	12	INKWELL RACK ROD	
7	404030	18	SCREW, FHCS, 8-32 UNF X 1/2"	

325311A, Transformer Mount Plate Assembly



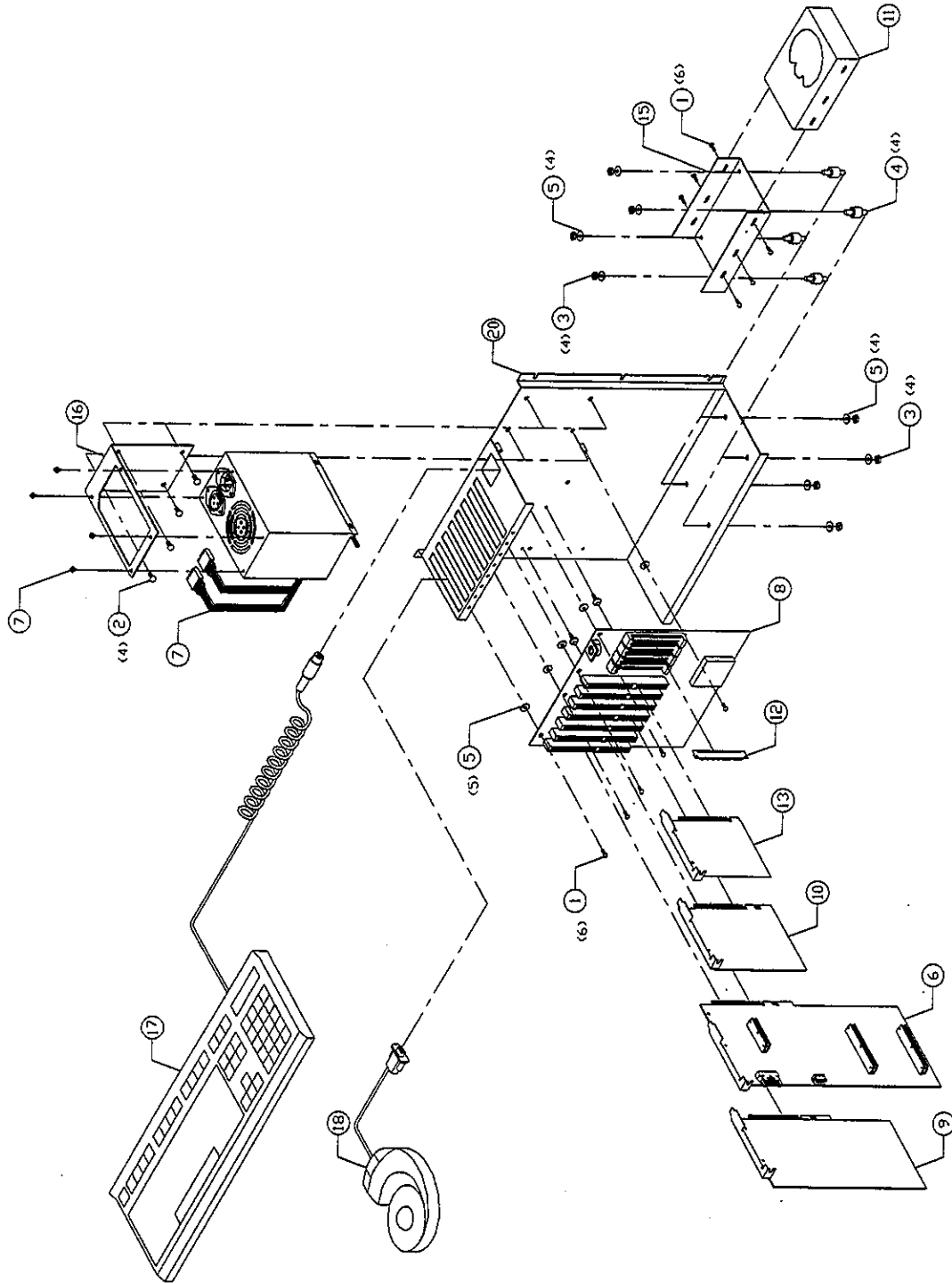
NO.	PART NO.	QTY	DESCRIPTION	REFERENCE
1	615064	1	FEMALE CONNECTOR, 6 PIN, BLA6	
2	606000		WIRE, #16, BLACK, HOOKUP X 30" LONG	
3	609000		SHRINK WRAP, 3/16" I.D. X 4" LONG	
4	325311	1	TRANSFORMER MOUNT PLATE	
5	640002	1	TRANSFORMER, 28V	
6	402510	4	SCREW, BHCS, 6-32 UNF X 1/4"	
7	614121		MUFFIN FAN CABLE X 1" LONG	
8	606005		WIRE, #16, GREEN, HOOKUP X 30" LONG	

325312A, Priming System Assembly



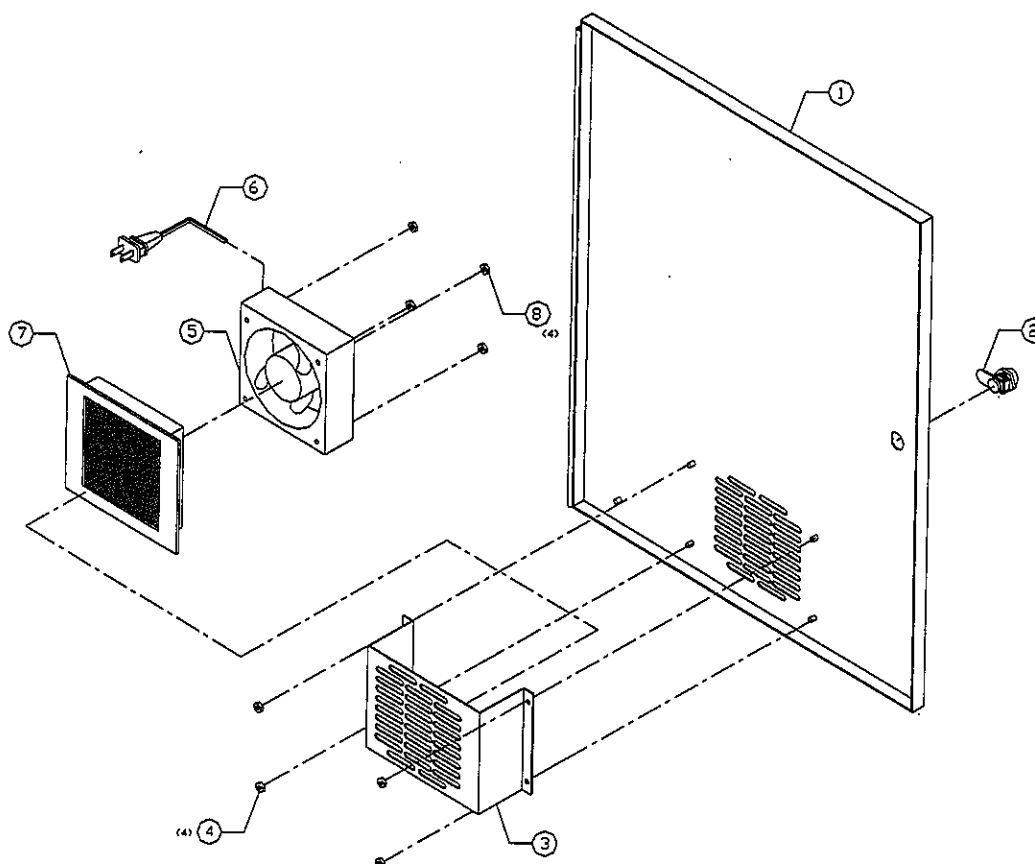
NO.	QTY.	DESCRIPTION	REFERENCE	
1	404550	2	SCREW, BHCS, 10-32 UNF X 3/4"	
2	325312	2	PRIMING SYSTEM PLATE	
3	330333	4	VALVE MANIFOLD	
4	803807	8	HEX PLUG, 1/8" NPT	
5	802059	5	MALE HOSE BARB, 1/8" X 1/8"	
6	803806		HOSE, CLEAR, 1/4" O.D. X 72" LONG	
7	615103	4	TIE WRAP MOUNT	
8	615141	4	LASHING TIE	
9	803801	8	PRIMING AIR PUMP	
10	606029	1	WIRE, #18, WHITE, HOOKUP X 25" LONG	
11	614130	3	PIN, CONTACT	
12	614131	1	CONNECTOR, PIN	
13	609003	2	SHRINK WRAP, 3/8" I.D. X 2" LONG	
14	606017		CABLE, #22-8, UNSHIELDED X 30" LONG	
15	614330	1	PRIMING PUMP PLUG	
16	803808	4	SOLENOID VALVE	

600313A, Computer Cage Assembly



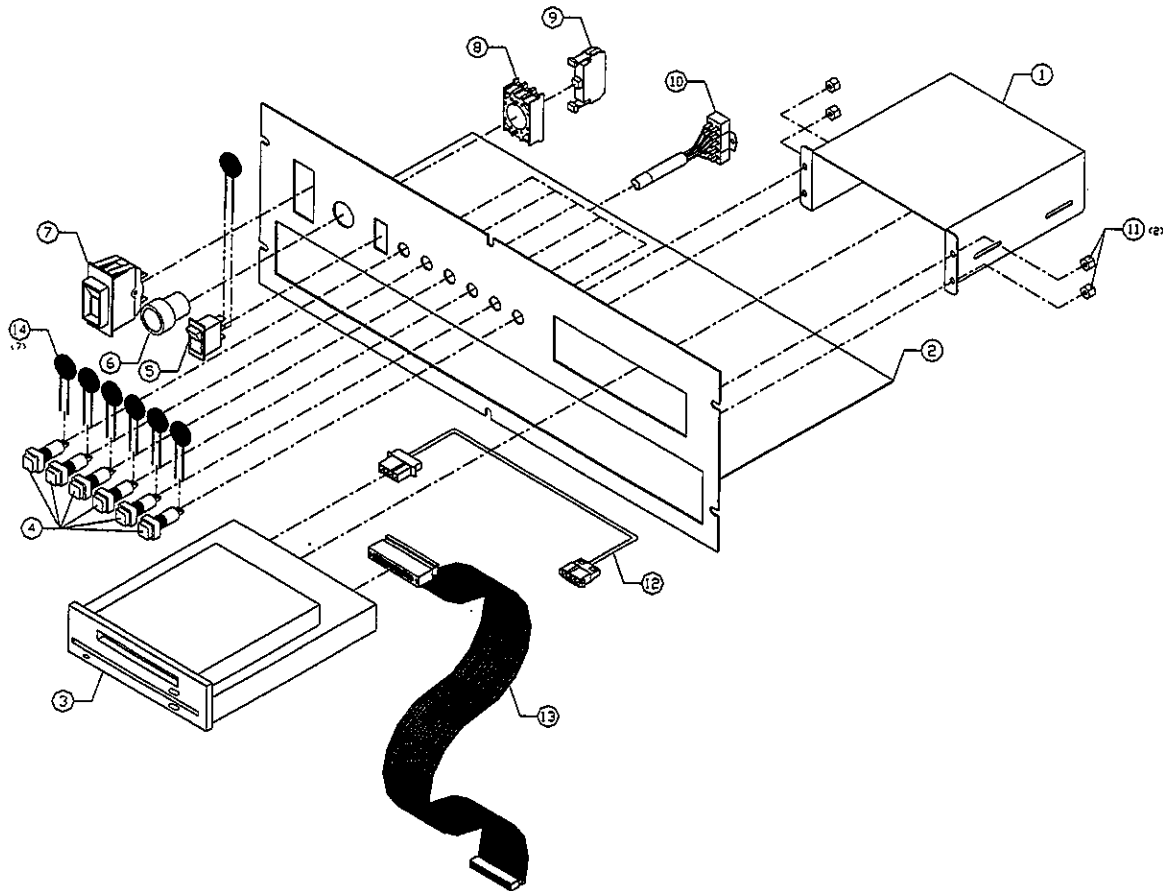
NO	QTY	DESCRIPTION	REFERENCE
1	402320	11	SCREW, PHMS, 6-32 UNF X 3/8"
2	404520	4	SCREW, BHCS, 10-32 UNC X 3/8"
3	420008	8	NUT, 10-32 UNF
4	426301	4	HARD DRIVE RUBBER MOUNT
5	440008	8	WASHER, No. 10
6	600300	1	JET DRIVE BOARD
7	600312	1	COMPUTER POWER SUPPLY
8	600313	1	COMPUTER MOTHERBOARD
9	600325	1	SUPER I/O CARD
10	600327	1	VGA CARD
11	600333	1	HARD DRIVE, 1.2GB
12	640324	1	8MB SIMM
13	652001	1	MODEM, INTERNAL 14400 BPS
14	706317	1	COMPUTER MOUNTING BOARD
15	713314	1	HARD DRIVE MOUNT
16	713318	1	COMPUTER POWER SUPPLY BRACKET
17	803304	1	COMPUTER KEYBOARD 101 MITSUMI JUNIOR
18	803305	1	COMPUTER MOUSE, LOGITEC TRACKMAN

700313A, Computer Access Door Assembly



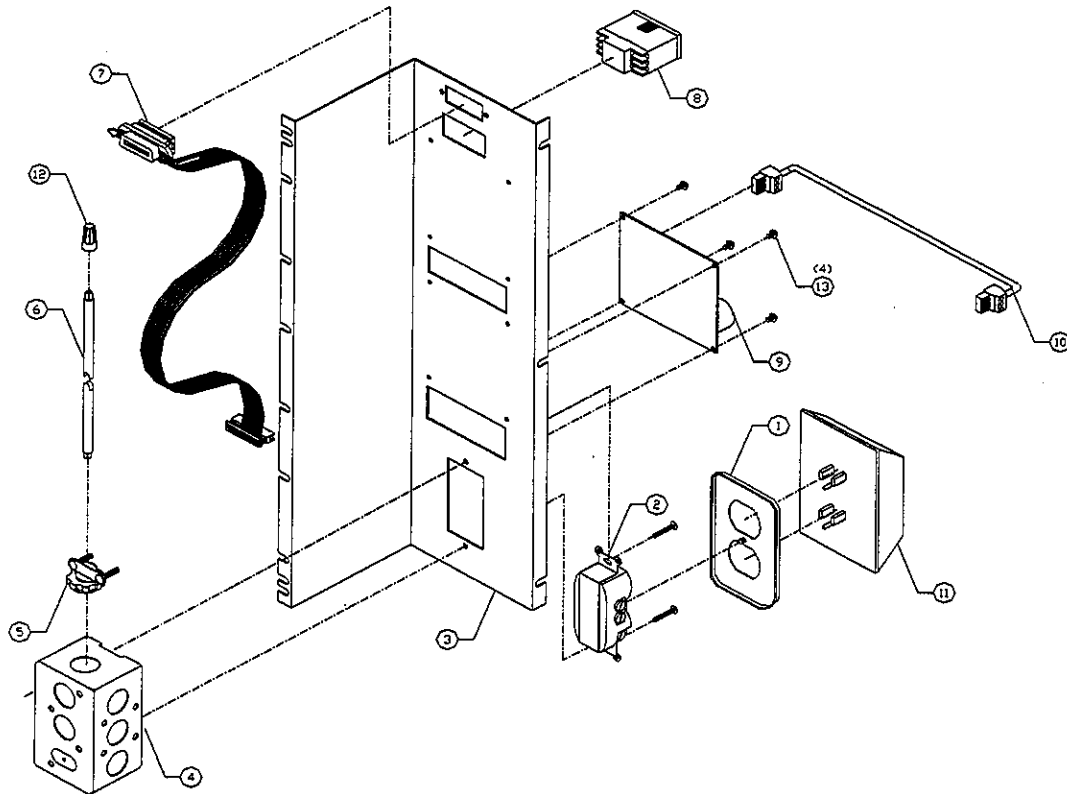
NO	PART NO	QTY	DESCRIPTION	REFERENCE
1	700313	1	COMPUTER ACCESS DOOR	
2	615313	1	CAM LOCK, 5/8"	
3	713315	1	MUFFIN FAN MOUNT	
4	420008	4	NUT, 10-32 UNF	
5	803300	1	MUFFIN FAN	
6	614121	1	MUFFIN FAN CABLE	
7	803306	1	MUFFIN FAN FILTER	
8	420007	4	NUT, 8-32 UNF	

706315A, Faceplate Assembly



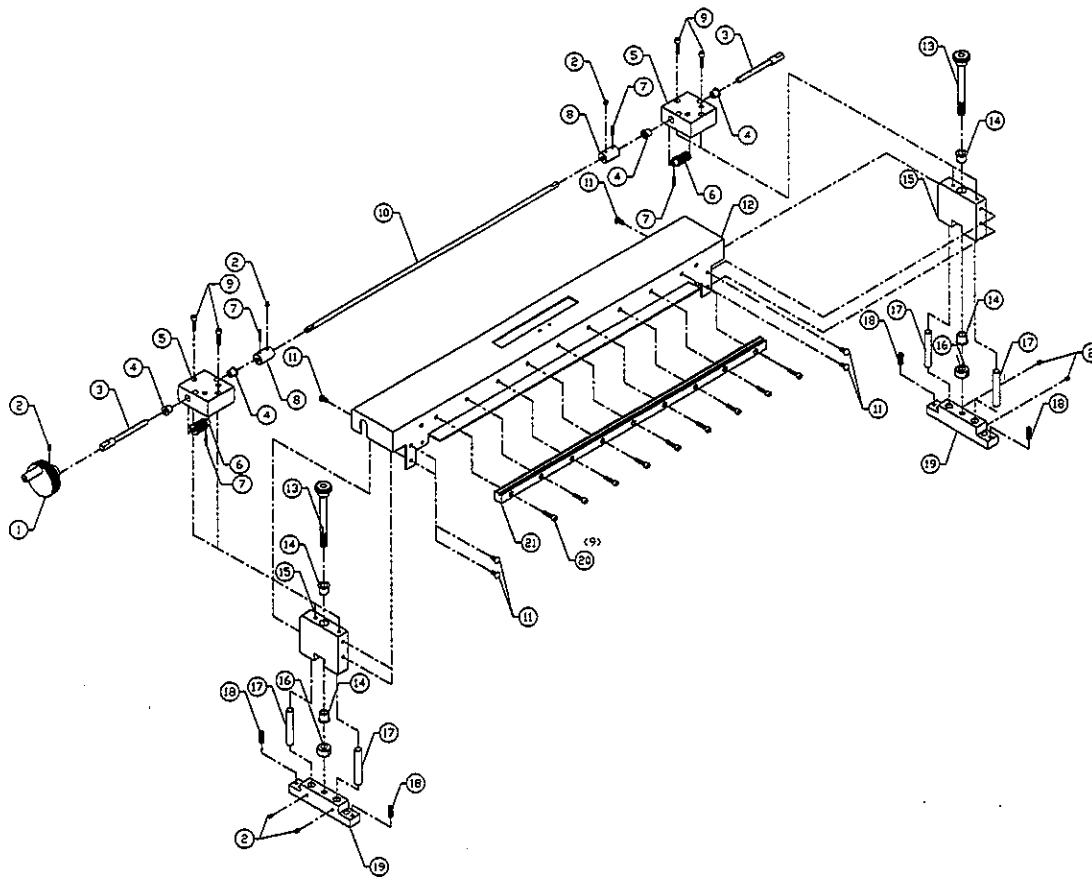
NO	PART NO	QTY	DESCRIPTION	REFERENCE
1	713321	1	FLOPPY DRIVE CAGE	
2	706315	1	CONTROLLER FACEPLATE	
3	803309	1	DUAL FLOPPY DRIVE	
4	603129	6	PRIMING BUTTON	
5	603117	1	PRIMING PUMP ROCKER SWITCH	
6	603124	1	SWITCH, RED PUSH BUTTON, FLUSH	
7	603300	1	CIRCUIT BREAKER SWITCH, 5 A, 1 POLE	
8	603125	1	SWITCH LOCKING COLLAR	
9	603126	1	BLOCK, N.O. CONTACT	
10	614331A	1	PRIMING PUMP RECEPTACLE CABLE	
11	420009	4	LOCKNUT, 10-32 UNF	
12	614009A	1	FLOPPY DRIVE POWER CABLE	
13	606326A	1	DUAL FLOPPY DRIVE POWER CABLE	
14	640300	6	METAL OXIDE VARISTOR, 120 VAC	

706322A, Power Supply Assembly



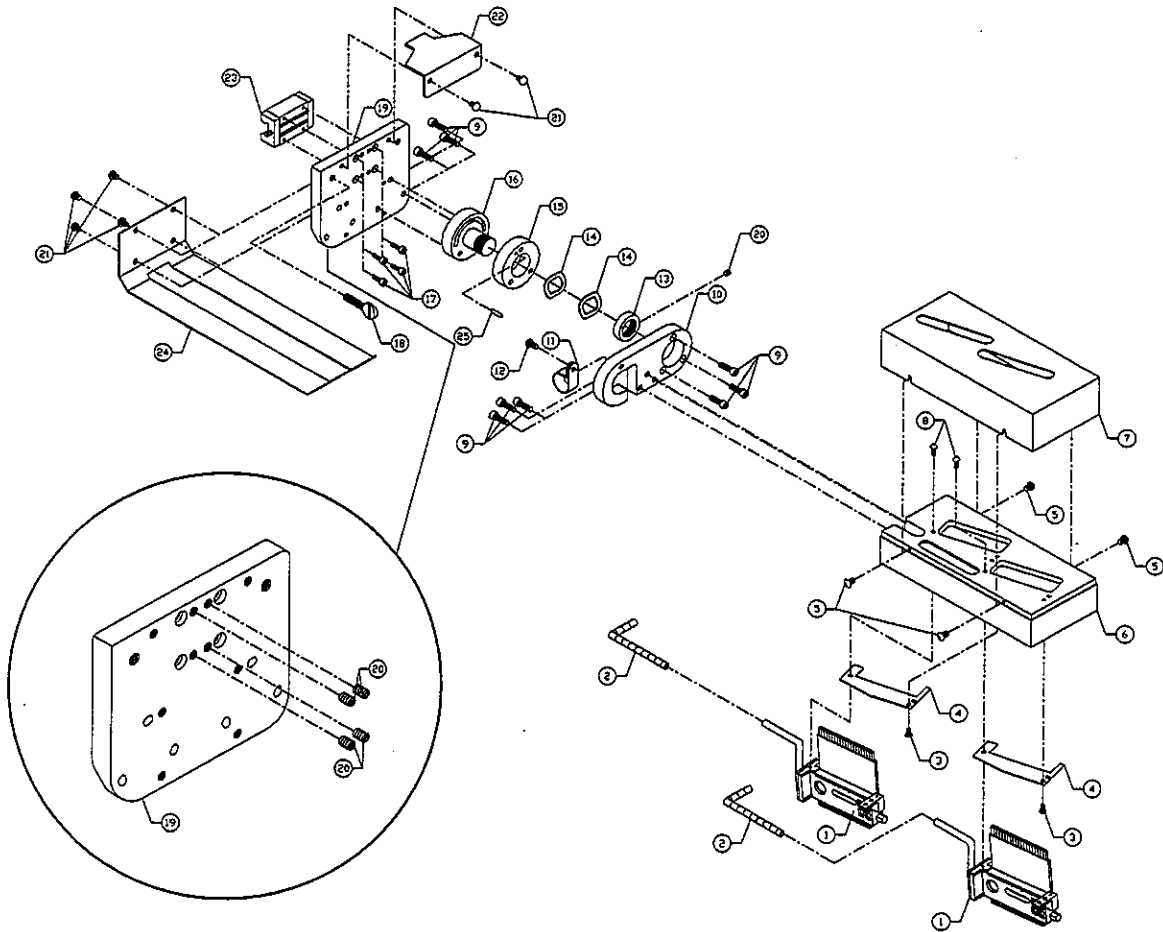
NO	QTY	DESCRIPTION	REFERENCE
1	1	BOX COVER, DUPLEX RECEPTACLE	
2	1	RECEPTACLE, DUPLEX, 2 POLE, 3 WIRE	
3	1	POWER SUPPLY MOUNT BOARD	
4	1	ELECTRICAL JUNCTION BOX, 2" X 4"	
5	1	BOX CONNECTOR, 3/8", CABLE	
6		CABLE, #18-3, UNSHIELDED, 90" LONG	
7	1	JET DRIVE I/O RIBBON CABLE	
8	1	COUNTER, NON RESETTABLE	
9	1	POWER SUPPLY BOARD	
10	1	JET DRIVE BOARD VOLTAGE CABLE	
11	1	SURGE SUPPRESSOR, FULL 3-LINE	
12	1	MARETTE, ORANGE, 14-22	
13	4	SCREW, PHMS, 4-40 UNC X 1/4"	

713311A, Printhead Bridge Assembly



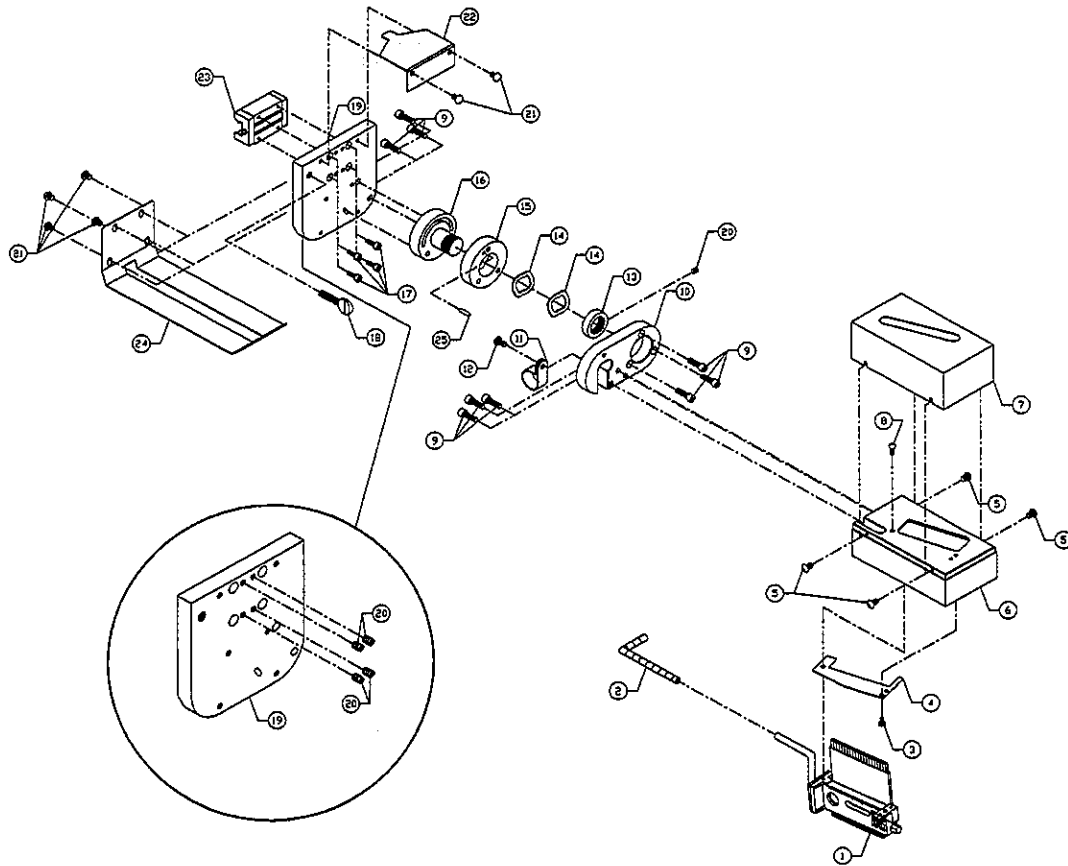
NO.	QTY.	DESCRIPTION	REFERENCE	
1	438311A	1	BRIDGE HANDWHEEL ASSEMBLY	
2	404807	7	SCREW, SHSS, 10-32 UNF X 3/16"	
3	100310	2	GEARBOX SHAFT	
4	505463	4	FLANGE BUSHING, 1/4" I.D. X 3/8" LONG	
5	330315	2	GEARBOX BODY	
6	110310	2	GEARBOX WORM, HARDENED, 1/4" BORE	
7	436312	4	SPRING PIN, 3/32" DIA. X 5/8" LONG	
8	122201	2	GEARBOX COUPLING	
9	404270	4	SCREW, SHCS, 10-32 UNF X 1"	
10	100315	1	PRINthead BRIDGE SHAFT	
11	404520	6	SCREW, BHCS, 10-32 UNF X 3/8"	
12	713311	1	PRINthead BRIDGE BODY	
13	100311A	2	HEIGHT ADJUSTMENT SCREW ASSEMBLY	
14	505384	4	FLANGE BUSHING, 3/8" I.D. X 1/2" LONG	
15	330313	2	PRINthead BRIDGE MOUNTING BLOCK	
16	131020	2	COLLAR, 3/8" I.D.	
17	100309	4	HEIGHT ADJUSTMENT PIN	
18	405830	4	SCREW, SHSS, 1/4-20 UNC X 1/2"	
19	330314	2	PRINthead BRIDGE MOUNTING FOOT	
20	403250	9	SCREW, SHCS, 8-32 UNF X 3/4"	
21	212311	1	LINEAR BEARING RAIL	

BK602 (H,V,F,A), Twin Printhead



NO.	QTY	DESCRIPTION	REFERENCE
1	640395,6,7	PRINTBAR, (H,V,F,A), 96/32	
2	609002	SPIRAL WIRE WRAP, (LENGTH VARIES)	
3	402310	2 SCREW, PHMS, 6-32 UNF X 1/4"	
4	706310	2 PRINTHEAD INSULATION SHIELD	
5	402510	4 SCREW, BHCS, 6-32, UNF X 1/4"	
6	330310	1 TWIN PRINTBAR MOUNT BLOCK	
7	700310	1 TWIN PRINTHEAD COVER	
8	402320	2 SCREW, PHMS, 6-32 UNF X 3/8"	
9	404240	9 SCREW, SHCS, 10-32 UNF X 5/8"	
10	330312	1 TWIN PRINTBAR BODY BRACKET	
11	615105,4	1 CABLE CLAMP 3/4", 7/8"	
12	404520	1 SCREW, BHCS, 10-32 UNF X 3/8"	
13	131300	1 ROTARY JOINT NUT	
14	439051	2 WAVE WASHER 3/4" I.D.	
15	127311	1 HEAD SWIVEL DISK	
16	127310	1 PRINTHEAD SWIVEL POST	
17	410415	4 SCREW, SHCS, M4 X 10 METRIC	
18	438310	1 LOCKING SCREW, 1/4-20 UNC X 1"	
19	330311	1 TWIN PRINTBAR MOUNTING PLATE	
20	404807	5 SCREW, SHSS, 10-32 UNF X 3/16"	
21	404510	6 SCREW, BHCS, 10-32 UNF X 1/4"	
22	706313	1 TWIN PRINTHEAD INDICATOR	
23	212310	1 LINEAR BEARING	
24	706312	1 TWIN PRINTHEAD SHIELD	
25	436030	1 SPRING PIN, 1/8" DIA. X 1/2"	

BK601 (H,V,F,A), Single Printhead



NO.	QTY.	DESCRIPTION	REFERENCE
1	640395,6,7	1	PRINTBAR, (H,V,F,A), 96/32
2	604002		SPIRAL WIRE WRAP, (LENGTH VARIES)
3	402310	1	SCREW, PHMS, 6-32 UNF X 1/4"
4	706310	1	PRINthead INSULATION SHIELD
5	402510	4	SCREW, BHCS, 6-32 UNF X 1/4"
6	330318	1	BK601 HEAD MOUNT BLOCK
7	700311	1	BK601 HEAD COVER
8	402320	1	SCREW, PHMS, 6-32 UNF X 3/8"
9	404240	9	SCREW, SHCS, 10-32 UNF X 5/8"
10	330319	1	SINGLE HEAD BRACKET
11	615104,5	1	CABLE CLAMP, 3/4", 7/8"
12	404520	1	SCREW, BHCS, 10-32 UNF X 3/8"
13	131300	1	ROTARY JOINT NUT
14	439051	2	WAVE WASHER, 3/4" I.D.
15	127311	1	HEAD SWIVEL MEMBER
16	127310	1	PRINT HEAD SWIVEL POST
17	410415	4	SCREW, SHCS, M4 X 10 METRIC
18	438310	1	LOCKING SCREW, 1/4-20 UNC X 1"
19	330326	1	SINGLE HEAD MOUNT
20	404807	5	SCREW, SHSS, 10-32 UNF X 3/16"
21	404510	6	SCREW, BHCS, 10-32 UNF X 1/4"
22	706321	1	BK601 HEAD INDICATOR
23	212310	1	LINEAR BEARING
24	706319	1	BK601 HEAD SHIELD
25	436030	1	SPRING PIN, 1/8" DIA. X 1/2"

Electrical Components

Terminal Block 1 Assembly
Terminal Block 2 Assembly
DC Speed Controller Layout

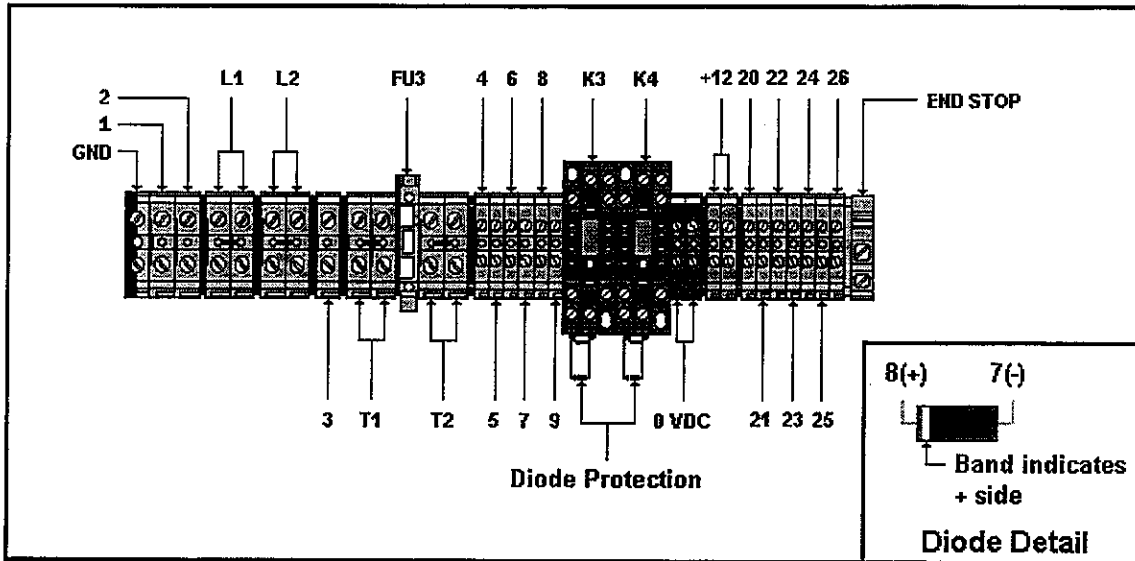
Schematics

Power Circuit Schematic, BK600E01
12 VDC Power Schematic, BK600E06
Keypad/Priming Schematic, BK600EL6
Controller Power Schematic, BK600EL8

Connector Information

JSE1 - Shaft Encoder Connector
JS2 - Photocue Sensor Connector
JS3 - Jam Stop Microswitch Connector
JS4 - Cycle Proxi-Switch Connector
JS5 - Jet Drive I/O Distribution Connector
J2 & J13 - Jet Power Supply Connector
J3 - Conveyor Connector
J4 - Main Power Connector
J5 - Instrument Control Connector
J12 - Priming Pump Connector

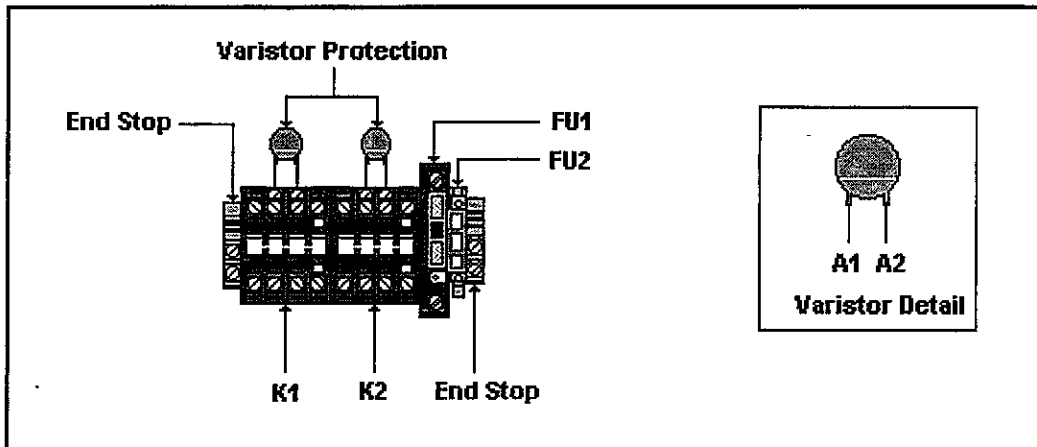
Terminal Block 1 Assembly



Terminal Block 1 Part List

SYMBOL	NAME	PART NUMBER	DESCRIPTION
GND	Earth Ground	615018	Ground Terminal Block, 10mm
1	220 VAC, Supply Power	615003	Terminal Block, Grey, 10mm
2	220 VAC, Supply Power	615003	Terminal Block, Grey, 10mm
3	Pump Rocker Switch	615003	Terminal Block, Grey, 10mm
4	Stop Switch Signal	615002	Terminal Block, Grey, 3mm
5	NCPB1, Stop	615002	Terminal Block, Grey, 3mm
6	NOPB1, Start	615002	Terminal Block, Grey, 3mm
7	ROTB1, Run/Jog	615002	Terminal Block, Grey, 3mm
8	ROTB2, Conveyor On	615002	Terminal Block, Grey, 3mm
9	ROTB2, Conveyor Auto	615002	Terminal Block, Grey, 3mm
20	Photo Cue Signal	615002	Terminal Block, Grey, 3mm
21	Machine Cycle	615002	Terminal Block, Grey, 3mm
22	Jam Switch	615002	Terminal Block, Grey, 3mm
23	Shaft Encoder A	615002	Terminal Block, Grey, 3mm
24	Shaft Encoder A Not	615002	Terminal Block, Grey, 3mm
25	K3-8 Machine Stop Relay	615002	Terminal Block, Grey, 3mm
26	Piece Counter	615002	Terminal Block, Grey, 3mm
L1	220 VAC Switch Power	615003	Terminal Block, Grey, 3mm
L2	220 VAC Switch Power	615003	Terminal Block, Grey, 3mm
T1	120 VAC Switch Power	615003	Terminal Block, Grey, 3mm
T2	120 VAC Switch Power	615003	Terminal Block, Grey, 3mm
FU3	120 VAC Fuse	615001 646001	Fuse Holder , Grey, 8mm, 6.3 A Fuse, 5 X 20 5 A
0V	0 VDC Power Supply	615000	Terminal Block, Black, 3mm
12V	+12 VDC Power Supply	615024	Terminal Block, Blue, 3mm
K3	Stop Relay	615004 610102 640301	Relay Base Relay, 12 VDC Zener Diode
K4	Stack Relay	615004 610102 640301	Relay Base Relay, 12 VDC Zener Diode

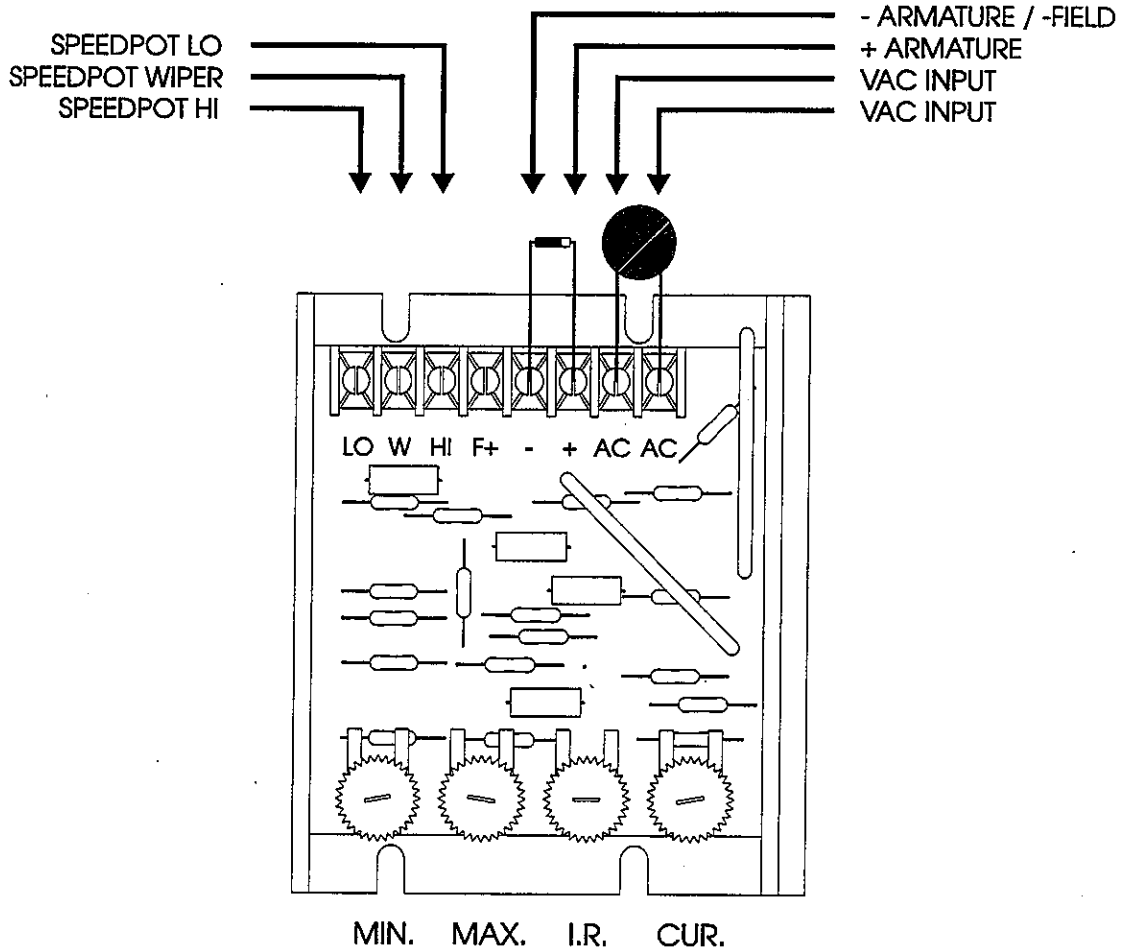
Terminal Block 2 Assembly



Terminal Block 2 Part List

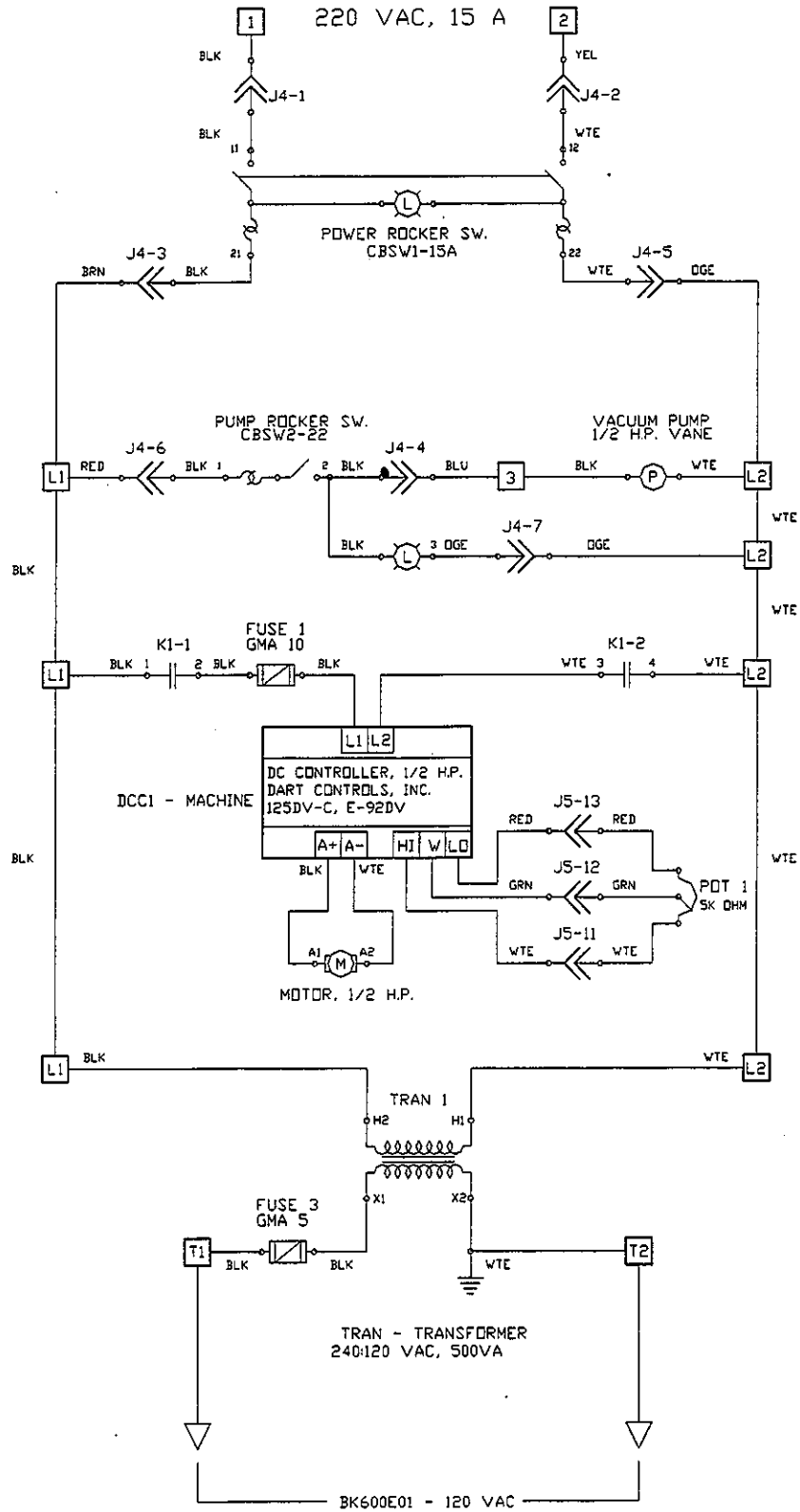
SYMBOL	NAME	PART No.	DESCRIPTION
K1	Machine Contactor	610001	3 Pole Contactor, 9A, 120 VAC
		640300	Metal Oxide Varistor, 120 VAC
K2	Conveyor Contactor	610001	3 Pole Contactor, 9A, 120 VAC
		640300	Metal Oxide Varistor, 120 VAC
FU1	120 VAC Fuse	646002	Fuse Holder
		646002	Fuse, 5 X 20 10A
FU2	120 VAC Fuse	646001	Fuse Holder
		646001	Fuse, 5 X 20 5A

DC Speed Controller Layout

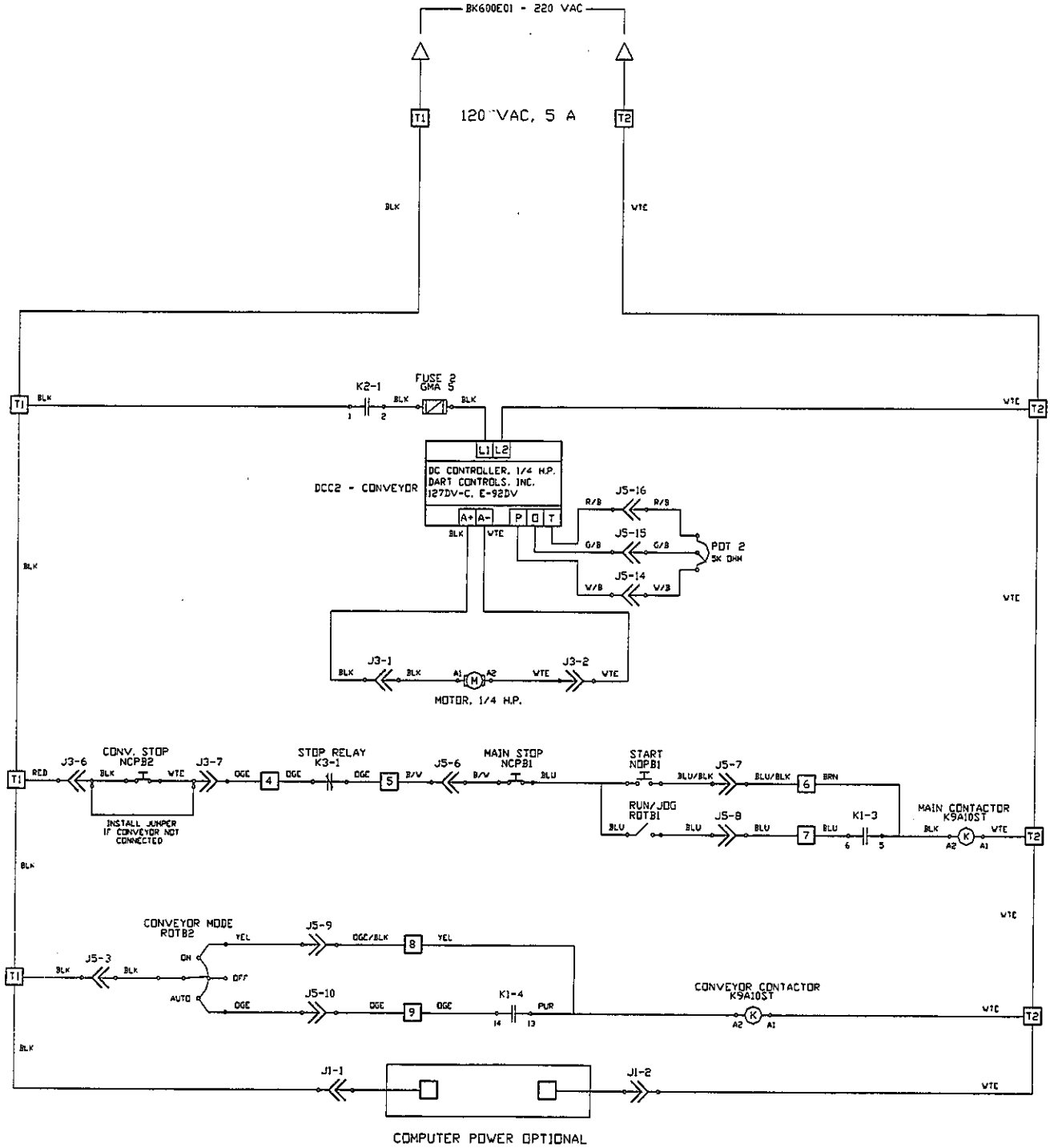


TRIMPOT ADJUSTMENT CHART			
DCC1 - MACHINE CONTROLLER		DCC2 - CONVEYOR CONTROLLER	
 MIN. MAX. I.R. CUR.		 MIN. MAX. I.R. CUR.	
1/2 H.P.	120 VAC INPUT	1/8 H.P.	120 VAC INPUT

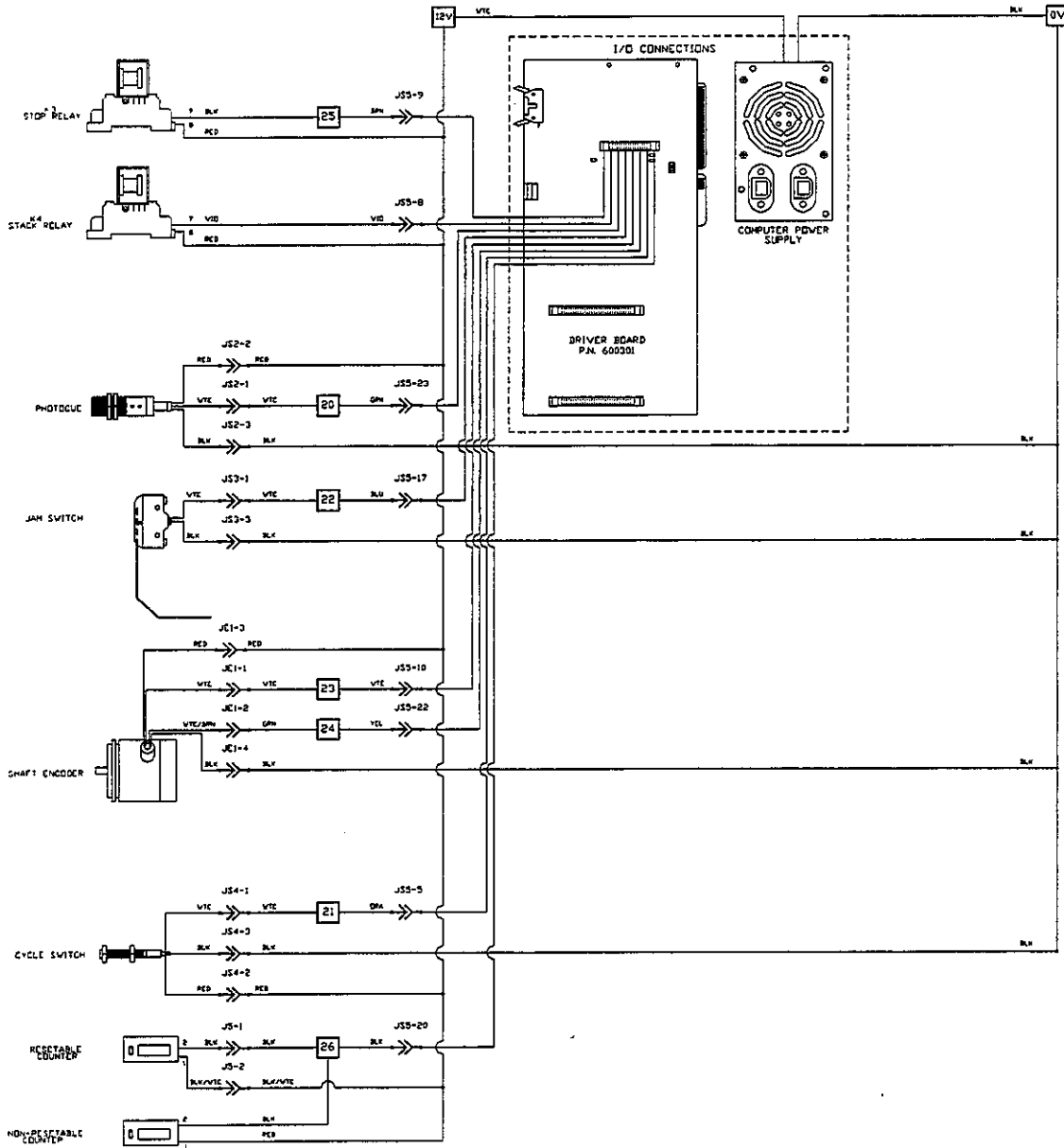
Power Circuit Schematic (220 VAC), BK600E01



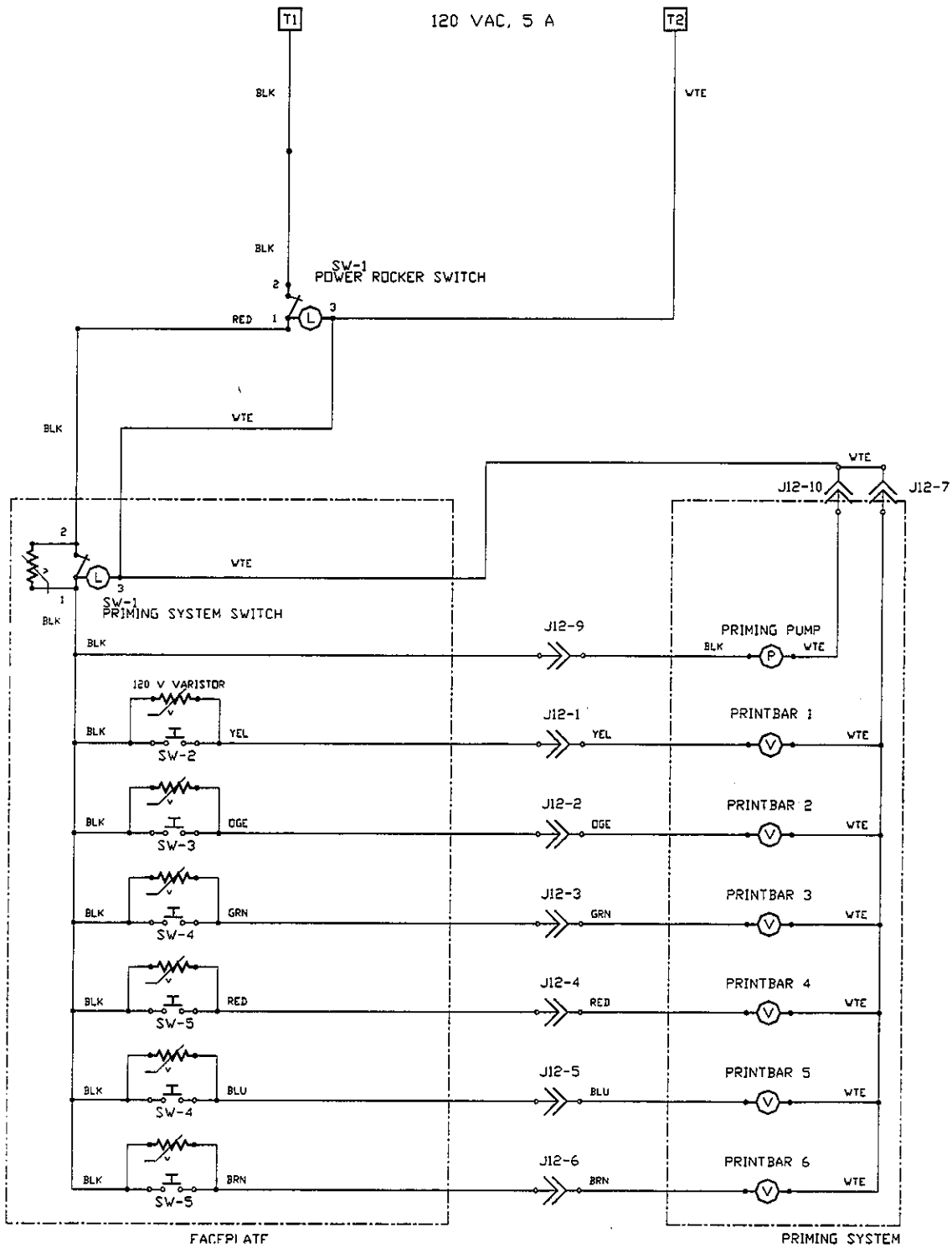
Power Circuit Schematic (120 VAC), BK600E01



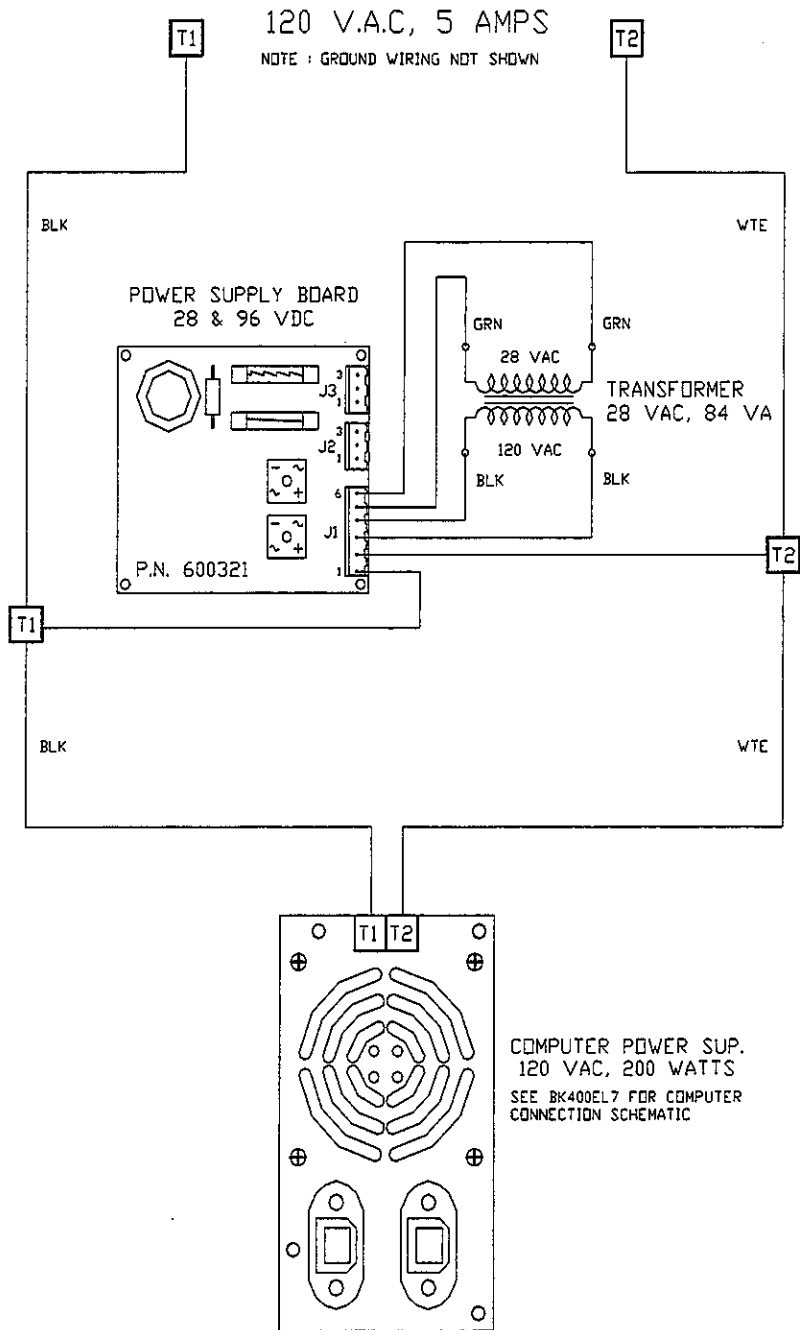
12 VDC Power Schematic, BK600EL6



Keypad/Priming Schematic, BK600EL7



Console Power Schematic, BK600EL8



JSE1 - Shaft Encoder Connector

PART NUMBER: 614007

DESCRIPTION: Connector that provides power to the Shaft encoder and supplies an encoder signal to the driver board.

TYPE: 4 pin AMP connector

REFERENCE: AMP No. 1-480424-0, 606017-1

ORIGIN: Shaft Encoder

DESTINATION: Terminal Block 1

JSE1 - Shaft Encoder Connector Pin Assignment

No.	Function
1	Terminal 23, Encoder Input A+
2	Terminal 24, Encoder Input A-
3	Terminal +12 VDC
4	Terminal -0 VDC

JS2 - Photocue Sensor Connector

PART NUMBER: 614001

DESCRIPTION: Connector that provides power to the Photocue sensor.

TYPE: 3 pin AMP connector

REFERENCE: AMP No. 172329-1, 172337-1

ORIGIN: Photocue Sensor

DESTINATION: Terminal Block 1

JS2 -Photocue Sensor Connector Pin Assignment

No.	Function
1	Terminal 20, Photocue Input
2	Terminal +12 VDC
3	Terminal -0 VDC

JS3 - Jam Stop Microswitch Connector

PART NUMBER: 614001

DESCRIPTION: Connector that provides power to the Jam Stop Microswitch.

TYPE: 3 pin AMP connector

REFERENCE: AMP No. 172329-1, 172337-1

ORIGIN: Jam Stop Microswitch

DESTINATION: Terminal Block 1

JS3 -Jam Stop Microswitch Connector Pin Assignment

No.	Function
1	Terminal 22, Jam Stop Input
2	Terminal +12 VDC
3	Terminal -0 VDC

JS4 - Cycle Proxi-Switch Connector

PART NUMBER: 614001

DESCRIPTION: Connector that provides power to the Cycle Proxi-Switch.

TYPE: 3 pin AMP connector

REFERENCE: AMP No. 172329-1, 172337-1

ORIGIN: Cycle Proxi-Switch

DESTINATION: Terminal Block 1

JS4 Cycle Proxi-Switch Connector Pin Assignment

No.	Function
1	Terminal 21, Machine Cycle Input
2	Terminal +12 VDC
3	Terminal -0 VDC

JS5 - Jet Drive I/O Distribution Connector

PART NUMBER: 614321

DESCRIPTION: Connector that provides the I/O signals to the driver board.

TYPE: 24 pin AMP Champ connector

REFERENCE: AMP No. 552317-1, 552076-1

ORIGIN: I/O Connections

DESTINATION: Terminal Block 1

JS5 -Jet Drive I/O Distribution Connector Pin Assignment

No.	Function
1	Not Connected
2	Not Connected
3	Not Connected
4	Not Connected
5	Terminal 21, Machine Cycle
6	Not Connected
7	Not Connected
8	Stack Relay, No.7
9	Terminal 25, Stop Relay
10	Terminal 23, Encoder A+
11	Not Connected
12	Not Connected
13	Not Connected
14	Not Connected
15	Not Connected
16	Not Connected
17	Terminal 22, Jam Switch
18	Not Connected
19	Not Connected
20	Terminal 26, Piece Counter
21	Not Connected
22	Terminal 24, Encoder A-
23	Terminal 20, Photocue Sensor
24	Not Connected

J2 & J13 - Jet Power Supply Connector

PART NUMBER: 615063**DESCRIPTION:** Connector that provides 0, 28, 96 VDC to the jet drive board.**TYPE:** 3 pin connector**REFERENCE:** Wiedmuller, No. 12818-6 BLA3**ORIGIN:** Power Supply Board**DESTINATION:** Jet Drive Board

J2 & J3 -Jet Power Supply Connector Pin Assignment

No.	Function
1	+ 96 VDC
2	- 0 VDC
3	+28 VDC

J3 - Conveyor Connector**PART NUMBER:** 614106**DESCRIPTION:** Connector that provides all the controls necessary for the operation of the conveyor.**TYPE:** 7 pin connector**REFERENCE:** AMP, 23-7, No. 206226-1, 206227-1**ORIGIN:** DCC2, Conveyor Controller**DESTINATION:** Conveyor Motor*J13 - Conveyor Connector Pin Assignment*

No.	Function
1	DCC2-A1, Conveyor Motor A1
2	DCC2-A2, Conveyor Motor A2
3	Terminal GND, Ground
4	Jumper to Pin 6 (T1)
5	Not Attached
6	Terminal T1, 120 VAC
7	Terminal 4

J4 - Main Power Connector

PART NUMBER: 614106**DESCRIPTION:** Connector that provides main electrical power to the instrument panel.**TYPE:** 7 pin connector**REFERENCE:** AMP, 23-7, No. 206226-1, 206227-1**ORIGIN:** Panel Box**DESTINATION:** Terminal Block 1

J4 -Main Power Connector Pin Assignment

No.	Function
1	Terminal 1
2	Terminal 2, 220 VAC
3	Terminal L1, 220 VAC
4	Terminal 3
5	Terminal L2, 220 VAC
6	Terminal L1, 220 VAC
7	Terminal L2, 220 VAC

J5 - Instrument Control Connector

PART NUMBER: 614103

DESCRIPTION: Connector that provides all control functions to the instrument panel.

TYPE: 16 pin AMP circular plastic connector

REFERENCE: AMP, 17-16, No. 206037-1, 66105-2

ORIGIN: Instrument control connector

DESTINATION: Terminal Block 1

J5 - Instrument Control Connector Pin Assignment

No.	Function
1	Terminal 26, Piece Counter
2	Terminal + 12 VDC
3	Not Connected
4	Not Connected
5	Not Connected
6	Terminal 5, Stop Pushbutton
7	Terminal 6, Start Pushbutton
8	Terminal 7, Jog/Run Selector
9	Terminal 8, Conveyor On
10	Terminal 9, Conveyor Auto
11	DCC1-HI, Machine Pot "Hi"
12	DCC1-W, Machine Pot "W"
13	DCC1-LO, Machine Pot "Lo"
14	DCC2-HI, Conveyor Pot "Hi"
15	DCC2-W, Conveyor Pot "W"
16	DCC2-LO, Conveyor Pot "Lo"

J12 - Priming Pump Connector

PART NUMBER: 615124

DESCRIPTION: Connector that provides 120 VAC to the Pump Priming System.

TYPE: 10 pin connector

REFERENCE: Cinch & Jones, No. S-310-CCT, S-310-AB

ORIGIN: Pump Priming System

DESTINATION: Connector Plate Priming System

J12 - Priming Pump Connector Pin Assignment

No.	Function
1	Priming Valve 1
2	Priming Valve 2
3	Priming Valve 3
4	Priming Valve 4
5	Priming Valve 5
6	Priming Valve 6
7	Power 120 VAC
8	Not Connected
9	Priming Pump
10	Power 120 VAC

