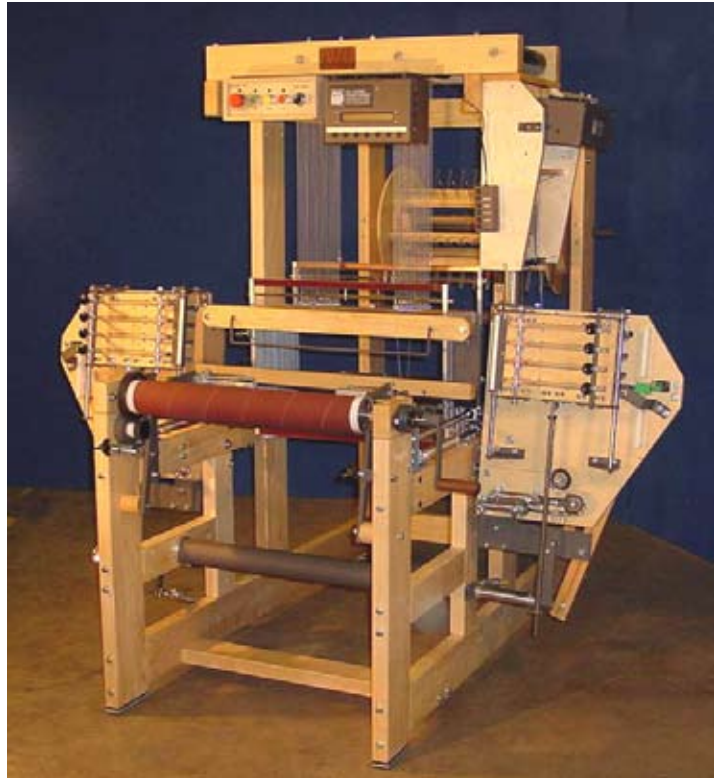

INDUSTRIAL DOBBY LOOM

User's Manual



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- 2.) Harness Pulleys (three sets)
- 3.) Dobby Cylinder
- 4.) Compu-Dobby
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- 7.) Dobby Head
- 8.) Top Horizontal
- 9.) Four-Box Shuttle Assembly
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- 57.) Beater Tube
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INDUSTRIAL DOBBY LOOM MANUAL

INTRODUCTION

Your Industrial Dobby Loom (IDL) is designed to be low-maintenance and immediately “user-friendly”. If you are an experienced power loom weaver, you may initially think this loom is a little quaint. If you’re more familiar with handlooms, it may seem impossibly busy and complicated. With a little hands-on experience, however, you’ll find that the IDL is “just right”. Considerable attention has been paid to the needs of the weaver. In addition to those things we know you’ll need, we’ve provided features that we think you’ll want. For example, the cloth beam can be removed so that you’ll have more working room when slewing the reed and we’ve placed the main operating controls conveniently “front-and-center”. Feature for feature, you’ll soon discover that the IDL is the best loom in its class.

ABOUT THIS MANUAL

We know that most people have neither the time, nor the interest, in wading through pages of jargon-laden techarcania. We’ll not burden you with such here. However, there is certain amount of information that you will need, like how to turn the IDL “on”, how to make adjustments, and what you’ll need to do to keep your loom in top working condition.

Wherever possible, we’ve provided you with “fast-track” explanations through processes. In most cases, more detailed information will be given in a side bar or information block. And we know that a picture is worth at least a thousand words, so you’ll have illustrations to guide you as well.

Finally, you’ll find a Maintenance and Troubleshooting section in the back of the manual.

PREPARATIONS

Your IDL will have been assembled and tested before it left the factory. An AVL technician will, in most cases, have uncrated and installed the loom at your facility, run it, and made any necessary adjustments. It is also likely that someone on your staff will have been oriented to the loom.

SUPPLEMENTAL LOOM SUPPORT

Depending on the circumstances of your particular installation, you may find it necessary to provide some additional support for your loom.

1.) **Squaring**

In order for your loom to function properly, it must be level, front-to-back and side-to-side. To check front-to-back, place a carpenter's level along the top of each Top Horizontal. Check side-to-side by placing the level along the length of the Cloth Beam and, again, along the Lower Back framing member. If you find that the loom is significantly out of level, you'll need to either correct the floor or shim the legs of the loom. To square your loom, measure its diagonals, front to rear. These should be equal.

2.) **Flexible Air Link**

If the air line from your compressor is made of a rigid material (steel pipe, pvc, copper), we suggest that you provide a flexible link between it and the loom. Simply connect a foot or more of 3/8" air hose between the FR and the end of the compressor line. This link will dampen vibration between your loom and the incoming air line, lessening the possibility of loosened fittings.

3.) **Floor Brackets**

Your loom is equipped with special shock absorbing pads which will retard its tendency to "walk". In some situations, the loom may need to be anchored to the floor. Brackets made for this purpose are available from AVL.

If you opt to bolt your loom to the floor, be sure to first check its squareness.

Bolting the loom to the floor will, overtime, reduce the need to readjust the squareness of the loom and the box adjustments.

SAFETY

Yes, we need to talk about safety. Any piece of equipment, from a hammer to a buzz saw, can be hazardous if it's misused or misunderstood. The IDL is fitted with a variety of safety devices, but the critical element in using this machine safely is your good **COMMON SENSE** and **ATTENTION TO THE RULES**. And the rules are as follows:

- 1.) Never, under any circumstances, remove or disable one of your loom's safety devices.
- 2.) Err on the side of caution: if something seems wrong, assume it is. Stop the loom until you've figured it out.
- 3.) Don't take chances — be particularly careful about your hands.
- 4.) Disconnect both electrical power and air before you do any maintenance on your loom.
- 5.) Don't guess. If you're unsure about anything, and this manual doesn't help, call our technical support number at 800 626-9615.
- 6.) Never stand at the end of the shuttle boxes when the loom is in motion.

BE SAFE!!! You'll come across other safety tips as you read more about your IDL. **PLEASE**, if you read nothing else in this manual, read this safety information!

PRE-OP CHECKLIST

TO START THE LOOM

We advise that you first operate your loom with empty shuttles. This will give you an opportunity to study the action of the loom and will point up any operating deficiencies. But before you put the loom in motion:

- Check that the shuttle boxes align with the shuttle race.
- Check that the shuttle boxes traverse their support rods without rubbing or binding (move up and down by hand).
- Check that the FR is set to operate at 105+ pounds of pressure.
- Check that your compressor is rated to deliver at least 24 cubic feet of air per minute at 150 p.s.i.

CONTROLS

1.) Computer

Assuming that your computer is connected to the Compu-Dobby, and that you've loaded your software, make those menu selections that are appropriate for a plain weave; this provides a good test scenario.

2.) Manual Loom Control

Assuming, as well, that your air line and power cord are connected:

- Switch on the Compu-Dobby at the power center or front of the Compu-Dobby.
- Set the **AUTO/MANUAL** control on the Control Box to **MANUAL**.
- Load an empty shuttle into box #2 (push it all the way back against the picker).
- Again, at the Control Box, turn the **TURN ON/PUSH OFF** button clockwise. The loom is now operational.
- Using the hand control that connects to the Control Box, depress the **ADVANCE** button once: *the Cloth Beam rotates a degree or so.*
- Depress the **DOBBY** button: *the harnesses lift.*

AUTOMATIC LOOM CONTROL

- Depress the **SHUTTLE** button: *the shuttle shoots.*
[repeat]
- Depress the **DOBBY** button: *the harnesses drop.*
- Depress the **BEATER** button: *the beater advances.*
- Depress the **BEATER**: *the beater returns.*

If any of the italicized actions did NOT occur, refer to the troubleshooting guide at the end of the manual. If the loom appears to be operating satisfactorily, proceed to Automatic Loom Control.

Automatic Loom Control means hands-free operation. Your loom will automatically cycle through its pre-programmed weaving plan; you'll need only to load and replace bobbins as they empty. This will be your usual weaving mode, your production mode.

BE SAFE!! If you need to suddenly stop your loom at any time, push the **EMERGENCY STOP** on the Control Panel.

However, if you use the **EMERGENCY STOP**, you'll likely need to make an adjustment in your program. Remember: the **EMERGENCY STOP** will now allow the loom to proceed to the end of the current pick cycle, however, when you restart the loom, it will automatically move to the top of the next cycle (see "Restarting After an Emergency Stop" on page 7).

- 1.) Set the **AUTO/MANUAL** control on the Control Box to **AUTO**: the red light on is.

CAUTION:

The next step will put the loom in motion. Be sure that no one is standing at either end of the shuttle race and that all hands are clear of the front of the beater and other pinch points.

- 2.) Now, if you're ready, press the green **RUN** button: *the green light is on, the red light is off, the loom will cycle continuously.*

USING PAUSE, STOP, EMERGENCY STOP

- 3.) Hit the **PAUSE** button at any time to temporarily stop the loom: *the green light is off, the yellow light is on, the loom stops.*
- 4.) There are four practical ways to stop your loom:
 - Hit **STOP**
 - Hit **PAUSE**
 - Hit **EMERGENCY STOP**
 - Pull the plug

In the end, each of these actions will bring the loom to a standstill; but, different situations call for different methods.

	APPLICATION	ACTION
STOP	To stop the loom for any reason	Loom works to the end of the cycle and stops
	To resume, press RUN	No unintended effects
PAUSE	To stop the loom when the shuttles don't fully "box"	Interrupts the loom, mid-cycle
	Press PAUSE to resume	No unintended effects
EMERGENCY STOP	When you need to stop NOW	Stops the loom immediately, mid-cycle
	Turn the loom on, press RUN	Unintended Effect: the loom resets at the beginning of the next cycle, may result in a flaw in the fabric (discussion below)
PULL THE PLUG	When all else fails	The boss comes running

RESTARTING AFTER AN "EMERGENCY STOP"

If you've used this mode, your loom will likely have stopped somewhere mid-cycle; that is, anywhere between a cloth advance and a beater return. However, when you re-start the loom, it will reset automatically at the beginning of the next cycle. It will simply delete whatever weaving operations were yet to go when it was shut down. If you continue weaving in the **AUTO** mode, you'll develop a flaw in the fabric.

Solution:

- 1.) Switch the loom to **Manual** at the Control Panel.
- 2.) Determine where you are in the weaving sequence.
- 3.) Use the hand control to advance through the remaining steps of the cycle. As a reminder, each cycle consists of the following sequence of steps:

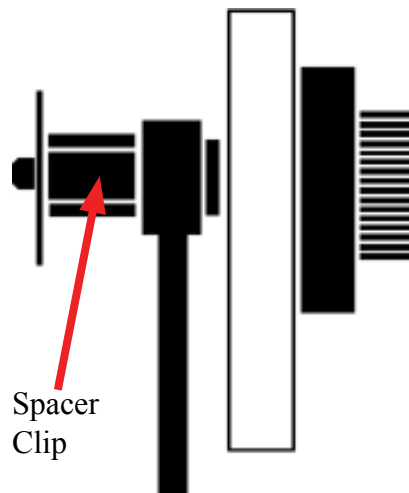
**ADVANCE → DOBBY → SHUTTLE → DOBBY →
BEATER → BEATER**

- 4.) RETURN THE LOOM TO **AUTO**, PRESS **RUN**, AND CONTINUE.

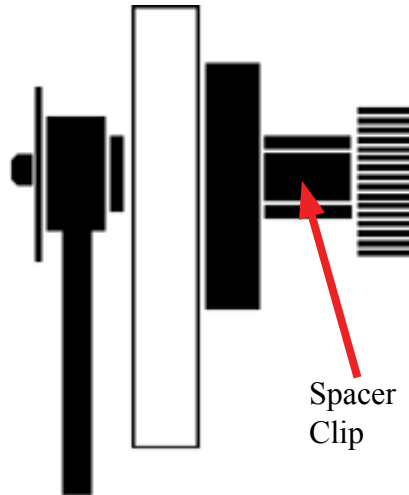
REVERSING CLOTH DIRECTION

It sometimes happens that you'll want to reverse the rotation of your cloth; you want to back-up. This is possible on your IDL, but it does require some extra effort and you'll have to unwind the cloth by hand.

- 1.) Turn off the Cloth Storage/Regulator Switch at the left side of the loom.
- 2.) Lift the Tension Weight Arm to release tension on the warp. You'll want to see a piece of cord to secure the arm to the Upper Horizontal on the loom frame.
- 3.) Pull the pin at the Cloth Storage Beam to disconnect it from the drive hub.
- 4.) Remove the spacer clip from the Automatic Advance drive shaft (see drawing below).



- 5.) Disengage the Automatic Advance gear by pushing the axle end toward the center of the loom until the gears are un-meshed and the large washer touches the small bearing housing. Install the spacer clip between the large bearing housing and the gear (see drawing).



- 6.) Back up the warp.
- 7.) Reverse the above steps to re-engage the Automatic Advance System.
- 8.) Adjust the warp tension.
- 9.) Run a few picks on **MANUAL** until the fell line has moved within approximately 6" of the reed. A hint here: you may want to disconnect the Auto Advance and comb in the first few picks by hand.
- 10.) Resume normal weaving in automatic mode.

ADJUSTMENTS

You'll need to make certain adjustments to your loom in order to accommodate your changing weaving needs. Most of these adjustments are a matter of refining your preferences as you go or of changing the speed or force at which the loom's mechanisms operate. There are, however, some minimum operating limits that must be adhered to for your IDL to function properly.

COMPRESSOR

Your compressor must be able to deliver a minimum of 24 cubic feet of air per minute at 150 pounds per square inch.

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FR (keep this set at 115 p.s.i.)

The FR (Filter, Regulator) is mounted on the back of the Computer Cabinet. This is where the air line coming from the compressor connects to the loom. The primary function of this device is to meter the air pressure coming into the system.

Air pressure is measured in pounds-per-square-inch (P.S.I.). If you're not familiar with pneumatic systems, just think of air as you think of gas in your car. The more air, the more power.

You'll see a gauge on the FR and an adjustment knob immediately above it. Turn this knob clockwise to increase pressure. You should start pressure from the FR at 105+ p.s.i. The operating pressure is generally around 120 p.s.i.

REGULATORS

In addition to the FR, there are other regulators that meter the amount of air that is delivered to the different loom systems. These are located on the component board in the computer cabinet in the Component Box, to the left of the FR. Each regulator has a gauge and a yellow plastic locking ring. **REMEMBER:** regulators control power. FLOW CONTROLS, discussed below, control the speed at which your systems operate.

Each regulator controls one system and is labeled on the air board in the computer cabinet. Consult the chart below to determine initial operating values for each system. You may find that these settings need to be modified, depending on the weight of your yarns, operating speed, and other factors.

<u>Regulator</u>	<u>System</u>	<u>P.S.I. Setting</u>
SV 1	Cloth Storage	10-20
SV 2	Beater	60
SV 3	Dobby	60
SV 4	Shuttle (right)	50
SV 5	Shuttle (left)	50

CYLINDER FLOW CONTROLS (Speed Controls)

The speed at which each of the loom systems operates is regulated by "flow controls" located at various points on the loom:

Cloth Advance:	Automatic Advance Cylinder
Harness Lifting:	Dobby Cylinder
Box Changing:	Box Changing Cylinders
Cloth Storage:	Cloth Storage Cylinder

SYNCHRONIZED LOOM MOTION

These different systems will operate according to the choreography which you establish. You'll want the loom to lift, beat, and pick according to your weaving needs at a particular moment. This means you'll need to set the controls for each of the systems. It sounds much more complicated than it really is and, once you've made your initial setting, you won't need to change them for the balance of your warp. Your installer will make the initial settings.

There is a particular order in which you'll want to adjust each of the loom's mechanisms. When you've finished, all the systems will work smoothly and in concert. We recommend that you proceed as follows:

- 1.) Automatic Cloth Advance
- 2.) Dobby
- 3.) Beater
- 4.) Box Changing
- 5.) Automatic Cloth Storage

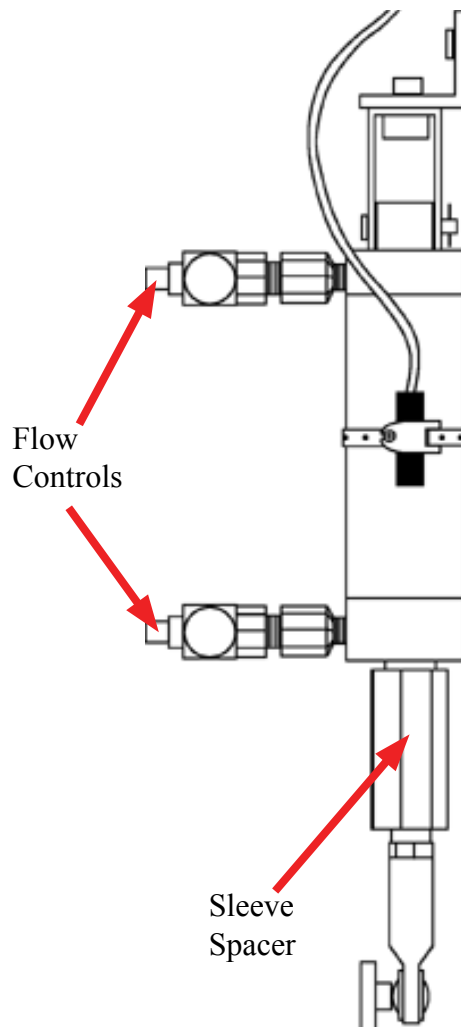
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AUTOMATIC CLOTH ADVANCE SPEED ADJUSTMENT

Be Safe!!! Put the loom in Manual mode when making any adjustments.

This setting is made at the Automatic Advance Cylinder on the left side of your loom. Find the upper most cylinder, mounted just below the left beater cylinder. You'll see that there are two plastic air tubes coming into the cylinder. At both connecting points, there is an adjusting screw. These are the flow controls.

Use a small screwdriver to turn each screw in or out. Turn the screws counterclockwise to accelerate and clockwise to retard the action of the Automatic Cloth Advance. You'll probably want to operate this system as quickly as possible.



AUTOMATIC ADVANCE AND CLOTH BEAM GEAR ADJUSTMENT

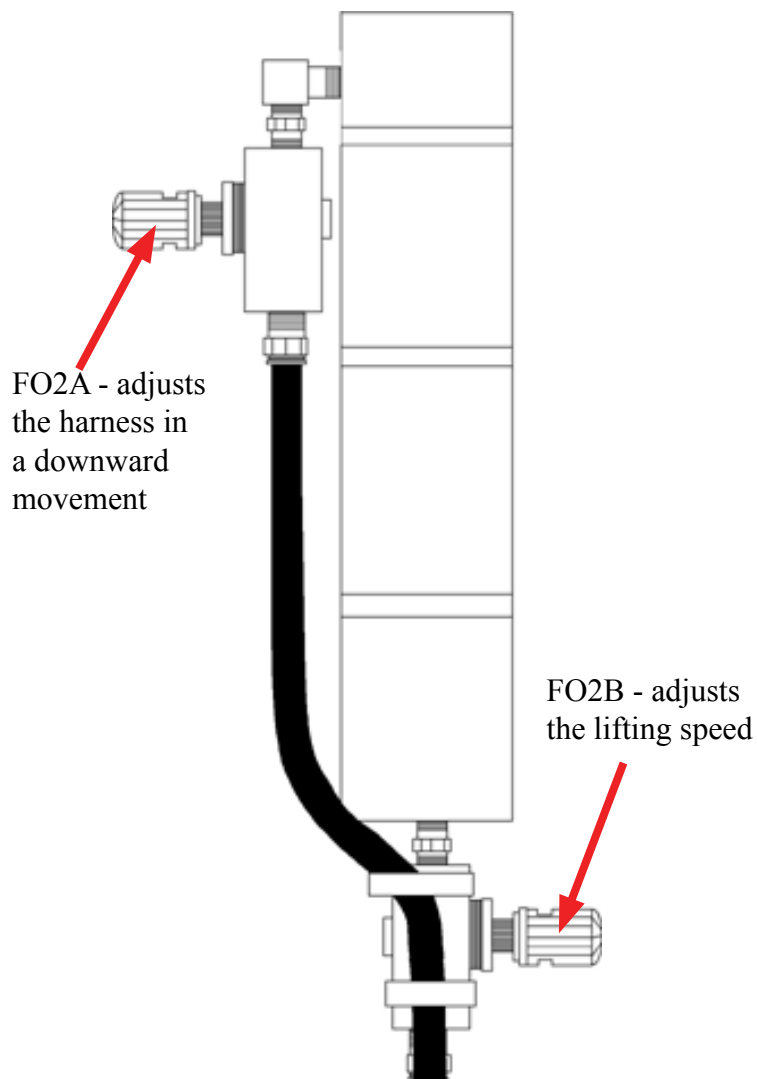
To adjust the Automatic Advance and Cloth Beam Gear Mesh:

- 1.) Loosen the two bolts holding the left Fafnir VCJT1 bearing.
- 2.) Rolling the cloth toward you, feed a single piece of paper between the small Automatic Advance gear and the larger cloth beam gear, stopping when the paper is trapped between the gears.
- 3.) Push down on the Cloth Beam to seat the gears into the paper.

- 4.) Retighten the VCJT1 bearing.
- 5.) Roll the Cloth Beam to check for binding between the gears (does not get harder to turn in one spot). If it does, then repeat the procedure with two pieces of paper and so on, until the beam rolls freely.

DOBBY CYLINDER SPEED ADJUST- MENT (controls harness lifting)

The speed at which the harnesses are raised and lowered is controlled from the Dobby Cylinder. This is the large air cylinder that extends from the bottom of the dobbie head on the right side of the loom. You set the flow controls on this cylinder in exactly the same way that you adjust those on the Automatic Advance Cylinder. Remember: clockwise retards, counterclockwise speeds.



The action of the harnesses needs to be coordinated with the action of the Automatic Advance.

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BEATER SPEED ADJUSTMENT

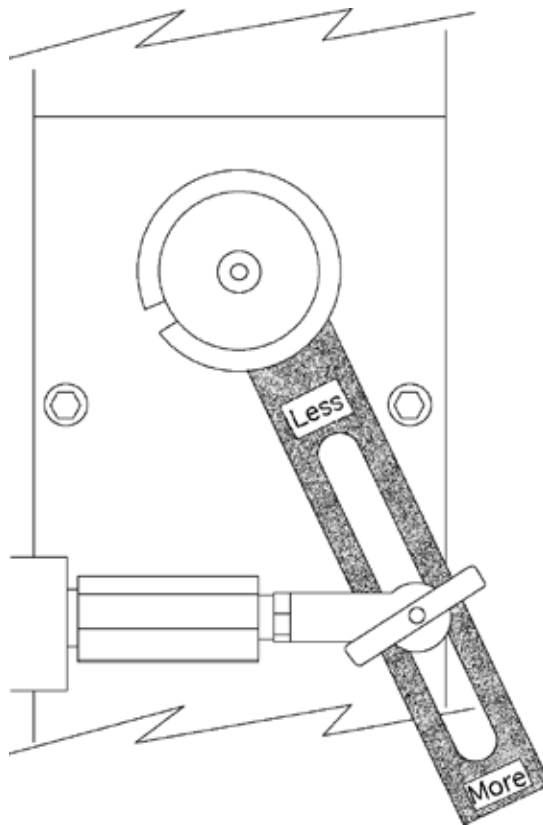
Beater speed and force is a function of air pressure. Use the lowest measure setting needed to achieve a firm beat.

CLOTH STORAGE POWER CONTROL

Note that we refer to power, not speed. The only thing you need be concerned about here is that the action of the Cloth Storage Cylinder is not greater than that of the Automatic Advance Cylinder directly above it. If the Storage Cylinder is set to overpower the Advance Cylinder, it will cause the warp to creep. To prevent this, set the regulator gauge at about 6 lbs.; just enough that the cloth storage mechanism keeps slack out of the cloth after it rounds the breast beam.

CLOTH BEAM ROTATION ADJUSTMENT (to establish p.p.i.)

The number of picks-per-inch that you'll achieve is determined by the degree of rotation of the Cloth Beam. This is established, mechanically.



Move to the left side of the loom. At the end of the Cloth Beam is a gear. This gear meshes with a second gear mounted below it. Connected to the bottom gear is a slotted lever.

There are two ways to adjust your pick count:

- 1.) By increasing or decreasing the stroke of the adjusting lever.
- 2.) By exchanging one sleeve for another of a different size.

	PICK CHART		
	SLEEVE SIZE	LEVER POSITION	PICKS PER INCH
Small Sleeve #1	1-5/16	Top	4
	1-5/16	Middle	5
	1-5/16	Bottom	7
Small Sleeve #2	1-13/16	Top	6
	1-13/16	Middle	9
	1-13/16	Bottom	14
Small Sleeve #3	2-5/16	Top	16
	2-5/16 Middle	20	
	2-5/16 Bottom	30	
Longest Sleeve #4	2-9/16	Top	25
	2-9/16	Middle	40
	2-9/16 Bottom	60	

These pick counts are approximations and are related to warp tension and by how hard the weft is beat into the warp. Increasing the warp tension and how hard you beat can increase the pick count.

ADJUSTING LEVER

You'll note that the Adjusting Lever is connected to the rod end of the Automatic Advance Cylinder by a locking T-handle. If you loosen this knob, you can move the rod end up or down in the slot. When you move the rod end up, the Cloth Beam rotates more and you have less picks per inch.

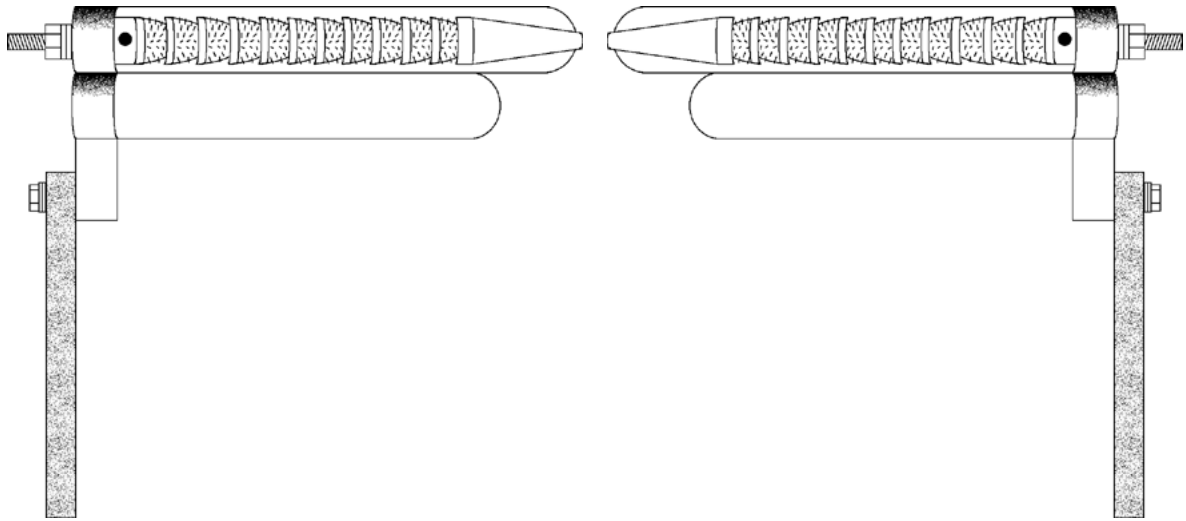
SLEEVE EXCHANGE

Your IDL is provided with four Automatic Advance sleeves. Each of these will cover a different pick range. The smaller the sleeve, the *less* picks per inch.

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PRESSURE ROLLER

The Pressure Roller allows you to weave without using your Cloth Storage system. So you can cut off your work at any time without losing warp tension.



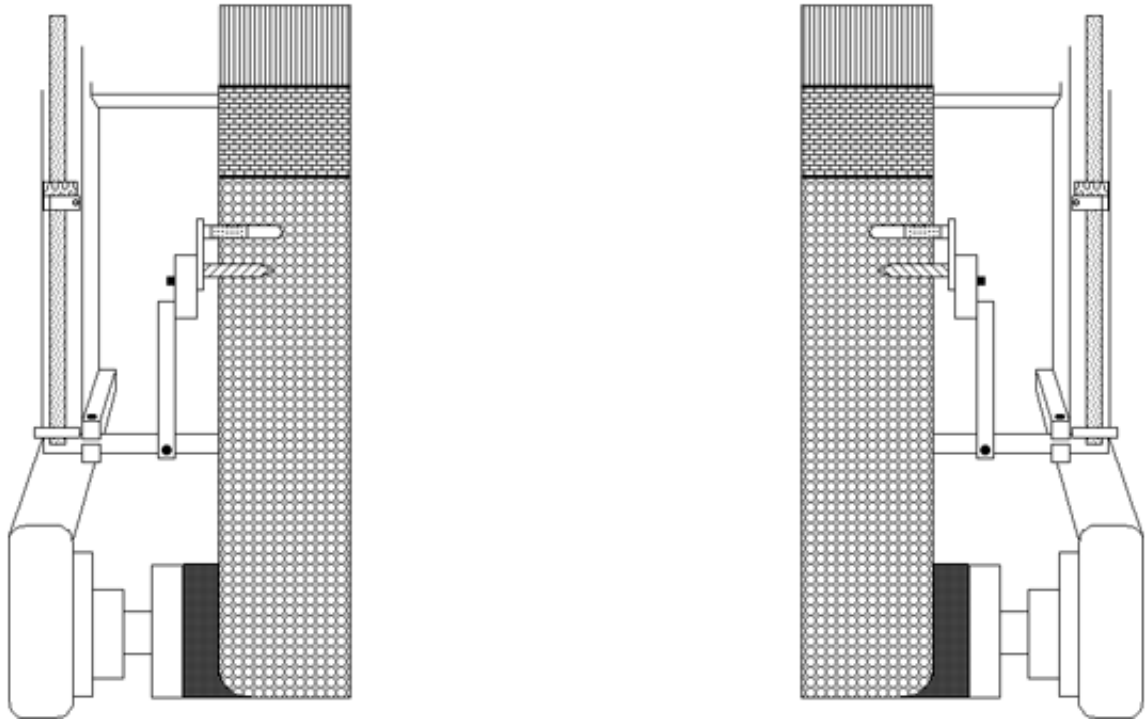
To start:

- 1.) Pull the warp approximately 10" beyond the Cloth Beam.
- 2.) Push the Pressure Roller into the warp under the Cloth Beam until it snaps into place.
- 3.) To remove the roller, relieve tension (two knobs in front under the Cloth Beam), push the arm, and remove the roller.

TEMPLE SYSTEM (to prevent draw-in)

The Temple System is used to maintain a good selvage and prevent draw-in. You'll usually deploy it after you've woven-off a yard or so of fabric, once you have selvage enough to work with. It consists of two rollers (barrels), working in tandem, which grab the selvage and prevent it from drawing in.

This device looks complicated, but is, in fact, relatively easy to work with. Refer to the accompanying illustration and step-by-step instructions for guidance in using this system.



SETTING THE TEMPLE ROLLERS

- Check the routing of your fabric against the illustration.
- Loosen the adjusting bolts on the Temple Holder Bracket so that it's somewhat movable.
- Swing the Temple Holder Bracket up and in, so that it is about 1/4" below the warp, with the selvage just touching the inside of the bracket.
- **Open the shed.**
 - Bring the holder up until the ridges on its platform just contact the bottom of the warp. The platform should be parallel with the warp.
 - Tighten the Temple Holder Bracket adjusting bolt.

- Slide the leading roller (with the majority of the needed rings) into its slot on the Holder Bracket. Seat the roller atop the warp and lock it down with a hex key.
- Install the after roller (with rubber grips). It bolts in. (optional)
- Check to be sure that everything is properly tightened down.

The selvages should run freely across the bracket.

Using a Temple System is somewhat of an art and opinion varies amongst weavers about things like the choice of rings and the efficacy of the after roller. However, we can offer some useful guidelines to help get you started.

TEMPLE RINGS

We provide you will a set of general purpose rings. If your leading roller is holding the selvage sufficiently well, and isn't causing looping or leaving a perforated line in the warp, you're doing fine. If, however, you're having problems, you made need to investigate different rings. As a rule of thumb, heavier yarns need rings with longer and fewer needles. Finer yarns require rings with more and shorter needles.

For additional information, please contact an AVL Customer Service Representative.

WARP TENSION

The warp tension device on your loom offers a number of advantages; chief amongst these is that it allows you to set tension in extremely fine degrees that remain constant as your beam surrenders warp. Unless you've used other AVL equipment, you're probably not familiar with this way of keeping tension. If you find the concept a little foreign, be patient; we promise that you'll soon recognize its merit.

SET TENSION

- Move the weight to its rearmost position, until it nearly touches the wooden pulley at the near end of the arm.
- Advance the warp until the tension arm rises and the cable begins to slip on the brake drum (of the warp beam).

- Ultimately, you'll want the arm to ride horizontally. As you advance the warp, the arm should rise no more than 45° above horizontal and then fall back to horizontal.
- If the arm is riding above horizontal, let the adjusting cord out at the spring. If it's riding low, take up cord.
- Check the tension in your warp. If it's loose, move the weight out on the arm. Advance the warp a little and check again. Continue in this way until you have exactly the tension you want.

Most weavers find that they can weave with less tension using this system.

If you've laid on a very heavy warp, you may need to add weight to the arm. Additional weights can be obtained from AVL. Conversely, warps comprised of extremely fine yarns may require a lighter weight. AVL can provide you with a half-weight if you so desire.

To make it a little easier to learn, we've created a quick reference for you to follow. You may want to copy it and keep it at the loom.

Arm above horizontal	===	Release cord at the spring
Arm below horizontal	===	Take-up cord at the spring
Warp too loose	===	Move weight out
Warp too tight	===	Move weight in

TROUBLESHOOTING TIP

The brake drum on the warp beam may, in areas or times of high humidity, swell a bit where the end grain is exposed. This swollen grain can prevent the tension cable from slipping as it should. When this happens, the tension arm will develop a habit of rising and then suddenly dropping.

To correct this problem, unwind the brake cable and lightly sand the grain in the cable race of the drum. Use a very fine grade of sandpaper (220-400#) and sand as little as possible.

Never, under any circumstances, should you apply a wax, or finish, or otherwise treat the cable race on the drum.

INDUSTRIAL DOBBY LOOM MANUAL

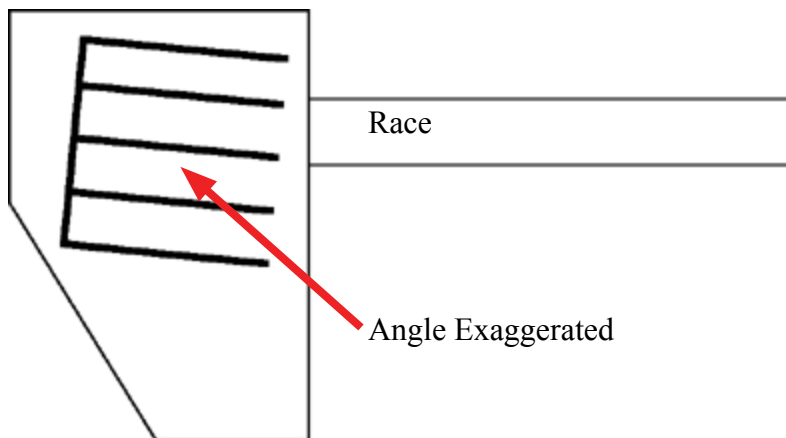
SHUTTLE BOX ADJUSTMENT

The shuttle boxes were adjusted when the loom was first installed at your site, however, over time, they may require some attention. You'll know it's time to check these adjustments if your usually tame shuttle seems suddenly to have become an "unguided missile". There are three alignments essential to satisfactory loom operation:

- Backplate tilt (downward angle) zero degree or very slight
- Backplate cant (forward angle) zero degree or very slight
- Shuttle box-to-race alignment - level or slightly higher (1/16" or less). Shelf cannot be lower than the race.

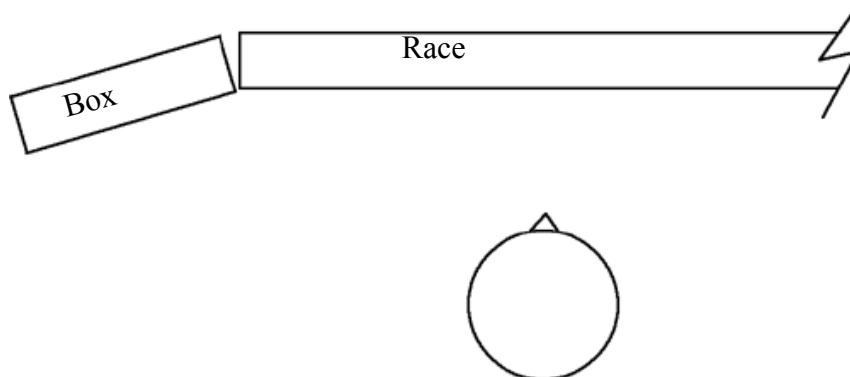
BACKPLATE TILT

The shuttle boxes must carry a slight downward angle relative to the shuttle race. This angle will cause the shuttle to "hug" the race as it travels across. If the boxes are misaligned in the opposite direction, the shuttle will take on an errant trajectory and may "porpoise" off the race — obviously creating an unsafe condition.



BACKPLATE CANT

The shuttle box assemblies must also carry a slight forward angle. In the same way that a bit of downward angle causes the shuttle to stick to the race, a slight forward canting of the backplates will keep the shuttle properly located against the reed as it travels across the loom. (Too much angle will cause the shuttle to bounce off of the reed and exit the loom area.)

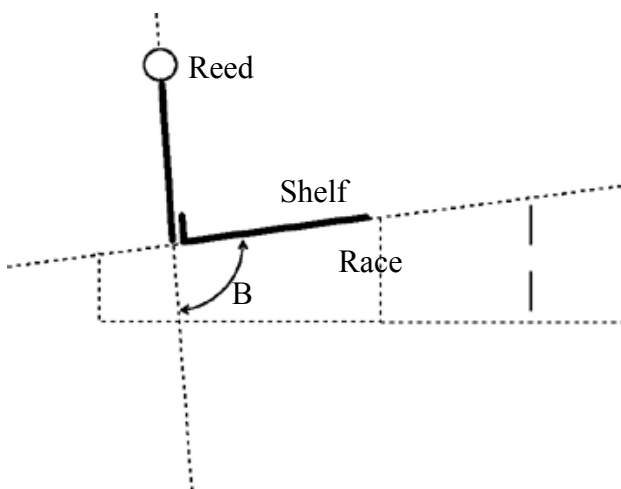


SHUTTLE BOX TO RACE ALIGNMENT

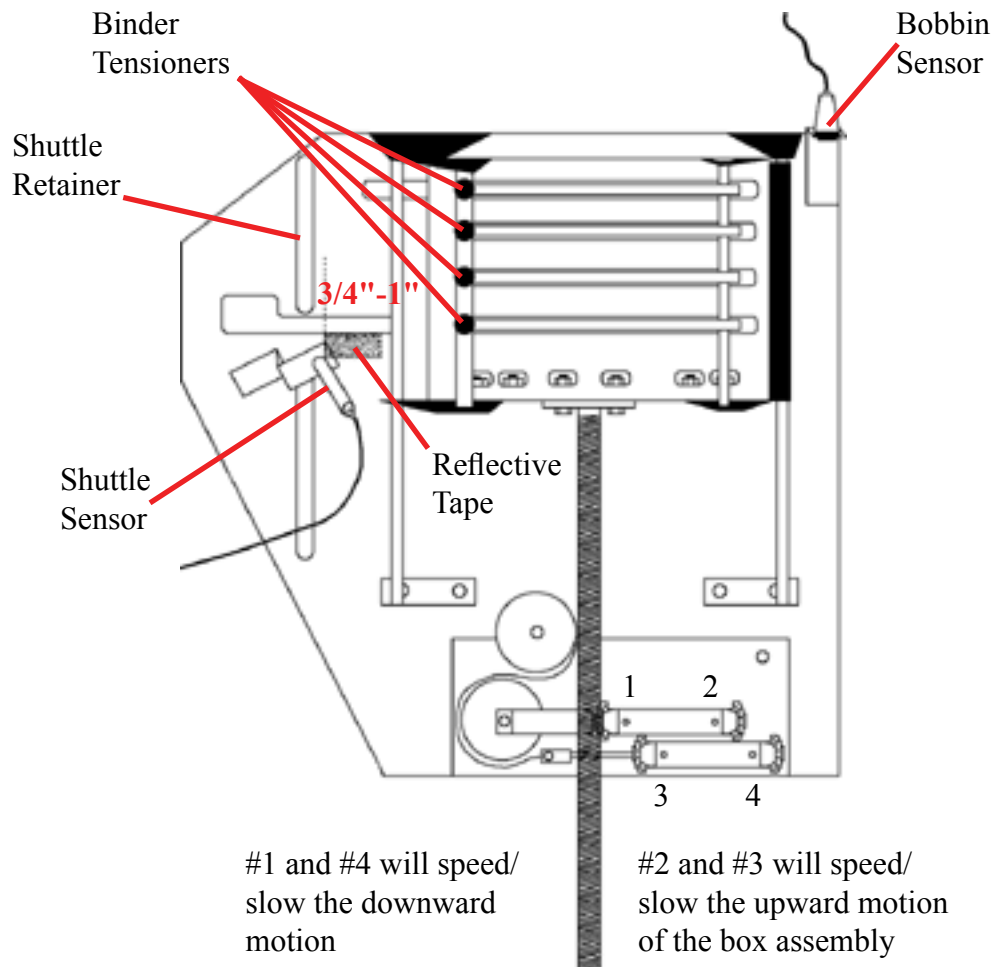
There are two critical alignments to consider here:

- 1.) The *leading edge* of each shelf in the Shuttle Box Assembly must be at precisely the same elevation as the top of the race (alignment "A" in the diagram below). You may check this by laying a straight edge between a box shelf and the race.

Remember: the box assembly will be adjusted at a very slight to no angle, so its only the *edge* of the shelf, immediately opposite the end of the race, that concerns us here. This edge should be at the same height as the top of the race so that the shuttle can make a smooth entry into the Shuttle Box.



If the box shelves are lower or higher than the race, you'll need to loosen the bolts in the large Box Mounting Bracket that attaches the Shuttle Box Assembly to the side of the loom. This will allow you to make the necessary adjustment.



- 2.) The shelves in the box must be in the same plane as the race. If you sight down the end of the race, you'll note that it's cut on an angle. The angle of the shelves must correspond (alignment "B").

Again, if you need to correct this alignment, loosen the Box Mounting Bracket and move the box assembly into position.

BOX TIMING

It's important that you get the timing of your boxes right. If a box moves too slowly, the picker will strike a shelf. If it moves too fast, the assembly will be subjected to constant jarring and possible damage. Because the action of the boxes needs to be synchronous, keep the up/down box speed equal.

MAINTENANCE

The Industrial Dobby Loom is designed to require very little maintenance. We suggest that you observe the following regime, however, you may find that your particular weaving environment requires that you do these things more or less often.

DAILY

- Clean any lint away from the optical eyes and the Compu-Dobby.
- Drain any moisture from the FR.

WEEKLY

- Check the oil level in the FR (if your unit requires lubrication).
- Clean the Compu-Dobby filter (soap and water, air dry).
- Check the loom frame bolts for tightness.

MONTHLY

- Lubricate the Shuttle Box Spring (with teflon spray, "TRIFLOW", for example).
- Clean and grease the Cloth Beam Axle (with any bearing grease).

AS NEEDED

- Check the color on the dryer/filter at back of the computer cabinet. Replace the filter cartridge as recommended by the manufacturer.

MAINTENANCE

GENERAL

You'll probably find that most of the problems you encounter, at least until you've become familiar with the characteristics of the loom, involve shuttles. Each time you change from one yarn to another, you'll need to fine tune the binders on the shuttle boxes and adjust the tensioners in the shuttles themselves. You may also need to change the pressure setting at Regulators SV 4 and 5. Very heavy yarns may require that you turn your shuttles around, so that the yarns feed out between the shuttle body and reed. This lessens the shuttle's tendency to veer or yaw away.

Poor air quality will produce an infinity of **Gremlins**. This can't be stressed enough. Dirt, oil, and moisture in your air delivery system can clog and erode valves and other air components. Affected valves may operate sluggishly or not operate at all. Always use a clean air source.

The shuttle boxes are fitted with various optical sensors. These are part of a larger "traffic control system" — not unlike a modern railway switching system — that prevents two shuttles from firing simultaneously. Keep these, and the reflectors opposite them, free of accumulated lint. If, for some reason, two shuttles do present at the same time, this system will shut the loom down: the shed will open slightly and the loom will abruptly turn off.

TROUBLESHOOTING TIPS

SHUTTLE DOESN'T FIRE

- 1.) Check for correct air pressure (105+ p.s.i.)
- 2.) Check that shuttle has boxed completely
- 3.) Shuttle sensor out of adjustment (see Adjustments section)
- 4.) More than one shuttle presenting:
 - i.) A shuttle may have been placed in the wrong box
 - ii.) A drafting error may have been made; check the program

SHUTTLE WON'T STAY ON RACE

- 1.) Bobbin improperly wound
- 2.) Knot in weft catching on shuttle tensioner
- 3.) Bobbin nearly empty and out of balance
- 4.) Shuttle boxes need to be adjusted (see Adjustments)

SHUTTLE DOESN'T BOX COMPLETELY

- 1.) Insufficient air pressure
- 2.) Binder (shuttle brake) too tight
- 3.) Shuttle boxes need to be adjusted
- 4.) Knotted weft yarn may have hung in the tensioner and impeded shuttle travel; usually, but not always, it stops or derails shuttle

LOOM FIRES ON EMPTY BOX

- 1.) Shuttle sensor out of adjustment (see Adjustments)

LOOMS STOPS -- RED LIGHT IS ON

- 1.) Empty bobbin
- 2.) Two shuttles presenting (see Shuttle Doesn't Fire above)

LOOM STOPS -- GREEN LIGHT IS ON

- 1.) Shuttle not boxed
- 2.) Sensors out of adjustment (see Adjustments)
- 3.) Automatic Advance cylinder too fast

HARNESSES DROP OR DON'T LIFT

- 1.) Compu-Dobby out of adjustment (see Adjustments)
- 2.) Harness springs too tight
- 3.) Auto Advance cylinder is over-powering dobbie cylinder (see Adjustments)
- 4.) Dobby cable controlling errant harness is not engaging in the dobbie finger inside the dobbie head (poor Compu-Dobby adjustment)

AUTOMATIC CLOTH ADVANCE INOPERABLE

- 1.) Auto Advance lever is reversed; screws attaching the lever to the bearing housing should be visible
- 2.) Reed Switch is not properly located (see Reed Switch Location Diagram)

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INCONSISTENT PICK COUNT

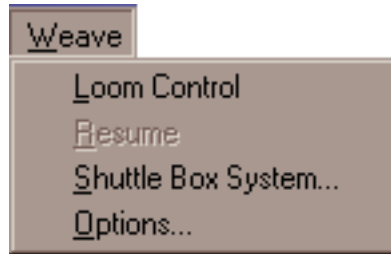
- 1.) Cloth Storage system not on
- 2.) Pressure setting too low or too high at the Cloth Storage regulator
- 3.) T-handle on the Automatic Cloth Advance lever is loose
- 4.) Fluctuations in the air delivery — compressor problem
- 5.) Check the cable at the Tension Arm — it may be crossed
- 6.) If the tension is loosening, the black plastic cord lock on the tension tie-up (in the Tension Arm cable) may be slipping; re-set the tension and tie-off with a piece of cord
- 7.) Loose the screw on the Right Vertical Cap (which holds the Cloth Beam Anti-Rollback Bearing)
- 8.) Beater pressure not correct for particular yarns being woven
- 9.) Cloth Beam Gear not properly meshing with the Automatic Advance Gear; gear mount bracket loose

LOOSE SHED

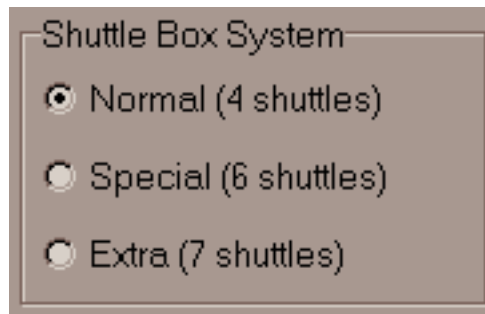
- 1.) Cloth Storage System not turned on
- 2.) Exceeding pick count possible with yarn being woven; this is especially a problem with thick yarns at high pick counts

SHUTTLE BOX SYSTEM

When you click on the Shuttle Box System in the Weave Menu, the Shuttle Box System Window opens.



Choose the Shuttle Box Mode that is appropriate for your project.



The three Shuttle Box Modes:

- 1.) **NORMAL:** one to four shuttles.
- 2.) **SPECIAL:** up to six shuttles -- designed for Tartan weaving. There must be an even number of picks of each color.
- 3.) **EXTRA:** seven shuttle weaving.

WeavePoint gives each color an Index Number. *WeavePoint* for IDL uses these numbers to "tell" the loom which shuttle to launch. To review using the *WeavePoint* Color Palettes and Color Dialog, see the following.

From the *WeavePoint* Manual:

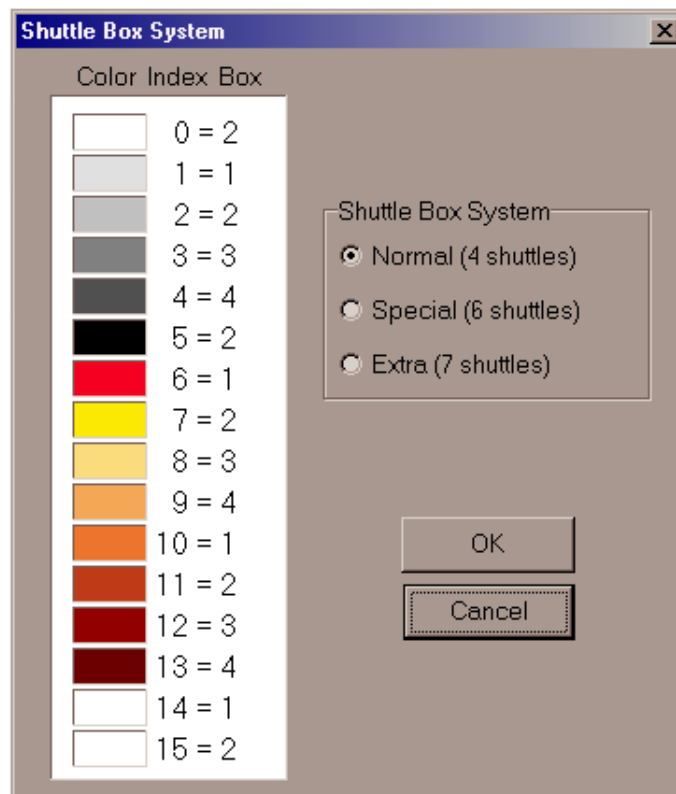
COLOR PALETTE: To access the color palette, click on the icon at the right hand side of the tool bar. The icon looks like four windows in different colors. Once the palette is displayed, you can select the size (number of colors per palette) by clicking at the bar at the bottom of the palette. The smallest size has sixteen colors, then 64, and the largest one has 256. The bar at the bottom of the palette is showing you which color is active and the same color is displayed at the tool bar, next to the color palette icon, in your general window.

Yarn colors are set in the warp color and weft color grids along the threading and liftplan or treadling. You can use up to 256 colors in one pattern. Each color has a **color index number**, ranging from 0 to 255. Each color index can be adjusted to any color you wish within a range of more than sixteen million hues and shades. You adjust a color in the Color Dialog.

Think of it this way: In the color grids, you select different yarns. In the Color Dialog, you dye the yarns. The great advantage when simulating a fabric on the computer screen is that you can dye the yarns even after the cloth is woven.

SHUTTLE BOX MODES

NORMAL is the mode used for most weaving and is the simplest to understand.



Shuttles move from Box 1 on one side to Box 1 on the other side; from Box 2 to Box 2; from Box 3 to Box 3; and from Box 4 to Box 4. The Shuttle Boxes on both sides move up and down together.

In NORMAL mode, use the first five indexed colors (0-4) to indicate the color usage in the pattern draft. (You can actually use the other ten colors, but it is simpler to just use 0-4.) You may want to change the color associated with any Index Number to the color you will actually be using by employing the Color Dialog.

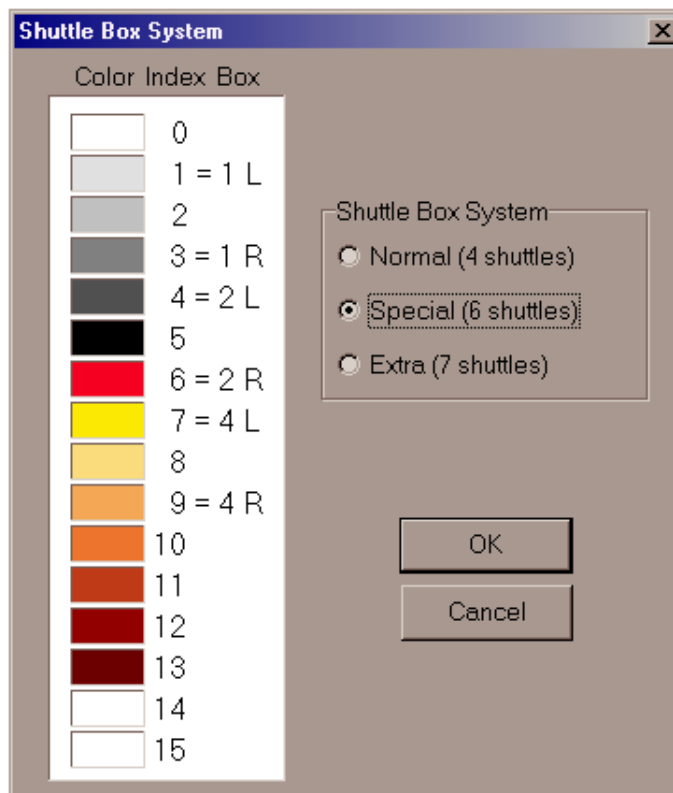
If you are using one color and one shuttle, use the color with Index Number 0 and place the shuttle in Box 2 -- either right or left.

If you are using two colors and two shuttles, use the colors with Index Numbers 1 and 3 and start the shuttles in Box 1 right and 3 left. This helps keep the threads from catching on each other, especially good for pick and pick weaving, i.e., shadow weave or Summer and Winter.

If you are using three or four colors and shuttles, place the shuttles as indicated in the previous table.

In NORMAL mode, your design can have any number of picks of any color in any order.

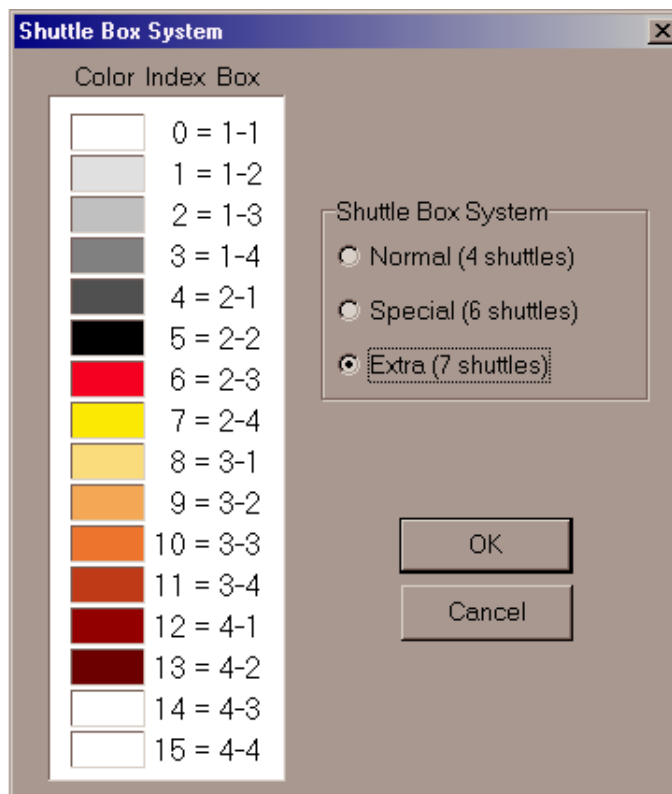
SPECIAL is the mode designed especially for weaving Tartans. You can have up to six shuttles and six colors. The following table shows which Index Numbers to use in the pattern and how to arrange the colors in the shuttle boxes.



You will notice that Shuttle Box 3 remains open on both sides. These boxes are left open to accept any of the six shuttles from either side on the first pick of a pair of picks; on the second pick, the shuttle returns to its original location. There must always be an even number of picks of each color in the design.

Authentic Tartan setts always have an even number of ends and picks of each color. The vast majority of Tartan setts use six or fewer colors. Many only use three or four, for these it is possible to use the NORMAL mode. For setts calling for more than six colors, it is possible to use the optional STOP MOTION feature to stop the loom; switch to Manual operation; to throw a seventh or eighth shuttle by hand; and then go back to the Automatic operation.

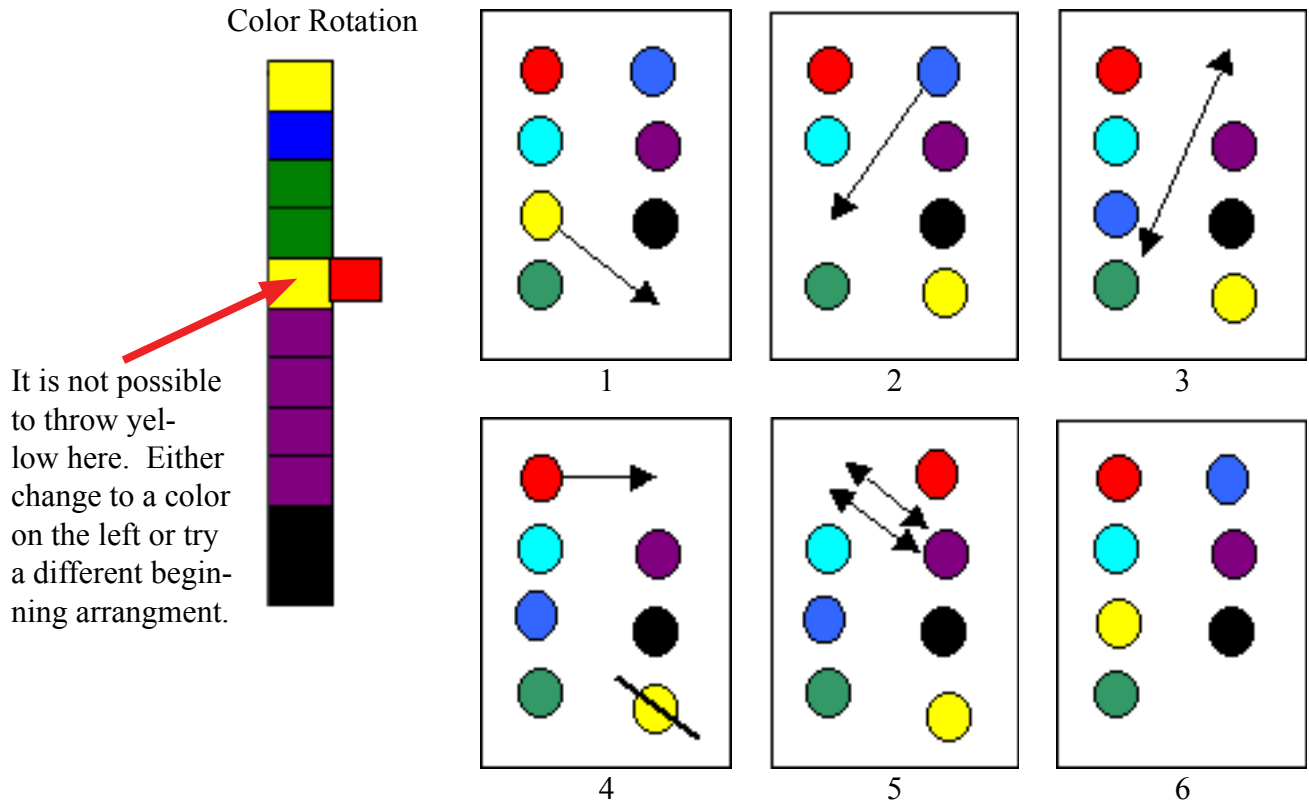
EXTRA is the most complicated mode and is used for weaving with seven shuttles. Both sets of shuttle boxes move independently. Before assigning shuttles/colors to specific box locations, the possible shuttle moves must be determined.



An easy way to work out the possible moves is to use seven colored dots arranged as shown on the next page. Place colors in any order to start, they may need to be rearranged to gain the desired result or the color rotation may need to be changed.

Look at the proposed color rotation below. The first color to be used is on the left; move it to the open space on the right. The next color is on the right and moves to the open space on the left. Then the third color moves to the open space on the right and back to its original spot. At the fourth color change, we see that there is not an open box to accept the yellow shuttle. It is necessary to either change the color rotation or rearrange the color dots and start again. Continue moving the colors from side to side, rearranging or editing as needed.

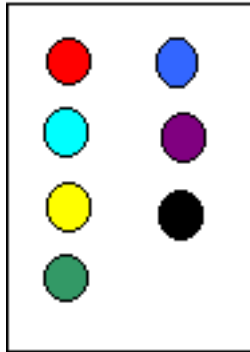
SHUTTLE MOVES



When the desired result is achieved, arrange the shuttles in the boxes as indicated by the table on the following page.

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Use the color order established in the previous exercise to determine shuttle placement and the Index Numbers to use in the pattern draft. Use the Color Dialog as needed to change the hue associated with a particular Index Number.



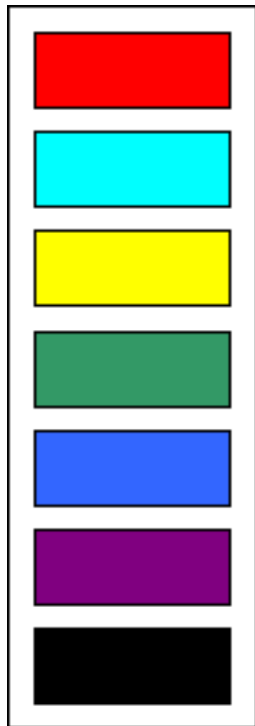
SHUTTLE BOXES

Sample Colors

Index Number

Left

Right



could be # 0, 1, 2, or 3	1	
could be # 4, 5, 6, or 7	2	
could be # 8, 9, 10, or 11	3	
could be # 12, 13, 14, or 15	4	
could be # 0, 4, 8, or 12		1
could be # 1, 5, 9, or 13		2
could be #2, 6, 10, or 14		3

TROUBLESHOOTING

ADJUSTING THE SHUTTLE SENSORS AND THE LOWER DOBBY SENSOR

Symptom: the left picker is firing when there is no shuttle in the box. So, the adjustments to make are:

Remember: ALL ADJUSTMENTS AND OBSERVATIONS MUST BE MADE WHILE LOOM IS ON AND IN THE MANUAL MODE!

- 1.) Adjust the shuttle sensors - in the PLC, when the shuttle is in the right box, #12 will light and #13 for the left side box. You need to check the alignment of the sensors mounted at the side and in front of the shuttle boxes. They have a little red light on the end that will light when the shuttle is in the box. If this sensor is out of alignment, the red light will be on because it thinks there is a shuttle in the box (because the beam of light it emits is not returned by the little piece of reflective tape placed to reflect the light back to the sensor).

To make the adjustment, remove the shuttles, loosen slightly the bolts that hold the shuttle sensors in place. Adjust their alignment until the little red light goes out and the beam of light is reflected back by the reflective tape. Carefully re-tighten the bolts.

- 2.) Adjust the sensor at the bottom of the Dobby Cylinder - In Manual Mode, lower the Dobby Arm, allowing the harnesses to rise completely. Input light #015 should blink and go off. If it does not go off, but stays lit, the sensor is not high enough. With the Arm still down, loosen the sensor and gently slide it up on the cylinder until the light goes out. THEN MOVE THE SENSOR UP ANOTHER 1/8". Gently retighten the sensor in its new location.

Slowing down the video showed us that the loom does not know where the shuttles are, because the picker is firing, even when there is no shuttle present AND the pickers are firing more than once during a shed cycle because the loom thinks the Dobby Arm is still moving down, even though it has reached the bottom. It is waiting for the light to blink off, but I bet it is staying on.

Please note: You have to run the loom in the Manual Mode or you will not be able to see clearly what lights are blinking with what instructions are being sent to the loom. TESTING MUST ALWAYS BE DONE IN THE MANUAL MODE. It is the only way to accurately observe the activity of the loom, PLC, and corresponding lights.

INDUSTRIAL DOBBY LOOM MANUAL

ADJUSTMENT OF THE DOBBY SPEED/SLIDE PLATE

Problem Solving – Loom runs in Manual Mode but will not run in Automatic Mode

Issue – The most likely reason for this issue is a timing problem in the synchronization between the movement of the Slide Plate and the Beater Bar. If the Slide Plate is down (and the harnesses are fully raised), but the beater is not in its back position, the shuttle will fire *behind* the beater. *This is a safety issue* and so the program will stop the loom.

Ideally, as the Slide Plate reaches it's lowest position and the harnesses rise to their highest position, the Beater Bar is moving back to its furthest position. Then, and only then, should the shuttle fire. Getting this correct sequence into the shortest possible time frame will optimize the speed of the loom and your production on it, while helping to maintain a safe work environment.

STEPS FOR ADJUSTMENT OF THE SLIDE PLATE

- 1.) Preparation
 - Turn the loom OFF
 - Remove ALL shuttles and
 - Loosely cover one shuttle sensor (not both)
 - 2.) Locate and close the valve at the bottom end of the Dobby Cylinder
 - To close the valve, turn it all the way to the right until it stops
 - Now, open it up *one full turn*, to the left
 - 3.) Turn the loom ON and switch to AUTO. Press the RUN button.
The loom will move through the full cycle, slowly.
 - A full cycle will be:
 - The Slide Plate will pull down;
 - the Harnesses will lift
 - The Beater will move all the way back
 - The Slide Plate will reach its lowest point and
 - the Shuttle will fire
- Note:** this is an optimal time to trouble shoot other systems (Automatic Advance, Cloth Storage)
- 4.) While the loom is running, gradually turn the valve to the left (see step 2.), opening it and speeding up the movement of the Slide Plate.

- 5.) Continue to increase the speed until THE LOOM STOPS. At this point, the loom has stopped because the Slide Plate is getting into position before the beater is all the way back. The loom has stopped to prevent the shuttles from firing behind the beater.
- 6.) Now that the loom has stopped, close the valve by about one full turn. Restart the loom. If the loom stops again, continue to close the valve in small increments until the loom runs consistently when turned on.
- 7.) Remove the cover on the shuttle sensor. Reinsert your shuttles and resume weaving!

FIRING SEQUENCE FOR THE IDL (AUTOMATIC MODE)

Normal Sequence

- 1.) Automatic Advance
- 2.) a. Dobby Down, b. Beater Back
- 3.) Shuttle fires
- 4.) a. Dobby Up, b. Beater Forward
- 5.) This sequence, 1-4, is repeated

To check that this sequence is supported with correct timing, you will need to watch the actual mechanisms on the loom as well as the sequence of the lights in the PLC. Input and Output refer to the small light array at the right, center of the Programmable Controller, and will indicate sensors as well as firing sequences (see PLC Controller Schematic for specific part references).

To begin: Control is in Manual Mode. Input #015 will stay on while loom is in Manual Mode.

1.) Cloth Advance

- Input #009 – blinks and goes out
- Output #200 – fires the Automatic Advance Cylinder

2.) A. Beater to Back Position

- Sensor Input: #011 (retracted and ready to extend), Output: #201

B. Dobby - Opens Shed

- Input #015, Output #202, Input #015 (sensor is at bottom of cylinder, so Input #015 blinks to show down position, but piston continues past, so it will not stay lit)

Note: If the bottom magnet is too far down, the loom will continue to try to fire shuttles. It is important that #015 blinks and goes out. If it continues to blink, it will be necessary to adjust the Slide Plate.

3.) Shuttle Fires

- Right Hand Shuttle – Input #012, Output #203
- Left Hand Shuttle – Input #013, Output #204

4.) A. Beater to Forward Position

- Sensor Input #010 (extended and ready to retract), Output #201

B. Dobby - Closes Shed

- Input #015 (blinks only), Output #202

TESTING THE FIRING SEQUENCE FOR THE IDL (MANUAL MODE)

Normal Sequence

- 1.) Automatic Advance
- 2.) a. Dobby Down, b. Beater Back (beater will move back automatically when loom is switched to Manual Mode)
- 3.) Shuttle fires
- 4.) a. Dobby Up, b. Beater Forward
- 5.) This sequence, 1-4, is repeated

To check that this sequence is supported with correct timing, you will need to watch the actual mechanisms on the loom as well as the sequence of the lights in the PLC. Input and Output refer to the small light array at the right, center of the Programmable Controller (see PLC Controller Schematic for specific part references).

To begin: Control is in Manual Mode. Input #015 will stay on while loom is in Manual Mode.

1. Cloth Advance – Tabby Button

- Input #100 – blinks and goes out
- Output #200 – fires the Automatic Advance Cylinder

2. A. Beater to Back Position

- Sensor Input: #010 (extended and ready to retract), Input: #103, Output: #201 (lights up and turns off-default setting)

B. Dobby - Opens Shed

- Input #101, Output #202, Sensor Input #015 (sensor is at the bottom of cylinder, so Input #015 blinks to show down position, but piston continues past, so it will not stay lit)

Note: If the bottom magnet is too far down, the loom will continue to try to fire shuttles.

3. Shuttle Fires

- Right Hand Shuttle – Input #012, Output #203
- Left Hand Shuttle – Input #013, Output #204

4. A. Beater to Forward Position

- Sensor Input: #011 (retracted and ready to extend), Input #103, Output #201 (will remain on until beater changes position)

B. DOBBY - CLOSES SHED

- Input #101, Output #202 (blinks when fired)