SEWING THREADS

1. CLASSIFICATIONS

   A. Fixed weight (cotton count) number of hanks of 840 yards per pound.

      Example:

         1 indicates 840 yards of weights 1 pound

         1 count means 2 times 840 yards of yarn weights 1 pound

   B. Fixed length (Tex)

      1. Tex = weight in grams of 1000 meters.

      2. Denier count = weight in grams in 9000 meters.

II. SEWABILITY CHARACTERISTICS

   A. Features

      1. Lubrication

      2. Freedom from faults

      3. Correct and stable twist balance

      4. Loop formation (continued on next page)

4. (cont'd) Physical Properties

   a. Tensile strength:

      The tension at which thread breaks.

   b. Tenacity:

      The relative strength of a fiber. (The thicker the thread is the stronger it will be.)

   c. Elongation at break:

      The amount by which a thread is extended at its breaking point expressed as a percentage of its original length.

   d. Elasticity:

      The property of a thread by which it tends to recover to its original length after being extended by a set amount.

      Example:

      1. Rubber band 100% return

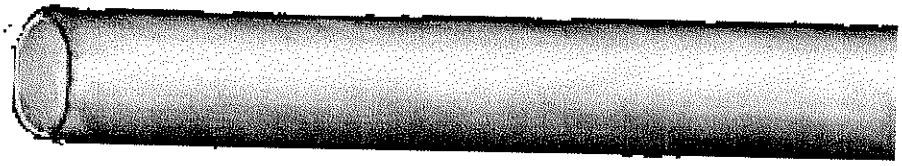
      2. Smocking

      3. Tension to set stitch

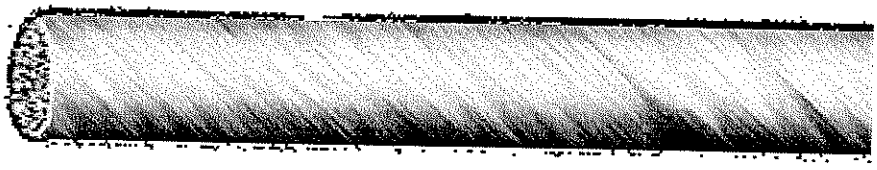
YARN CONSTRUCTIONS

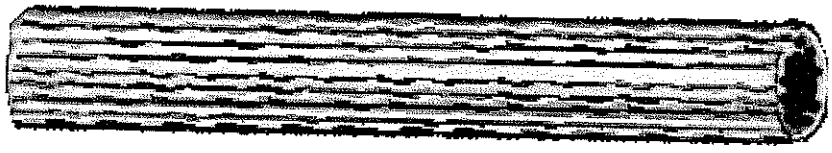
Spun

Monofilament



Multifilament





Monocord

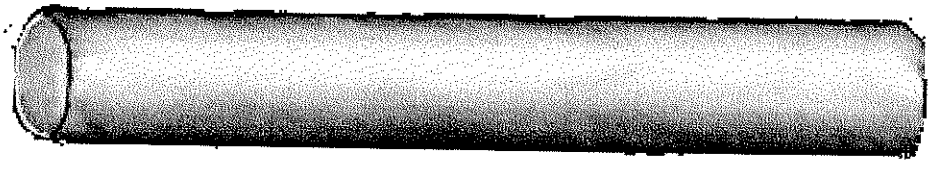
Textured

Core

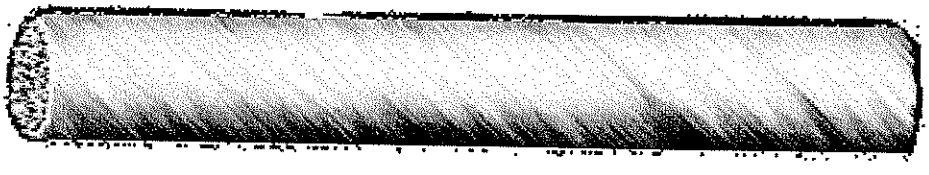
INDUSTRIAL SEWING THREADS

SPUN SEWING THREADS – can be made from either cotton, rayon, or polyester staple which is spun into a singles yarn and then plied to make a sewing thread. Spun yarns have fuzz on their surface giving them a soft hand and good lubricity characteristics. Sometimes spun cotton threads are "gassed" by passing them through a flame at high speed to reduce the fuzz giving a more brilliant appearance. Spun threads will pull apart easily if the twist is backed out of the yarn. (Equity, Super-Delray, Winton, Sewkay Plus, etc.)

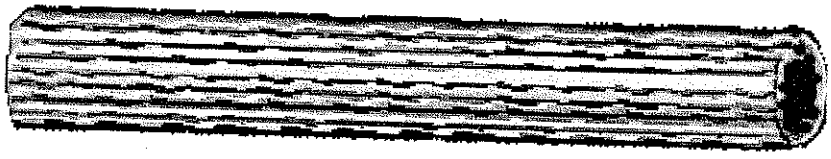
MONOFILAMENT THREAD – is a single filament resembling fishing line. It is formed by extruding a continuous filament through a spinneret with a specified diameter. Usually monofilament threads are used in blindstitch operations because the thread is translucent and blends in with many colors. It is also very inexpensive when compared to conventional sewing threads.
(Clearion)



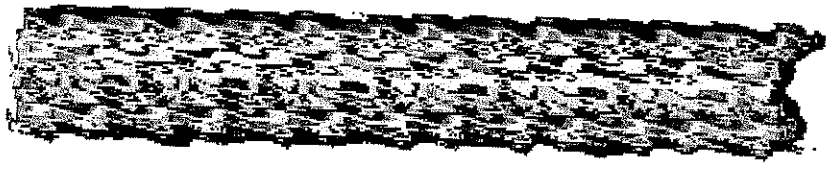
MULTIFILAMENT THREAD – is made of nylon or polyester continuous filaments which have been twisted together into a cohesive bundle. It is used for seaming everything from bathing suits to automobile upholstery. It is available in either its soft form or with an additional bond for better ply security and abrasion resistance. (Twistion and Polytwist)



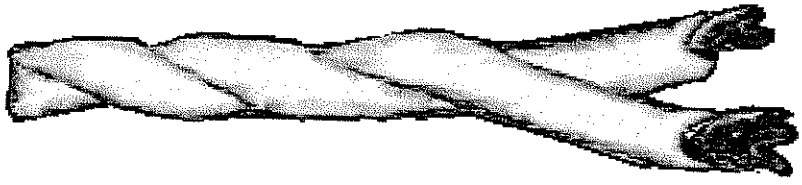
MONOCORD THREAD – is made from continuous filaments of nylon or polyester which have been bonded together. They have very little twist so that it looks like a single cord of yarn. Monocord threads are used in manufacturing furniture, shoes, and other heavy-duty applications, as well as blindstitch operations on slacks and coats. (Flexlon and Hemshire)



TEXTURIZING SEWING THREAD – is made from either polyester or nylon continuous filaments that have been entangled by mechanical or other means. It is available with varying degrees of entanglement and can be made from different tenacity fibers to reduce its cost. Texturized threads are ideal for looper positions and depending on the degree of entanglement and tenacity, can also be used in needle positions to give optimum thread cost savings. (Max-Tex and Sergetex)



CORE THREAD – is made by spinning a cotton, rayon, or polyester around a continuous filament bundle of fibers giving the thread the advantages of a spun and filament construction. When using a cellulosic cover of cotton or rayon. It also has very good heat resistance. Core threads are used in everything from fine blouses to heavy overalls and coveralls. (ONCORE)



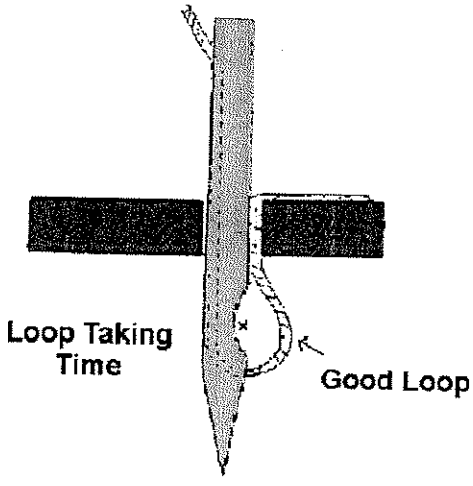
THREAD SELECTION

Presented by Threads USA

There are a number of factors that should be considered when purchasing sewing threads. Some of these include:

- Sewability
- Size
- Strength
- Twist
- Seam performance
  - Seam strength
  - Seam appearance
  - Abrasion resistance
  - Chemical resistance
- Color availability and fastness
- Putup type and size
- Service and quality
- Thread cost

SEWABILITY – The two most common sewing problems related to the performance of a thread on a sewing machine are skipped stitches and thread breakage. Both of these problems can occur if an improper needle loop is formed. The size of the needle loop formed and the right angle that is formed in relation to the needle are factors that can vary from one thread type to another.

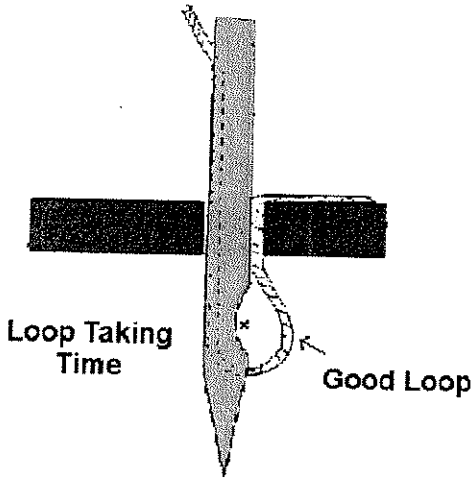


NEEDLE LOOP FORMATION – Regardless of the thread type, needle loop formation is dependent upon the upward motion of the needle in conjunction with the pinching action of the fabric against the thread on the scarf side of the needle. As the needle rises, the pinched thread will form a needle loop.

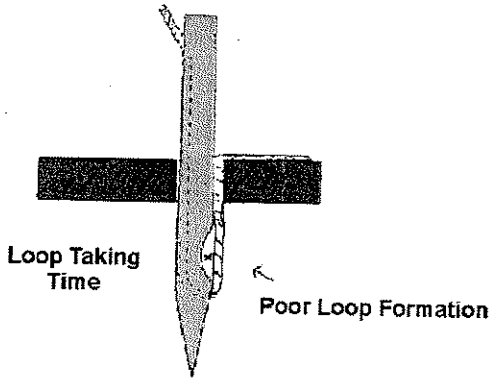
If the thread is not pinched or if the material moves up with the needle, poor needle loop formation will occur and skipped stitches are likely.

Most synthetic threads will recover immediately after stretching thus minimizing grinning in the finished seam. The amount that a thread stretches and when it stretches is dependent upon the physical characteristics of the fibers used to make the thread. For example, a 100% cotton thread will only elongate 3 or 4% until it breaks, as compared to 15-25% on many spun polyester and core type threads.

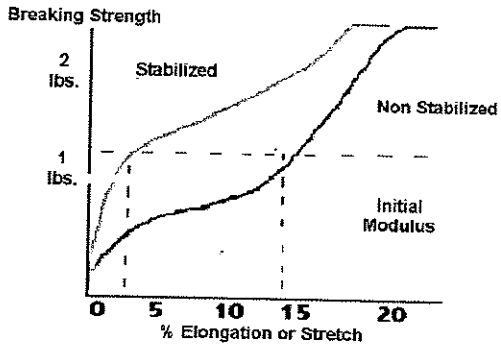
As you can see from the preceding comments, the size of the needle loop formed during sewing is directly related to the amount that the thread has been elongated as it goes through the machine's thread handling system. If the thread is stretched only a small amount, a needle loop will form as soon as the needle begins to rise. The size of the loop will be large enough to make a good target for the hook point of looper to enter.



If a thread is elongated a large amount as it passes through the machine, as the needle rises from the bottom of its stroke the thread will recover before a needle loop is formed. In severe cases, a needle loop will not be formed at loop pick-up time and skipped stitches or thread breakage will occur. (Figure 6) Most mechanics have found that by reducing the machine thread tension and slowing or retarding the timing of the hook or looper a larger loop will be formed reducing sewing problems.

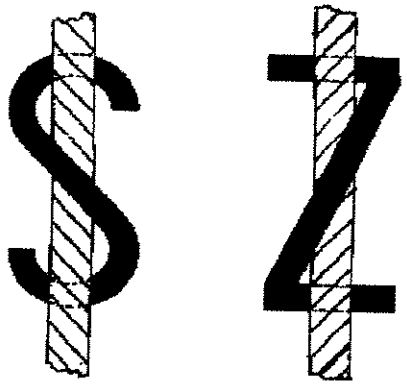


Some synthetic sewing threads made of polyester or nylon are "stabilized" to reduce the amount that the thread stretches under normal sewing tensions. This stabilization creates a higher "initial modulus" in the thread which means it has a greater resistance to stretching. A nonstabilized thread may stretch 5–10% under normal sewing tensions as compared to 1-2% with a stabilized thread.



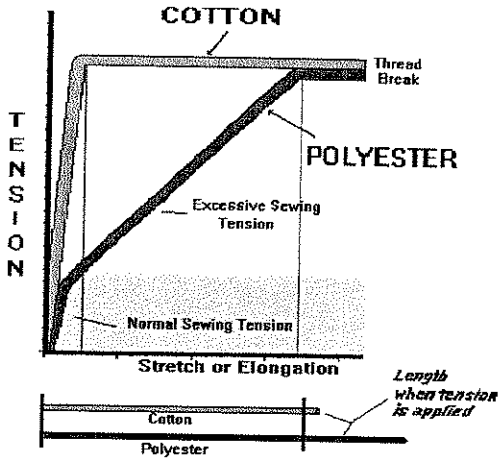
THREAD TWIST – Some synth Improper thread twist or using a thread with the wrong twist direction can cause skipped stitches and thread breakage. Most sewing machines require a "left-hand" or "Z" twist because most stitch forming devices approach the loop from the right-hand side of the needle. A "left-hand" twist thread will normally throw the needle loop toward the hook or looper.

A thread with an improper twist construction may have excessive torque in the thread causing the thread to "kink" or "pig-tail". This condition can cause the thread to knot up before it goes through the machine tensions or cause a well-formed needle loop to twist around the needle and collapse the needle loop. Excessive machine thread tension applied to the thread will increase this excessive torque condition in the thread.



Right or "S" Twist **Left or "Z" Twist**

THREAD DURABILITY – From the preceding comments, you can see how important thread tensions are to the performance of sewing threads. The durability of a thread is dependent upon its strength, size, ply security, and uniformity. Generally, the larger the thread size the greater the thread strength. For example, a Ticket 100 core thread will break at 2.5 lbs., and a Ticket 50 core thread will break at 4.0 lbs. This is true if we are talking about the same type and construction of thread but can vary when changing fibers and construction. A Ticket 50 cotton thread will break at 2.1 lbs. while a Ticket 100 core thread will break at 2.5 lbs. even though the core thread is only half the size of the 100% cotton thread.



PLY SECURITY – Ply security speaks of the ability of the fibers in the thread to stay together in a cohesive bundle during the sewing process. Ply security is dependent upon the twist construction of the thread. If the thread has been coated with a bond of glazed finish or the degree of entanglement in texturized sewing thread. Machine thread tension and lubricity characteristics of the thread can also affect ply security.

Ply security is of particular importance when sewing on lockstitch machines due to the way the thread twists around the hook and the numerous times that the thread is carried back and forth through the needle eye and other thread contact surfaces in the hook.

Ply Security is dependent on:

- Twist Construction
- Bonded or Glazed finish
- Degree of Texturing

When sewing very dense and heavy fabrics like leather, vinyl, cardboard, etc., a bonded or glazed thread is recommended due to the heavy tensions that the thread is subjected to in order to set an acceptable looking stitch. This special thread is usually only required in the needle position and not in the looper or bobbin.

When the ply security of a thread is broken down, the fibers in the thread can be split and "skinned back" causing the thread to break.

UNIFORMITY – Good Good sewability and stitch appearance are dependent upon having a uniform diameter sewing thread with a consistent low friction thread lubricant. Sometimes thread breakage and unbalanced stitches can be attributed to defects in the thread. These defects can be classified as neps, slubs, knots, kinks, improper twist, etc. which are inconsistent thicknesses in the thread. The smaller the diameter of the needle being used, the more critical it is to have a uniform, consistent thread. Continuous filament threads and core threads are more uniform in diameter and strength than spun thread constructions.

THREAD LUBRICANTS – The purpose of a thread lubricant is to allow the thread to pull through the machine thread handling system with good lubricity characteristics and to protect the thread from needle heat. Thread lubricants can be applied in the dye bath with exhaust-type finishes or applied during winding with a "kiss-roll" application. Generally, a larger thread size requires more thread finish to protect the thread. A good thread lubricant should allow the thread to pass through the machine with a uniform, low drag with minimum "chatter" regardless of the sewing speed.

NEEDLE HEAT – Needle heat is a cause of many thread breaks when sewing thermoplastic threads made of nylon or polyester. Generally, these thread breaks occur when the sewing operator stops after making a long, high-speed run. At this time, the thread comes to rest in the needle eye which is much hotter than the melting point of the thread. Usually, a needle-heat problem can be detected by feeling the end of the thread that has broken and seeing if it has a hardened surface where the thread melted or resolidified.

Needle heat is generated by the rubbing action of the needle balde with the fabric. Both the thickness of the seam and the speed at which the needle is moving through the fabric affect the amount of needle heat generated. If the needle heat is a problem, most manufacturers will take the following steps to reduce the problem:

- Reduce the needle size
- Use a ball-eye or oversized ball-eye needle
- Use a special coated needle (teflon, etc.)
- Make sure the thread has been finished properly
- Go to a 100% cotton thread or core thread with a cellulosic wrap
- Use additional lubricants
- Blow forced air on the needle

FIBER CHARACTERISTICS

CELLULOSIC (COTTON AND RAYON)

Origin	Plants
Strength/Size	Low
Elongation	Low
Heat Resistance	Very Good
UV Resistance	Fair
Shrinkage	Low*
Colorfastness	Fair**
Abrasion Resistance	Poor
Chemical Resistance	Poor

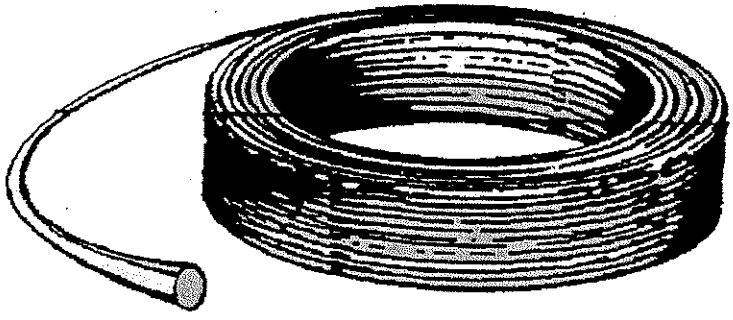
* Low after being made into sewing thread.
** Varying degrees of colorfastness depending on the dyes being used. Generally, not as good as polyester.

THERMOPLASTICS (POLYESTER AND NYLON)

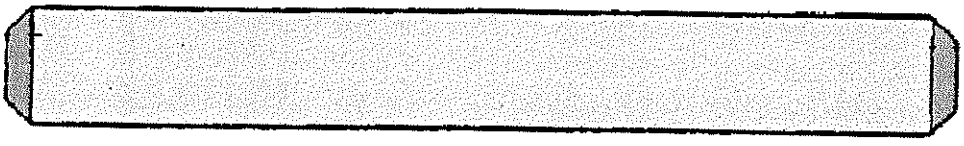
Origin	Man-made by petrochemicals
Strength/Size	High
Elongation	High
Heat Resistance	Fair
UV Resistance	Very Good*
Shrinkage	Low
Colorfastness	Very Good*
Abrasion Resistance	Very Good*
Chemical Resistance	Very Good*

* Polyester is better than nylon.
** Nylon is better than polyester.

MANUFACTURING STEPS TO PRODUCE A NEEDLE



COIL – WIRE



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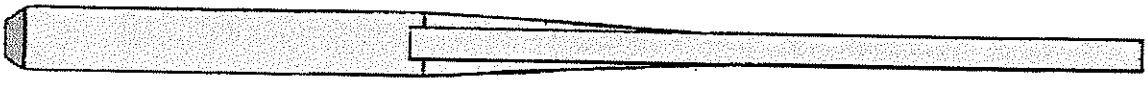
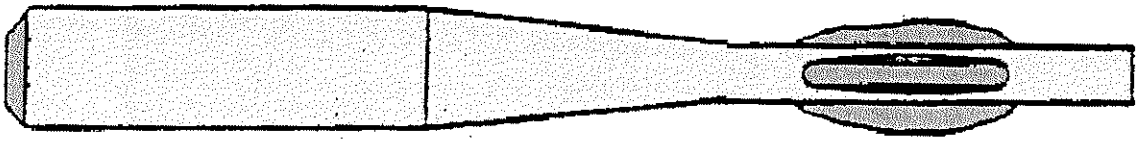


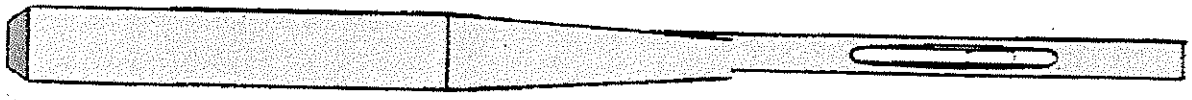
SWAGE



STRIKE GROOVE

PIERCE EYE

MANUFACTURING STEPS TO PRODUCE A NEEDLE



MILL FLASH

MILL GROOVE

POINT

HARDEN

STRAIGHTEN

POLISH

FINISH POINT

BUFF – TUMBLE

NEEDLES

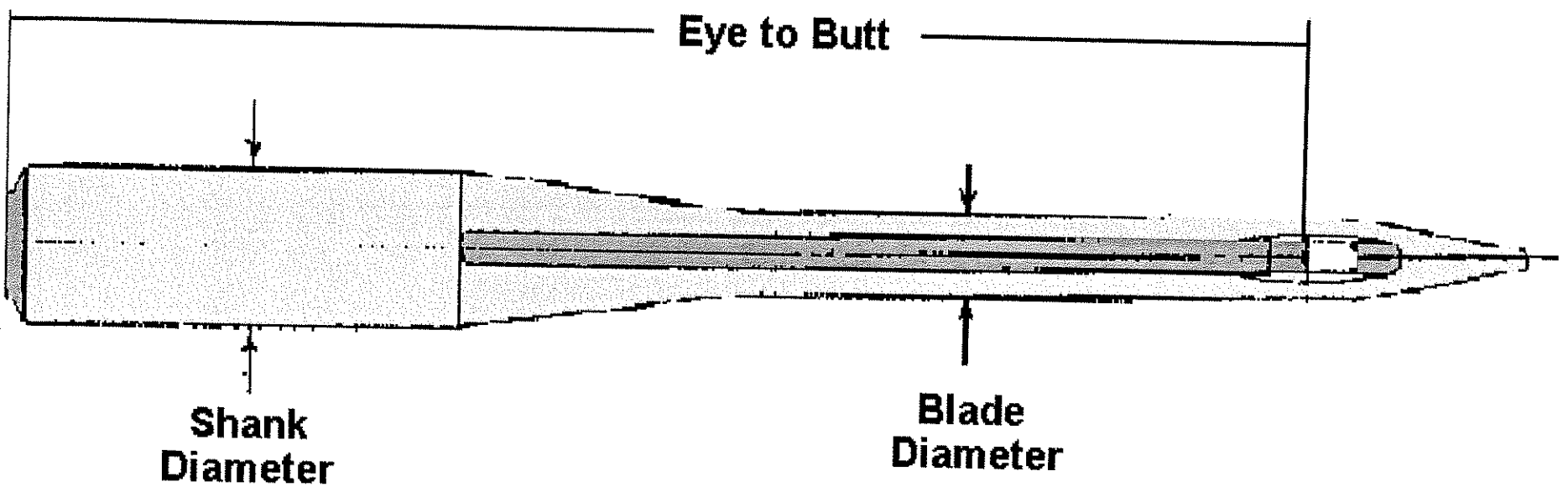
A. The functions of the sewing machine needle are:

1. To produce a hole in the material for the thread to pass through.
2. To carry the needle thread through the material and form a loop which can be picked up by the loop taking device.
3. To pass the needle thread through the loop formed by the looper mechanism on machines other than lockstitch.

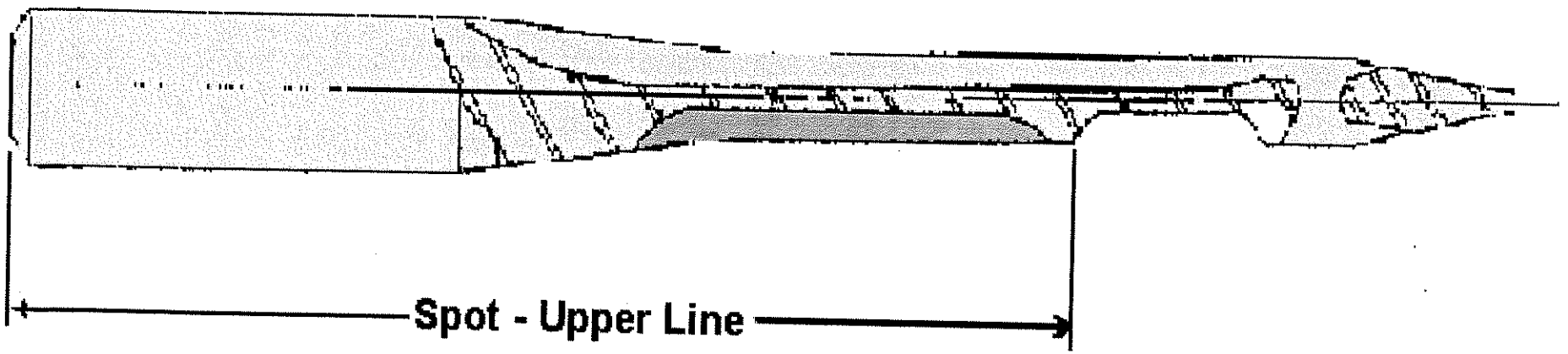
B. Machine needles are identified by system, size, and point.

1. System
2. Size
3. Point

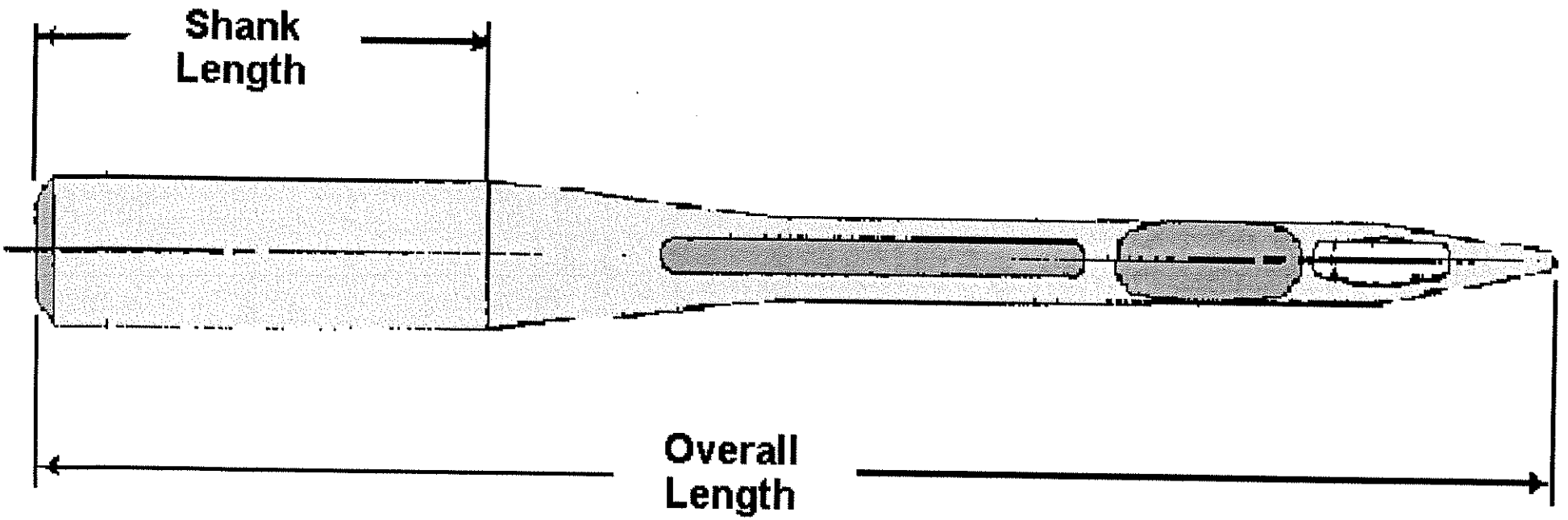
NEEDLE SIZE AND DIMENSIONS



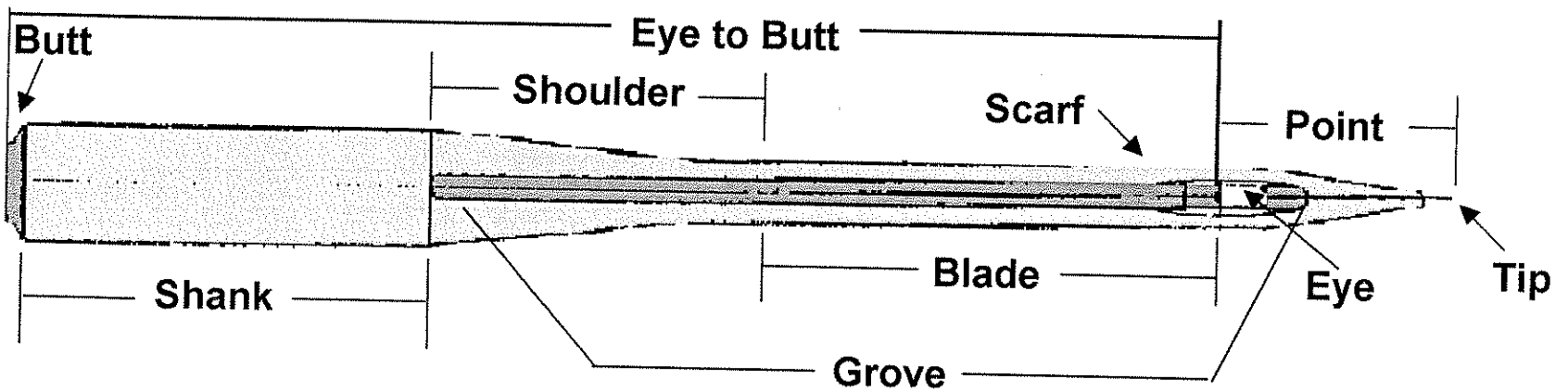
NEEDLE SIZE AND DIMENSIONS



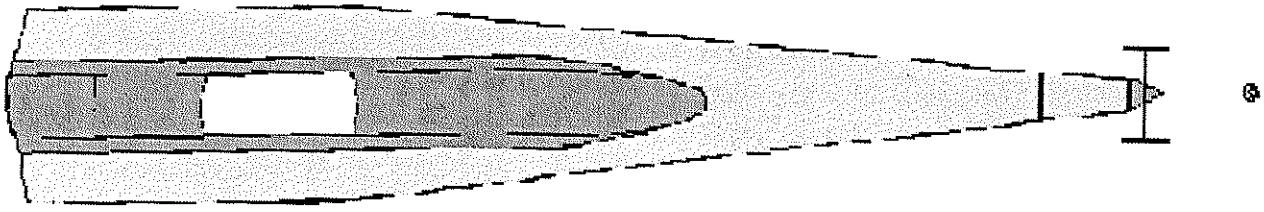
NEEDLE SIZE AND DIMENSIONS

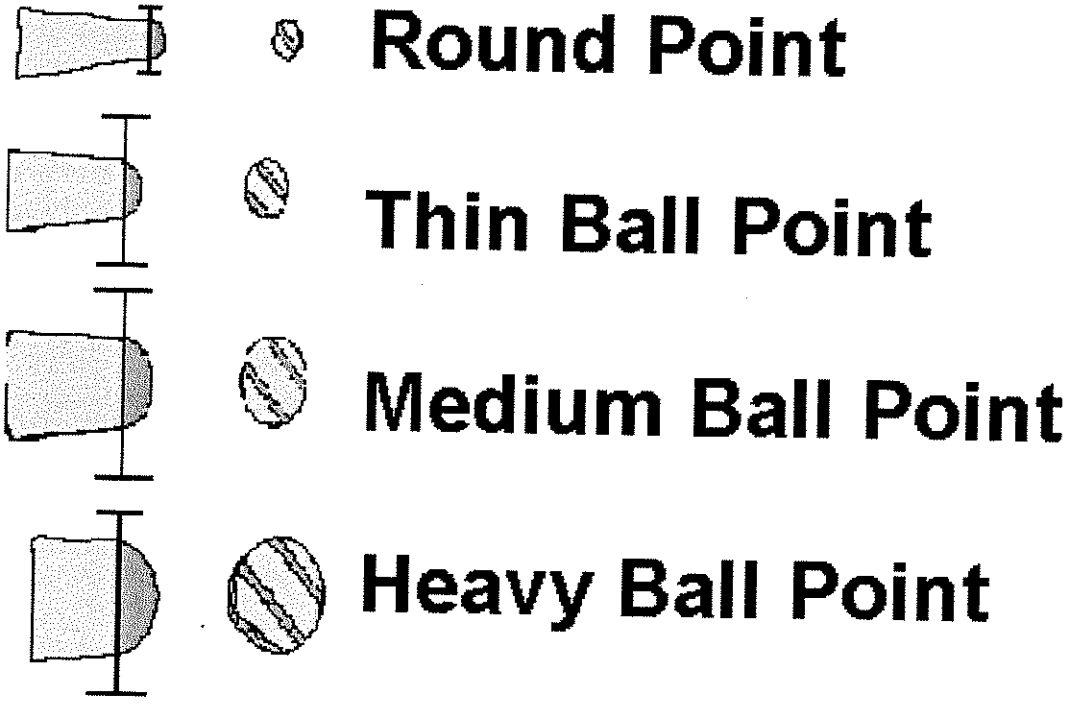


NEEDLE NOMENCLATURE



CLOTH POINTS NEEDLES



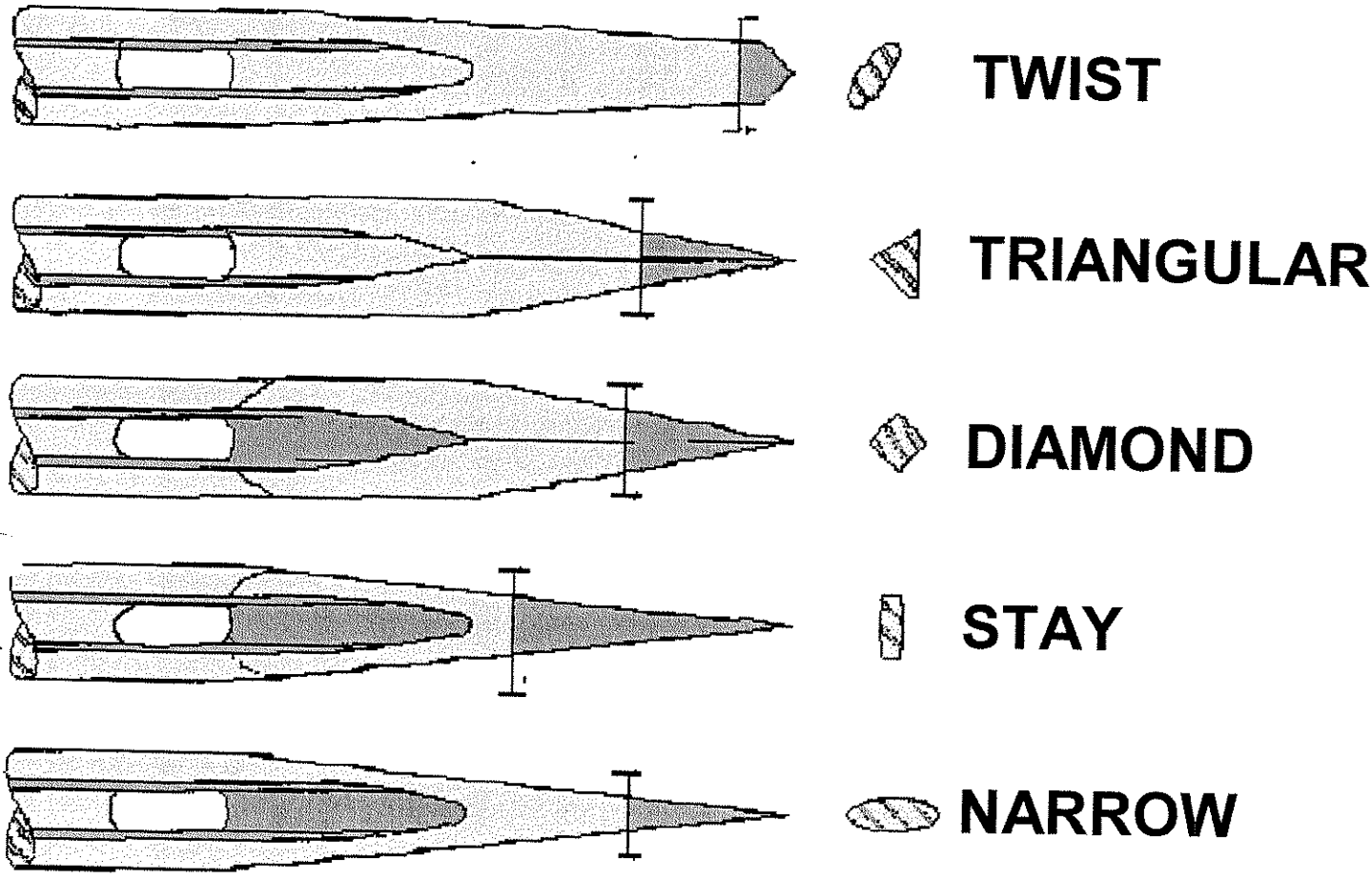


POINT SELECTION GUIDE

Light warp knit	#23		
Knits	#43	#44	
Tightly woven, very dense	#1	#23	
Light to medium woven	#23	#43	#44
Medium to heavy woven	#43	#44	#45
Elastic	#43	#44	#45

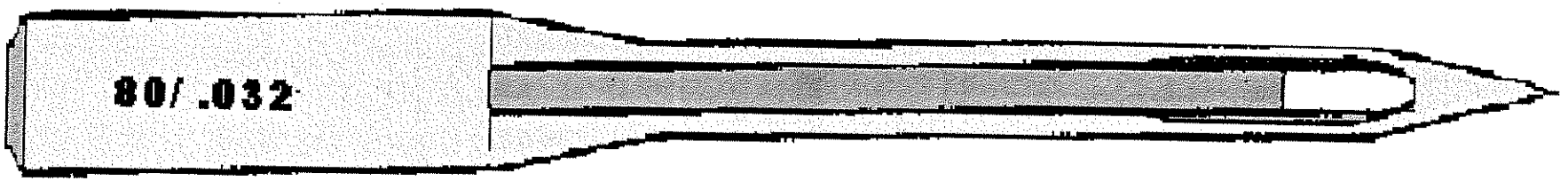
Note – As a rule, the coarser the fabric thread, the heavier the ball point

CUTTING POINTS FOR LEATHER

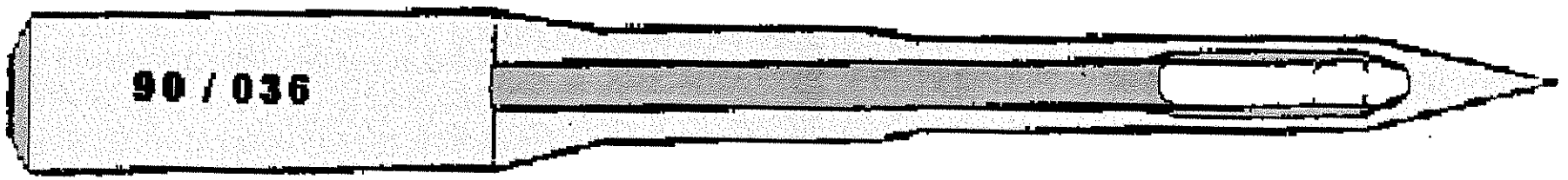


Leather points are generally used for stitching hard leathers and similar materials. The primary function of the point is to cut the material for easier penetration. This reduces friction and heat. The secondary function is to provide a decorative stitch. Only such factors as seam appearance and the number of stitches per inch determine the correct leather point.

BLADE TYPES

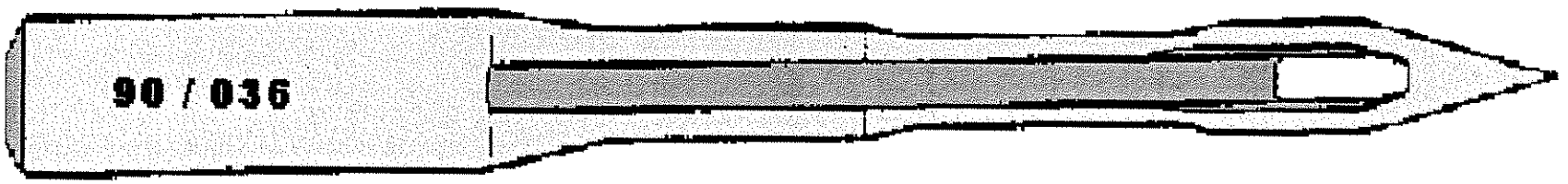


Straight Blade



Reinforced Blade

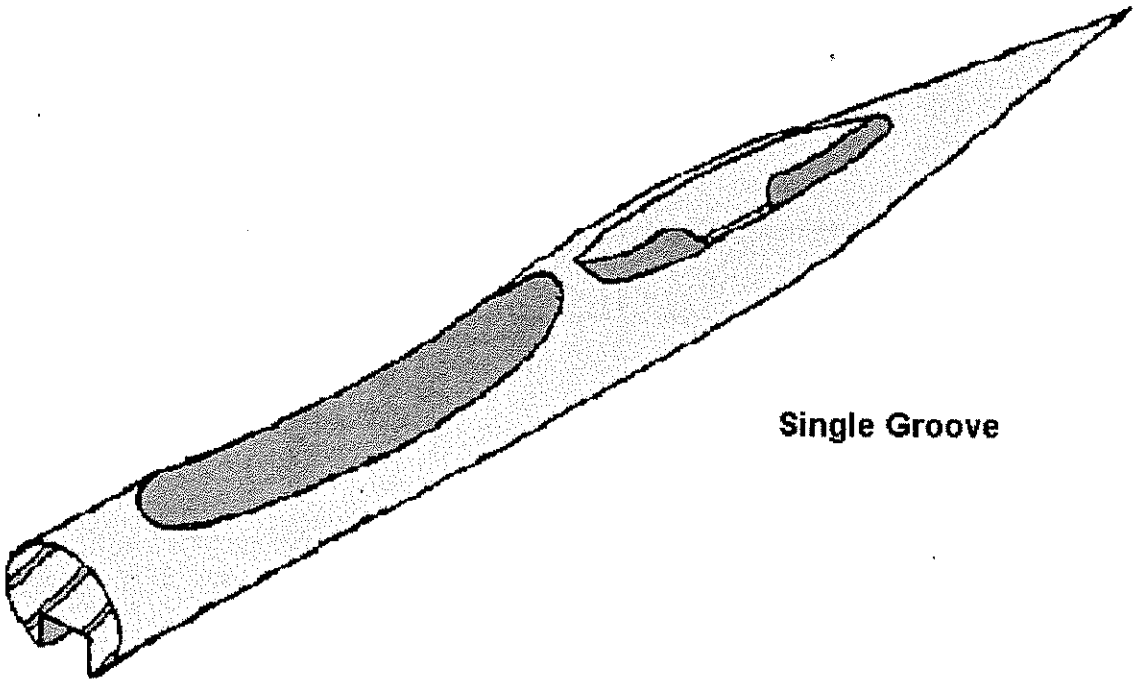
BLADE TYPES



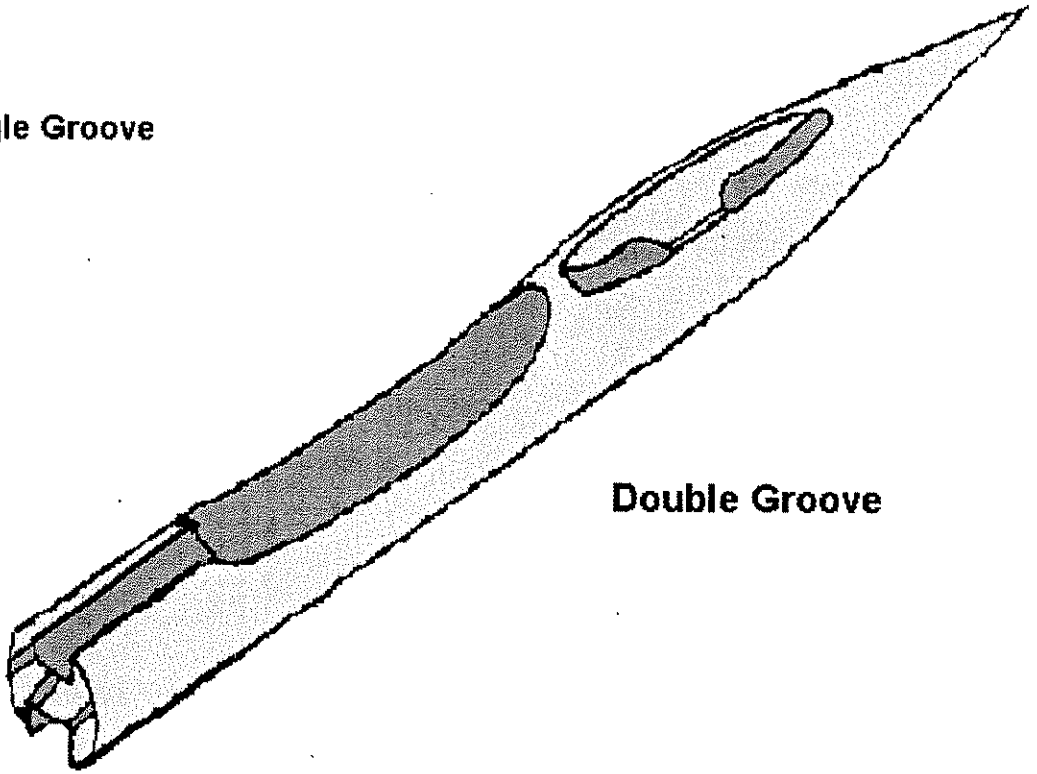
Ball Eye Type

Taper Blade

GROOVE TYPES

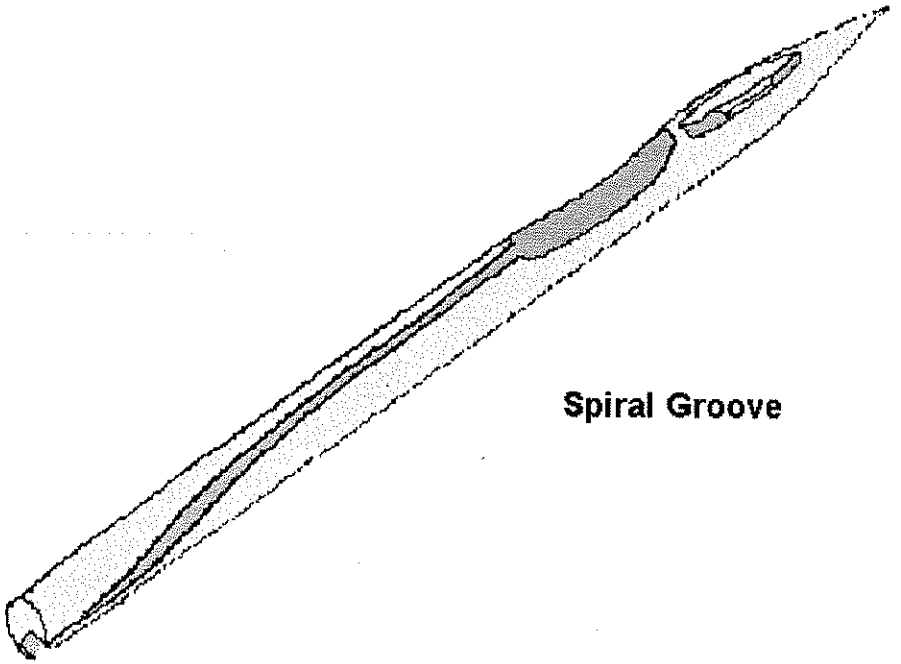


Single Groove

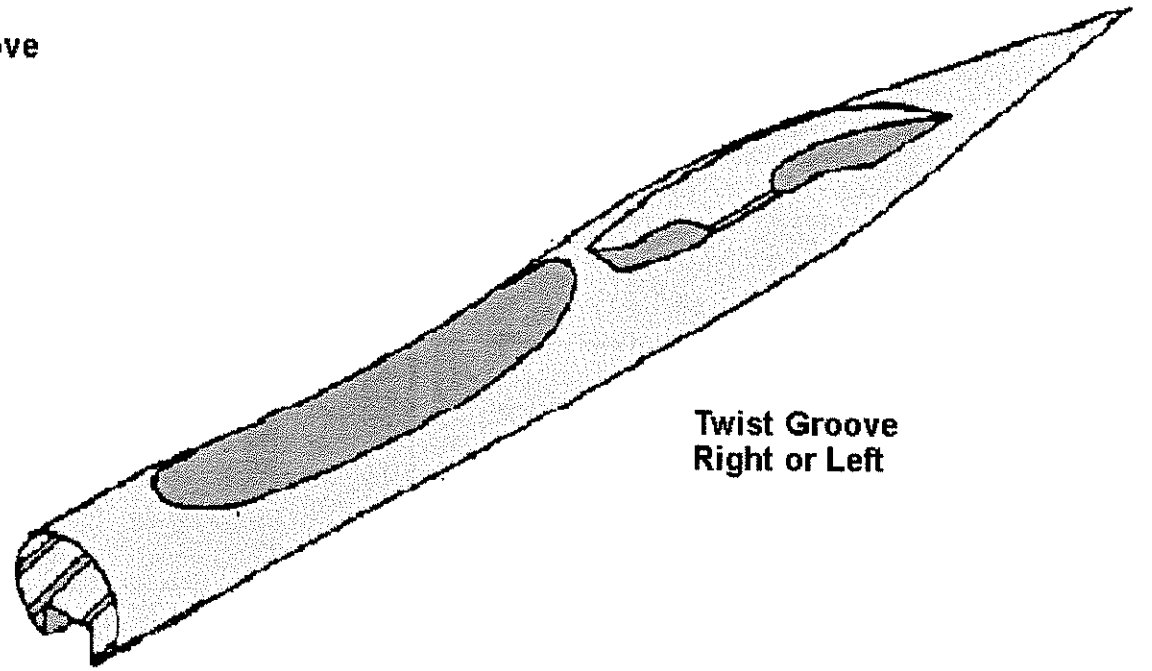


Double Groove

GROOVE TYPES

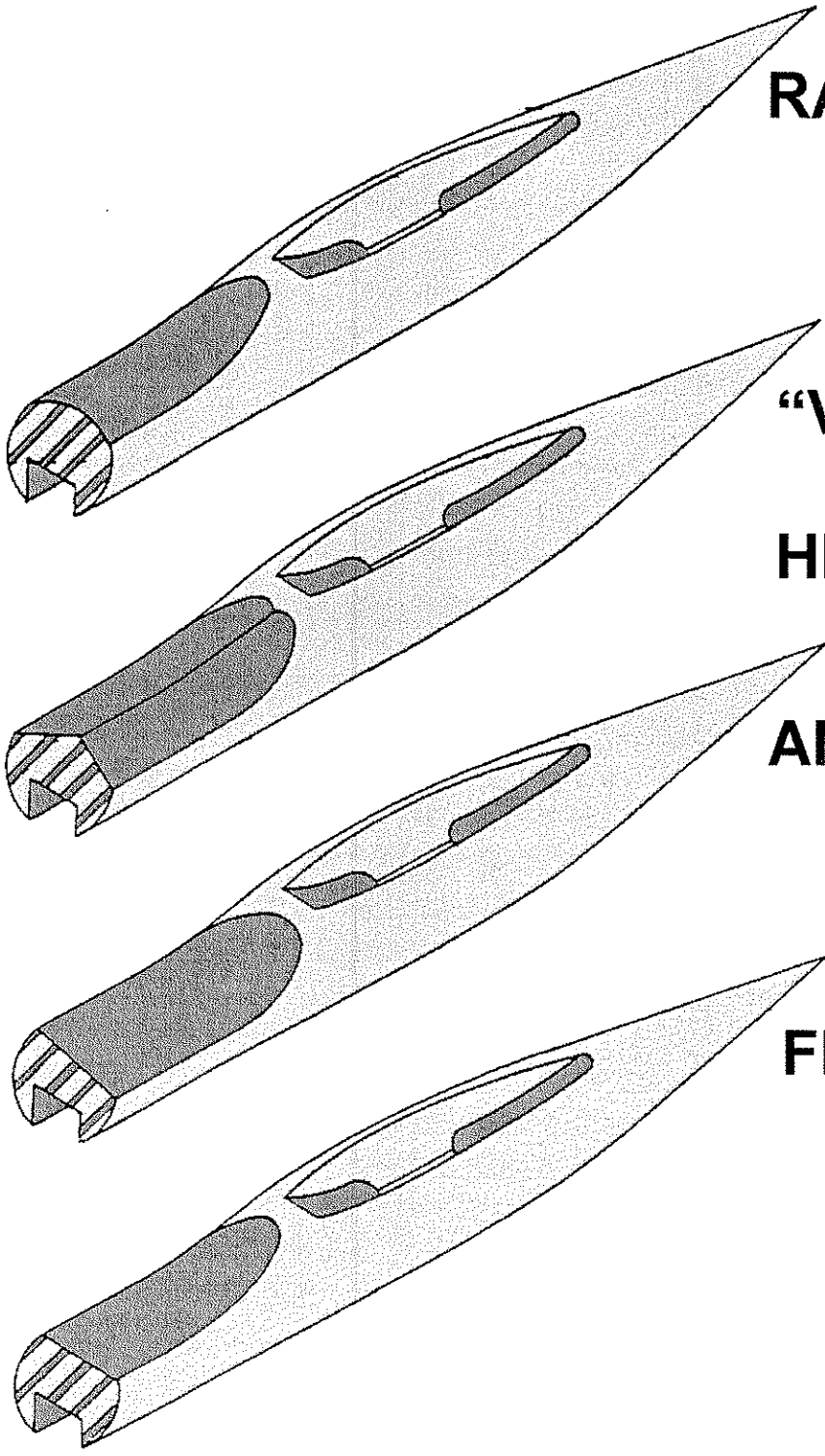


Spiral Groove



Twist Groove
Right or Left

SPOT OR SCARF TYPES



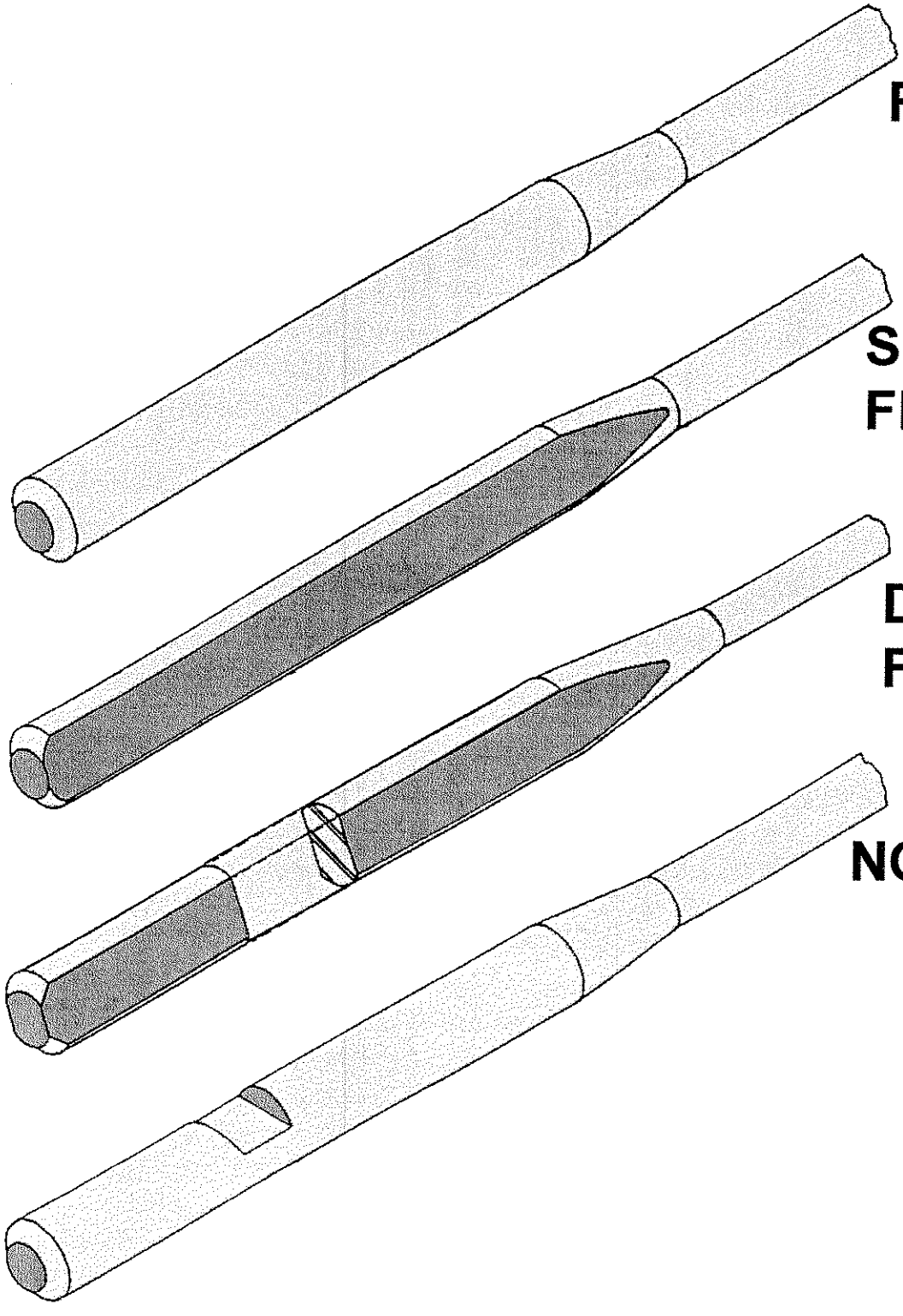
RADIUS SPOT

"V" SPOT
or
HIP SPOT

ANGLE SPOT

FLAT SPOT

SHANK TYPES



ROUND

SINGLE or FLAT SLAB

DOUBLE or FLAT SLAB

NOTCH

TROUBLE SHOOTING

NEEDLE CUTTING & BURSTING

Needle cutting results when the point of the needle impales a fiber of the material causing it to break. Bursting is caused by fibers being stretched beyond their limits, thus rupturing and creating a hole. The smaller the needle, the less fiber distortion and fabric damage.

NEEDLE RECOMMENDATION FOR CUTTING

1. Use a ball point

NEEDLE RECOMMENDATIONS FOR BURSTING

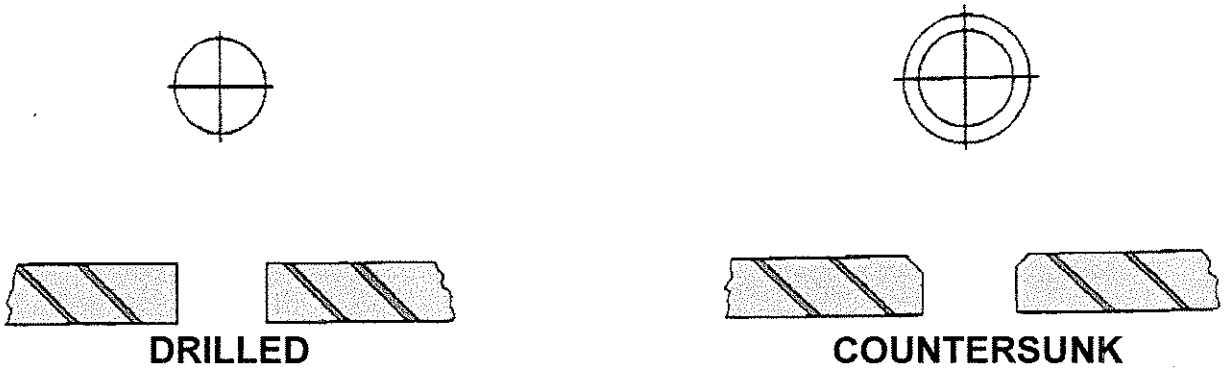
1. Use smaller size needle
2. Use TPR needle

NOTE – Needle cutting has been traced sometimes to fabric finish or "dryness." This dryness may be the result of dry cleaning by the fabric mill upon discovering the fabric is soiled. Dry cleaning tends to remove fabric softness, thus creating more friction on the needle and thread. A silicone treated thread (or other effective lubricant) will help alleviate this problem.

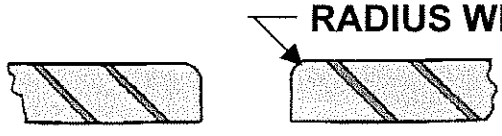
Humidity can also affect material sewability. Dry air creates a brittleness in synthetic material that leads readily to damage.
Needle cutting or bursting may result from normal wear or damage to the needle due to machine interference. Needles should be checked periodically to avoid this situation.

HINT – In some cases fabric is pinched between the needle and the surface of the throat plate hole. To eliminate this problem we recommend using emery cloth to form a radius or bellmouth at the top of the hole as indicated in the following drawing.

BASIC THROAT PLATE SHAPES



SUGGESTED SHAPE



NEEDLE HEAT PROBLEM

Needle heat is the result of friction generated when sewing at high speeds and is usually more of a problem with synthetic threads and fabrics.

The melting of thred or cloggin of the needle eye and groove, so that needle breakage occurs, is due to needle heat. Excessive needle heat can also locally melt the fabric as the needle passes through it.

NEEDLE RECOMMENDATIONS
1. Kooltorr finish needle
2. Ball eye needle
3. TPR needle

HINTS
1. Compressed air cooling
2. Thread lubricant
3. Reduce machine speed

SEAM PUCKERING

Seam puckering is a distortion of yarn fibers of the fabric and thread along the seam line. This is due to the high elastic recovery characteristics of the yarn fibers. After being stretch, the yarn fibers have the ability to regain their original shorter length.

There are two types of seam puckering.
A. Inherent type, which is due to the characteristics of the yarn fibers. This will show on both top and bottom sides of material.
B. Feed pucker. This is due to the machine presser foot retarding the movement of the fabric between itself and the feed dog. The fabric on the bottom is being fed more rapidly than the top, therefore, puckering occurs on the bottom material.

NEEDLE RECOMMENDATIONS
1. Use smallest needle size possible
2. Use TPR needle
3. In many cases a thin ball point needle may reduce puckering

HINTS

1. Use minimum thread tension
2. Use smallest thread size possible
3. Thread and fabric should be of the same type material
4. Use stitch type which have some stretch (401, 515, 516,519).
5. Reduce number of stitches per inch
6. Use smallest possible needle hole plate
7. Use minimum pressure on presser foot
8. Use feed dogs with fine teeth

SKIP STITCHES

BASIC REASON Inability to obtain proper formation of the needle thread loop or failure of the looper or hook to enter the thread loop at the proper time and place.

SOME CAUSES

A. Timing of looper or hook incorrect
B. Incorrect setting of the take up and pull off devices
C. Loss of thread control (too large an eye in the needle, usually resulting from needle size being too large for thread being used)
D. Needle vibration or staggering
E. Incorrect hole size in throat plate
F. Needle being deflected by resistance of material (multi plies of material, elastic inserts, etc.)
G. Needle crooked or bent

NEEDLE RECOMMENDATIONS

Now Using	Recommended
Straight blade	Reinforced blade
Reinforced blade	TPR needle

HINTS

1. Rotate needle slightly so it throws the needle thread loop into the looper.
2. Check machine setting and thread tension.
3. If possible, try large size needle.

NEEDLE BREAKAGE

CAUSES

1. Too small a size needle being used to perform the seaming operation.
2. Incorrect needle being used in machine.
3. Machine interference – looper hitting needle, feed dog timing, too small a hole in throat plate.

NEEDLE RECOMMENDATIONS

Now Using	Recommended
Straight blade	Reinforced blade
Reinforced blade	TPR needle

HINTS

1. Point style can affect needle penetration. Also check the needle for worn or blunt point due to excessive usage
2. If possible, try next larger size needle.

KNITWEAR SEWING INFORMATION

Listed below are some guidelines for use in the sewing of knits.

Working Surface should be free of rough edges to eliminate snagging.
Throat Plate Needle Hole should be compatible with the needle being used.
Use Light Pressure on presser foot.
Fine-Toothed Feed Dog will minimize stretch and reduce snagging.
Thread Tension should be kept at a minimum.
Stitches Per Inch – More stitches per inch increases the stretchability while also increasing the possibility of needle holes.
Stitch Type – Use double lock or multithread chainstitch wherever possible.
Fabric Storage – Humidity affects a material's sewability greatly. Dry air creates a brittleness in synthetic material that lends itself readily to damage.

NEEDLE RECOMMENDATIONS

1. Use smallest size possible with thin or medium ball point.
2. Use TPR style needle.

HINT

1. Needle should be checked periodically for wear or damage, especially point and spot area.

NEEDLE THREAD BREAKAGE OR FRAYING

CAUSES – There are several causes of thread breakage or fraying. Usually it is the result of some interference with the needle thread.

Any sharp edge along the path the needle thread travels can cause this failure. This includes the thread guides, needle, needle hole plate, presser foot, feeddog and looper. These areas must be free of burrs and sharp edges.

Too tight tension can also cause thread breakage or fraying. Thread breakage could result from excessive needle heat.

NEEDLE RECOMMENDATIONS

1. Check for correct needle size.
2. Try next larger size.
3. Use spotted type needle.
4. Use Kooltoor finish needle to reduce heat.

HINT

1. Dark colored threads have a tendency to be more brittle than light colored threads due to the drying processes. Whenever possible, use light thread tension when sewing with dark colored thread.

COMPARISON TABLE OF NEEDLE SIZES

METRIC (mm)	SINGER	UNION SPECIAL	REECE	BLINDSTITCH		LEWIS		WILLCOX & GIBBS		MAUSER	MERROW
				SHORT	LONG	CURVED	STRAIGHT	OLD	NEW		
55	6	022							22	5/0	3/0
60	8							2/0	24		2/0
65	9	025				2 1/2		0	25	4/0	
70	10	027	0000				10	1	27	3/0	1
75	11	029	000	1	10	3			30		
80	12	032	00	1 1/2	15		12	2	32	2/0	2
85	13			2	20						
90	14	036	0	2 1/2	25	3 1/2	14	3	36		3
95	15			3	30						
100	16	040	1	3 1/2	35	4	16	4	40	1	4
105	17										
110	18	044	2	4		4 1/2	18	5	44	2	5
120	19	048	3				19	6	48		
125	20	049		4 1/2		5	20		49	3	
130	21		4	5				7	52		
140	22	054	5	5 1/2		5 1/2		8		4	
150		060				6		9		5	8
160	23		6					10			
170		067								6	
180	24	073	7			7					
190										7	
200	25	080								8	10
230	26	090								9	
250	27	100								10	

THREAD INFORMATION

COMPARATIVE TABLE – PHYSICAL PROPERTIES

	NYLON	POLYESTER	NYLON MONOFILAMENT	COTTON
TENSILE STRENGTH	1	2	1	4
LOOP BREAK	3	4	3	2
ELASTIC RECOVERY	1	2	1	5
FLEX LIFE	2	3	2	5
RESISTANCE TO:				
SUNLIGHT	3	3	3	5
ABRASION	1	2	1	5
MILDEW	1	1	1	5
HEAT	3	3	3	3
ACIDS	4	2	4	5
ALKALI	3	4	3	5
SPECIFIC GRAVITY	1.14	1.38	1.14	1.50

LEGEND:

(1) Superior (2) Excellent (3) Good (4) Fair (5) Poor

THREAD SIZE – COMPARISON 1 RECOMMENDED NEEDLE SIZE

2-Cord COTTON	3-Cord COTTON	4-Cord COTTON	MERCERIZED	UNICORD	NYLON	POLYESTER	NYLON MONOFILAMENT	METRIC (mm)	DECIMAL
								0.55	.022
100/2								0.60	
					13	13		0.65	.025
90/2	90/2		000/2		15 - 22	15 - 23	50	0.70	.027
80/2	80/3				22 - 23	23 - 30	50 - 80	0.75	.029
70/2	70/3		00/2	B	23 - 33	30 - 46	50 - 130	0.80	.032
	60/3	60/4		B	33	46 - 46/2	80 - 180	0.85	
		60/4		B-C	33	46 - 46/2		0.90	.036
	50/3	60/4	00/3	C	33	46 - 46/2	180 - 520	0.95	
				C		46/2		1.00	.040
	40/3	50/4	0/3	C	46	46/2 - 69	520 - 750	1.05	
	36/3 - 30/3	40/4 - 36/4	A/3	C	46 - 46/2	69	630 - 750	1.10	.044
	24/3	30/4	B/3	E-F	46/2 - 69	69 - 92	630 - 750	1.20	.048
	20/3	24/4 - 20/4		F F	69	92	630 - 750	1.25	.049
	16/3	16/4		#125	92 - 99	138	630 - 750	1.30	
	12/3	12/4	C/3	#250	99 - 138			1.40	.054
	10/3	12/4		#250	138/			1.50	.060
		12/4		#250	138	207		1.60	
						207		1.70	.067
		10/4			207	207 - 346		1.80	.073
		10/4			207	207 - 346		1.90	
		10/4		#343	207	346		2.00	.080
					277 - 346	346		2.30	.090
	8/3			#350	277 - 346	346		2.50	.100

A convenient test for thread and needle size relationship is to take a two or three foot piece of thread and see if the needle will slip easily from one end to the other as the opposite ends are alternately raised and lowered. If the needle does not slip easily from one end to the other by its own weight – the next larger needle should be tried.

ASTM D 6193 SEAMS

STITCH – IS A FORMATION OF A THREAD FOR THE PURPOSE OF MAKING A SEAM OR STITCHING.

SEAM – CONSISTS OF A SERIES OF STITCHES USED TO JOIN TWO OR MORE PLIES OF MATERIAL TOGETHER.

STITCHING – CONSISTS OF A SERIES OF STITCHES USED TO FINISH THE EDGE OR DECORATIVE STITCH A SINGLE PLY OF MATERIAL.

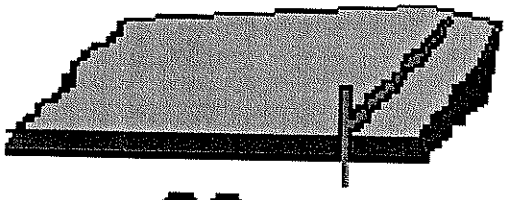
SEAMS AND STITCHINGS

A seam may be defined as a series of stitches used in joining two or more plies of material together.

A **stitching**, on the other hand, is a series of stitches used for finishing the edge or decorative operations of a single ply of material.

Seams

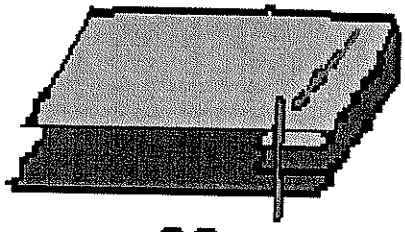
Superimposed Seam (SS) – (description) two or more plies of material being joined together generally with the edges being even.



SSa

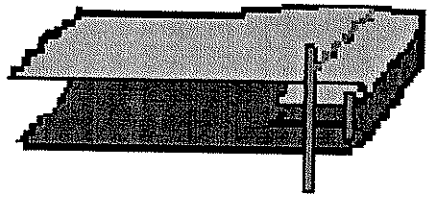
General Seaming

SSb



SSc

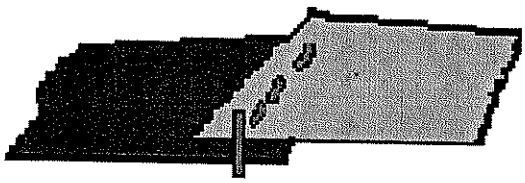
2



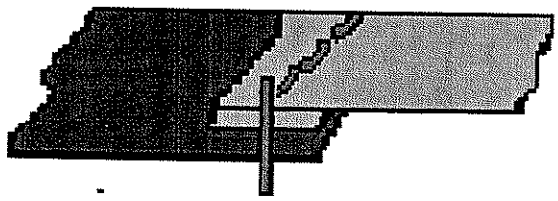
SSe

Runstitch & Topstitch

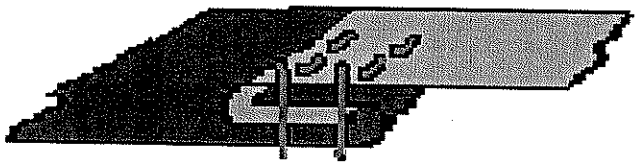
Lapped Seam (LS) – (description) two or more plies or material being joined together and generally being overlapped at the needle.



LSa

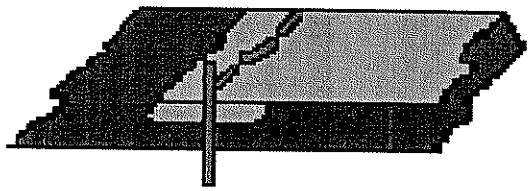


LSb



LSc

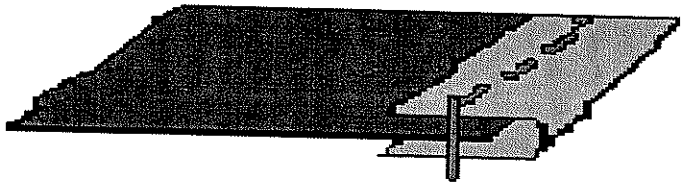
Felling Jeans, Shirts



LSd

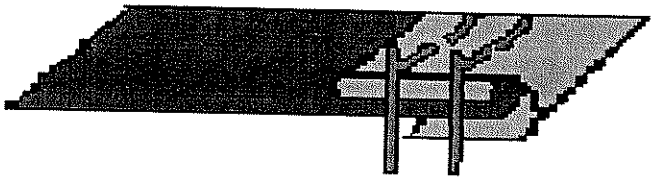
Setting Patch Pkts, Facings

Bound Seam (BS) – (description) folding a piece of material around the edge of one or more plies of material usually with the aid of a folding device called a binder.



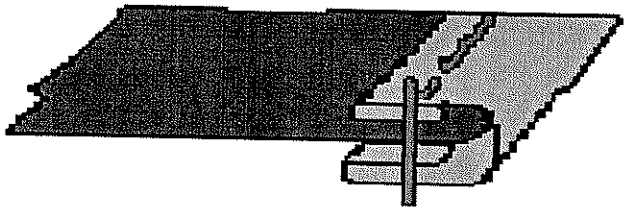
BSa

Binding edge un-turned



BSb

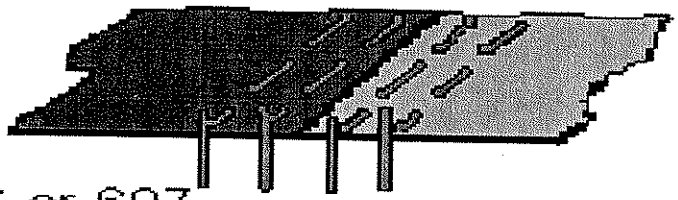
Top edge of binding turned



BSc

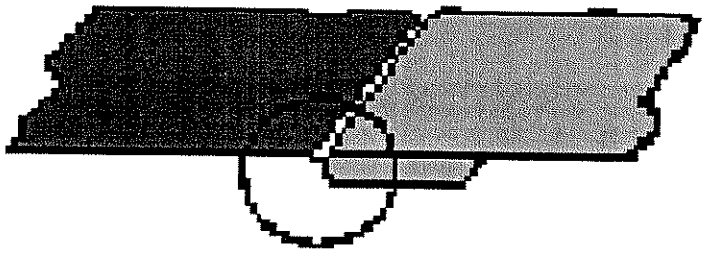
Both edges of binding turned

Flat Seam (FS) – (description) butting two plies of material together not overlapped at the needles.

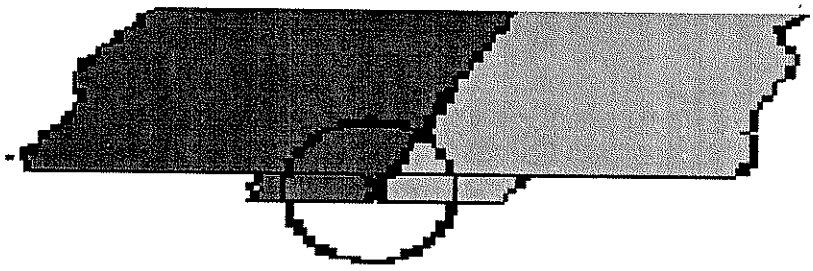


606 or 607 **FSa**

Flatseaming *



FSb



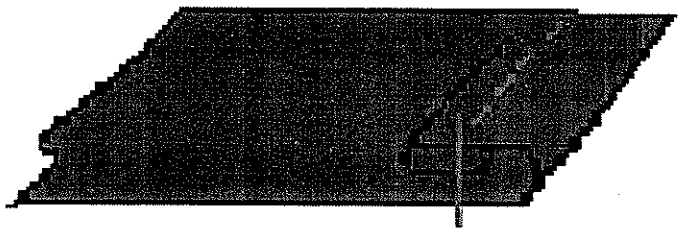
FSc

Stitchings

Edge Finish Stitching (EF) – (description) finishing the edge of a single ply of material by folding it or covering it with a stitch.

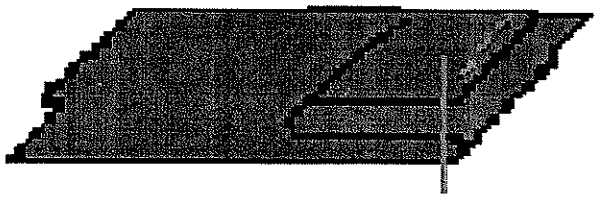
EFa

Single-turn Hem



EFb

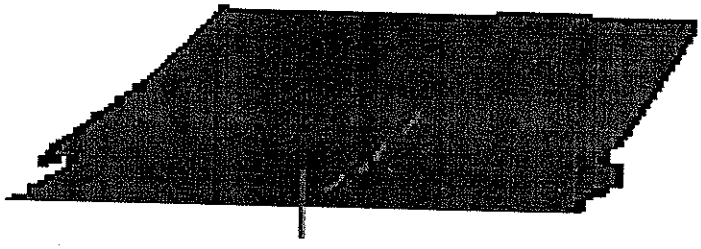
Clean Finish Hem



EFc

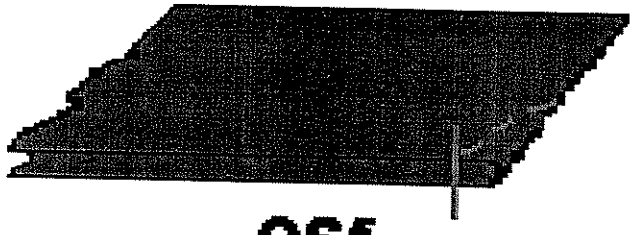
Blindhemming

<u>Ornamental Stitching</u> (OS) – (description) decorative stitching on a single ply of material.



OSa

Decorative Stitching



OSf

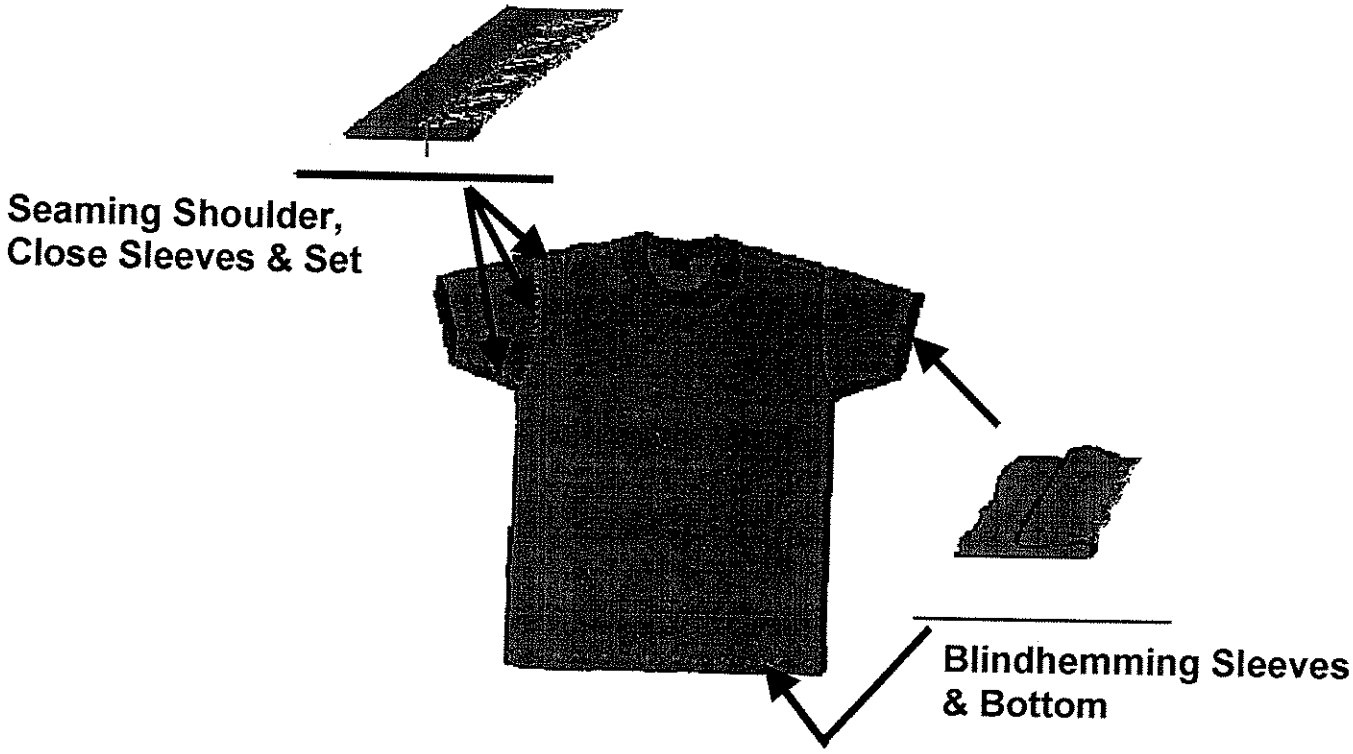
Sewing Darts

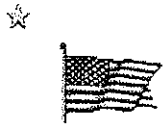
Complete Stitching and Seam Specification

Example: 401 LSc - 2

Stitch type Seam type N°. of rows of stitch

KNIT TEE SHIRT





Stitch Formation

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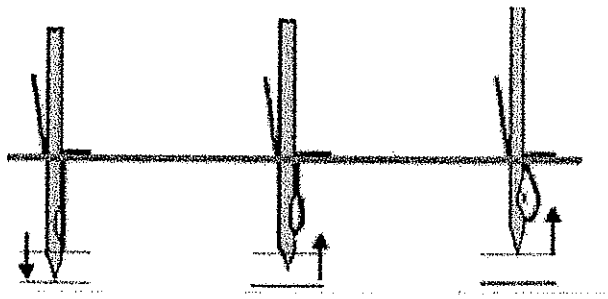
The first step in producing a stitch on a sewing machine is the formation of the needle thread loop. This step is the same regardless of the type of stitching being produced, or the nature of the machine being used. Failure to generate a good loop will cause many different problems such as skipping, breaking thread, loose stitches, threading bunching up, etc...

Proper formation of this loop depends on the tendency of the thread to bulge away from the needle as it is drawn upward after reaching the lowest point of it's stroke - due to inertia and friction against the material through which it passes.

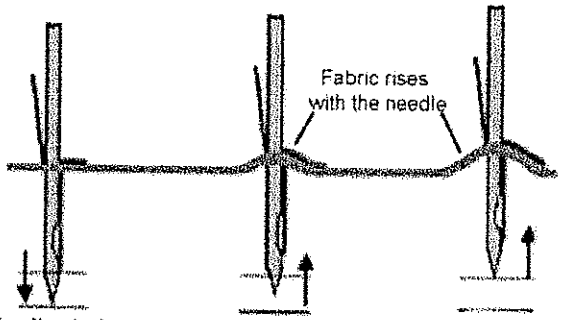


Needle stroke at the lowest position.

Needle begins to rise and the loop begins to form

Needle rises slightly higher and loop is formed (Now is when hook will pick up thread)

Any interference with the formation of the needle thread loop will result in faulty stitch formation. One of the most common conditions is that the material stitched is not held firmly by the presser foot at the point where the needle passes through, allowing the material to flag, or move up with the needle as it rises. Either no loop is formed at all, or the loop is formed too late. This will result in skipped or broken stitches. You should always refer to the needle, fabric and thread chart to make sure the right size needle is being used. A quick visual inspection of the foot and throat plate is also recommended.



Needle stroke at the lowest position

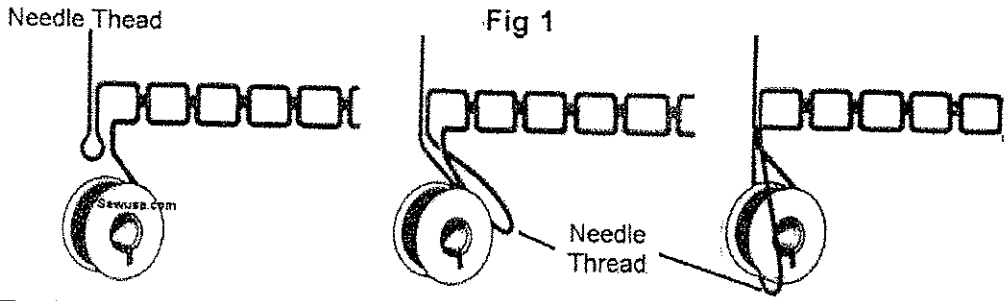
Needle begins to rise and the fabric rises with it. This is called "Flagging" and will result in skipped stitches and breaking thread.

The thread tends to form an equal loop on each side of the needle, a guard is used to push the loop through to the side from which the thread is taken by the shuttle, hook or looper. Correct setting of this guard is necessary for good loop formation.

☆

Step Two is getting the top thread to go round the bobbin. This is done by the hook coming across at the right time and catching the top thread and pulling it around the bobbin case and bobbin. This process is shown in figure 1 & 2. Figure 1 is without the hook, bobbin case and fabric. Figure 2 is with the hook, bobbin case and fabric.

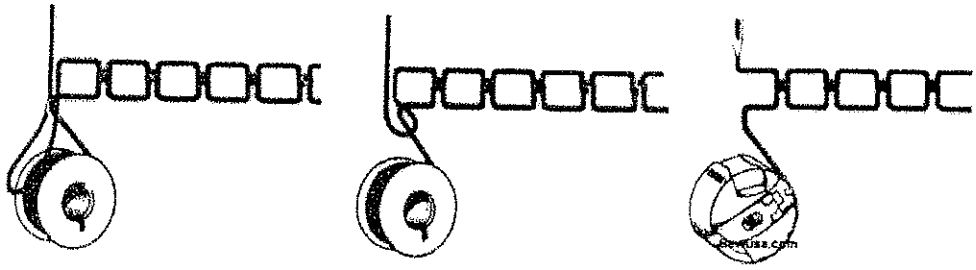
Fig 1



Top Thread forms the loop

Hook catches the loop and and starts to pull it around the bobbin

Top thread half way around the bobbin

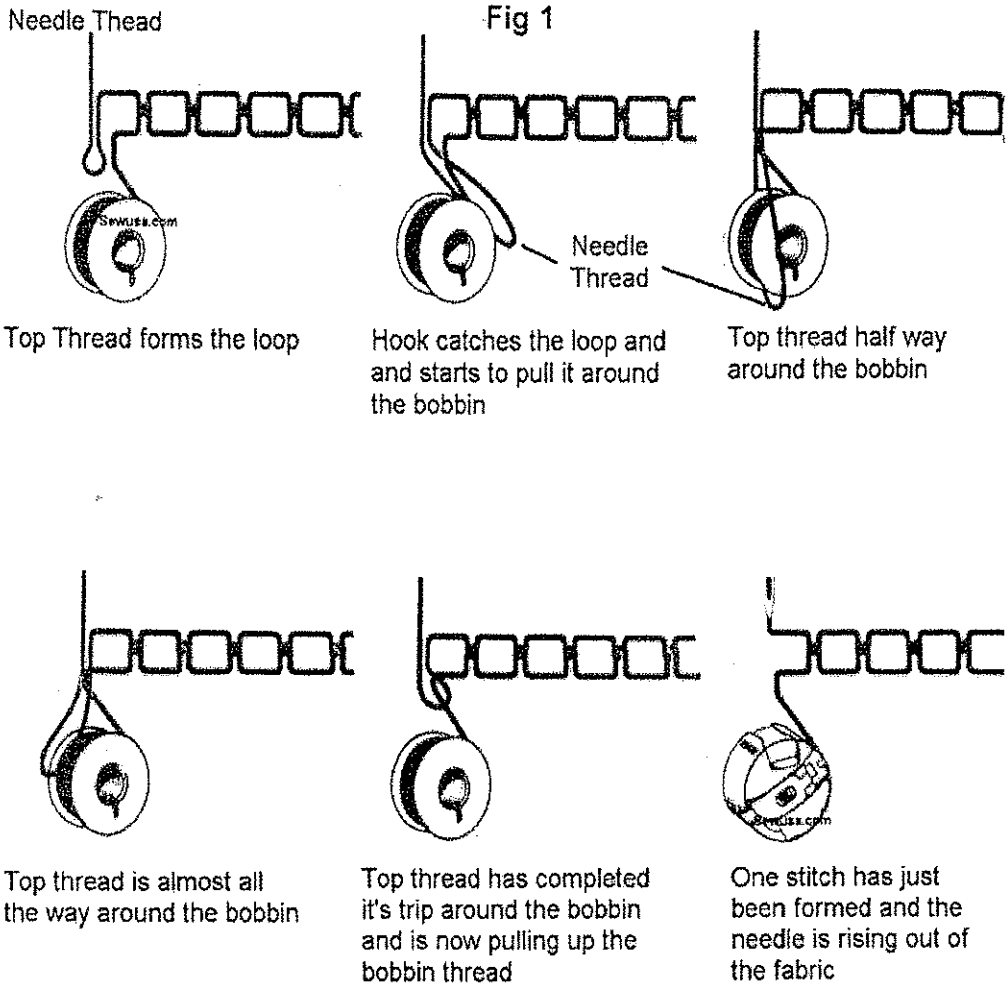


Top thread is almost all the way around the bobbin

Top thread has completed it's trip around the bobbin and is now pulling up the bobbin thread

One stitch has just been formed and the needle is rising out of the fabric

Fig 1



Knowing how a stitch is formed is very important! Especially when problems occur. The diagrams above can help you to visually watch a stitch being formed on your machine and teach you to watch for certain problems when sewing. Remember the top thread has to go completely around the bobbin case, in a smooth motion every time. to make a good stitch. If it gets stuck or even hesitate a little, this can result in the usual problems of skipping, breaking thread, loose stitches, thread bunching up etc...

Tension Settings

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We always recommend you check your manual first for proper tension settings. But if you don't have the manual, or you want a different view of it, then this a good starting point.

The correct setting of the tensions is so the top and bottom threads lock in the center of the fabric (Fig1)

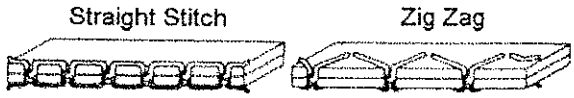


Fig 1

Bobbin Thread The bobbin thread is adjusted by the adjustable leaf spring tension (Fig 2) on the bobbin case. Turn the tiny screw on the leaf spring (Fig 3) no more then a 1/2 of a turn at a time to get the desired setting. This adjustment doesn't need to be done often, but something as simple as switching to lighter, heavier or a different thread can cause the adjustment to be off. You can quickly check the bobbin thread tension by holding the bobbin thread in your fingers (Fig 4) and pull it up in a swift motion. The bobbin case should slightly move downwards. If it doesn't move at all then most likely the tension is to strong. If the bobbin case moves downward by just holding the thread, then the tension is to weak.

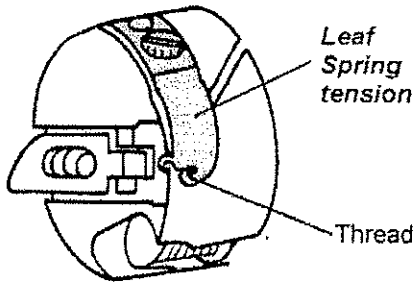


Fig 2

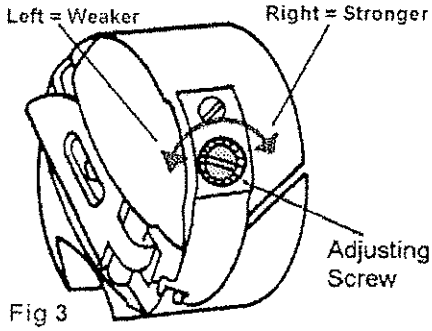
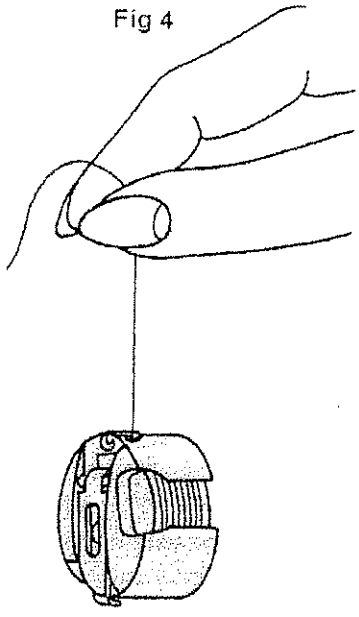


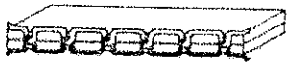
Fig 3

Fig 4



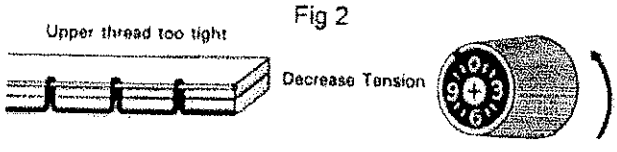
Top Thread To check the top thread tension, make sure the presser foot is down and pull a few inches of thread through by hand. You should be able to feel the tension on the thread as you pull it through. The thread should pull through nice and smooth with no snags or tight spots. Now sew a few stitches on a test fabric and compare it to the diagrams below. Adjust the tension as needed.

Fig 1



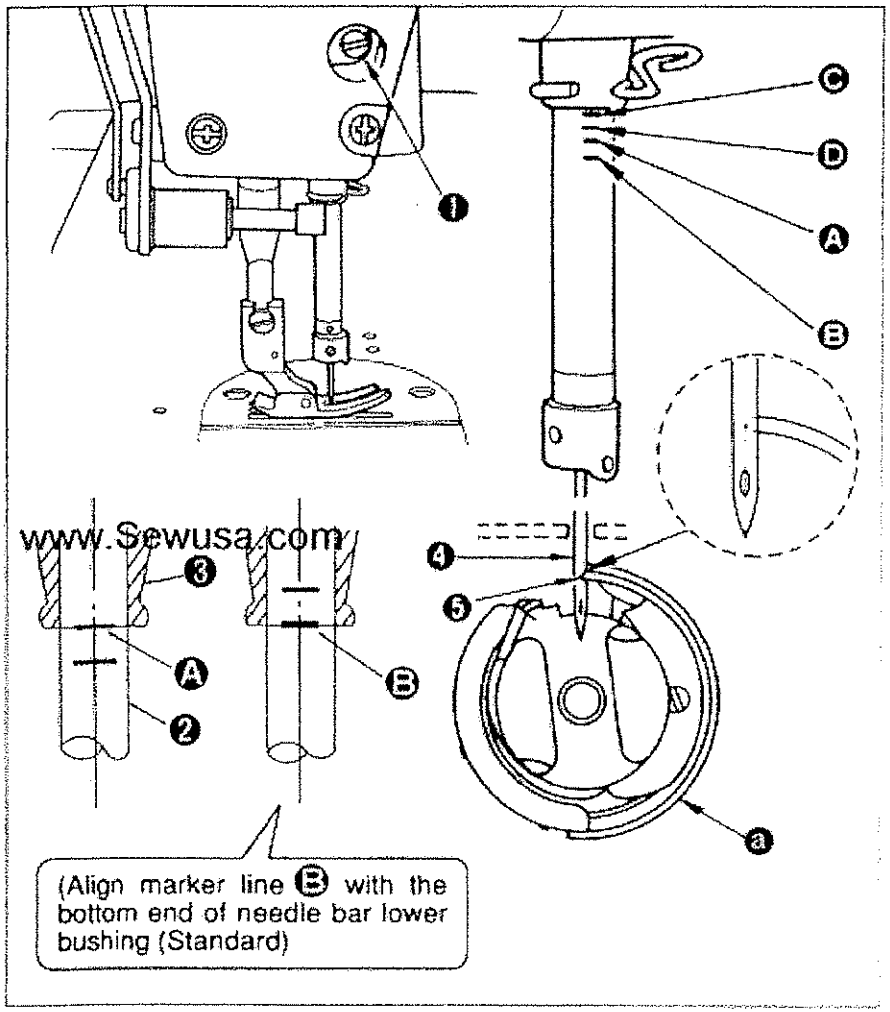
Correct Setting

Fig 2



Never sew with more tension then needed to make a good stitch!

19. NEEDLE-TO-HOOK RELATIONSHIP



1. Adjust the timing between the needle and the hook as follows:

1) Turn the handwheel to bright the needle bar down to the lowest point of its stroke, and loosen setscrew ❶ .

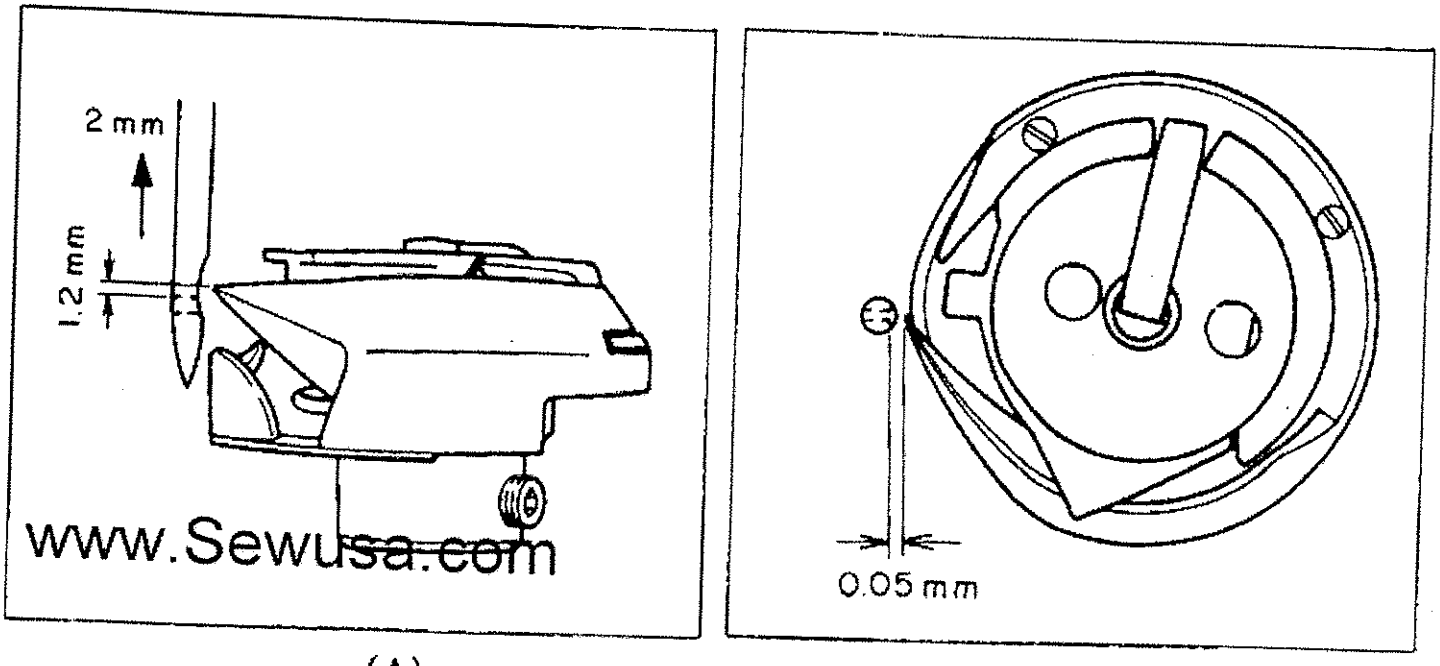
(Adjusting the needle bar height)

2) **(For a DB needle)** Align marker line Ⓐ on needle bar ❷ with the bottom end of needle bar lower bushing ❸ , then tighten setscrew ❶ .
(For a DA needle) Align marker line Ⓒ on needle bar ❷ with the bottom end of needle bar lower bushing ❸ , then tighten setscrew ❶ .

(Adjusting position ❹ of the hook)

3) **(For a DB needle)** Loosen the three hook setscrews, turn the handwheel, and align marker line Ⓑ on ascending needle bar ❷ with the bottom end of needle bar lower bushing ❸ .
(For a DA needle) Loosen the three hook setscrews, turn the handwheel, and align marker line Ⓓ on ascending needle bar ❷ with the bottom end of needle bar lower bushing ❸ .

4) After making the adjustments mentioned in the above steps, align hook blade point ❺ with the center of needle ❹ . Provide a clearance of 0.04 mm to 0.1 mm between the needle and the hook, then securely tighten the hook setscrews.



(A) (B)

Fig. 23

(2) Matching the timing of the sewing hook

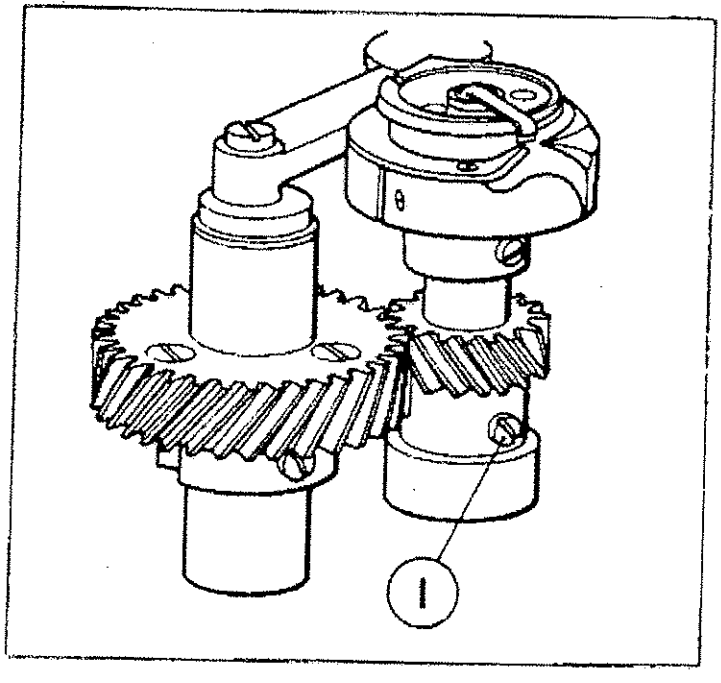
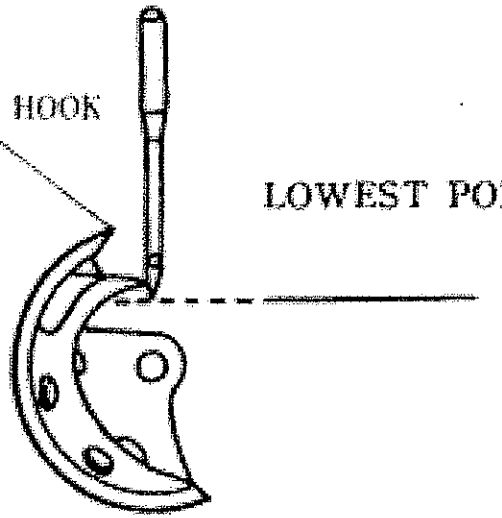
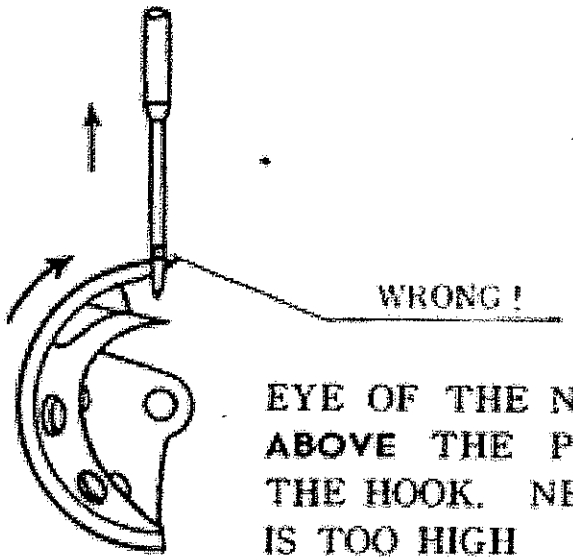


Fig. 24

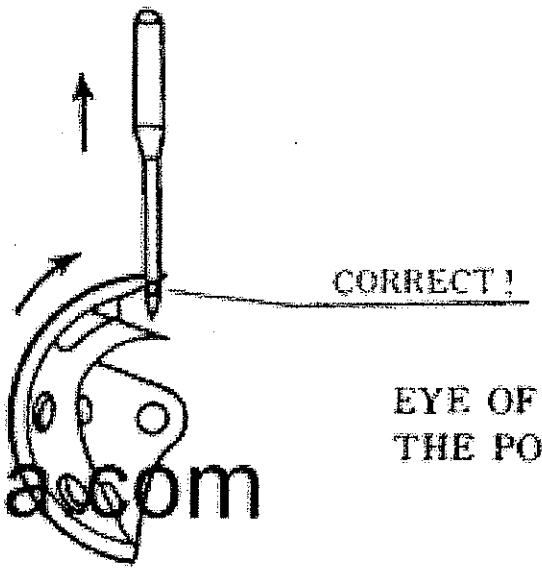
This is adjusted by loosening the set screw (Fig. 24 ①) of the small gear of the shaft of the sewing hook. After this adjustment, pull up the sewing hook and lower the small gear to prevent the up and down rattle of the sewing shaft and securely tighten the screw.

THE TIMING OF HOOK AND NEEDLE





EYE OF THE NEEDLE IS **ABOVE** THE POINT OF THE HOOK. NEDLE BAR IS TOO HIGH



EYE OF THE NEEDLE IS JUST UNDER THE POINT OF THE HOOK

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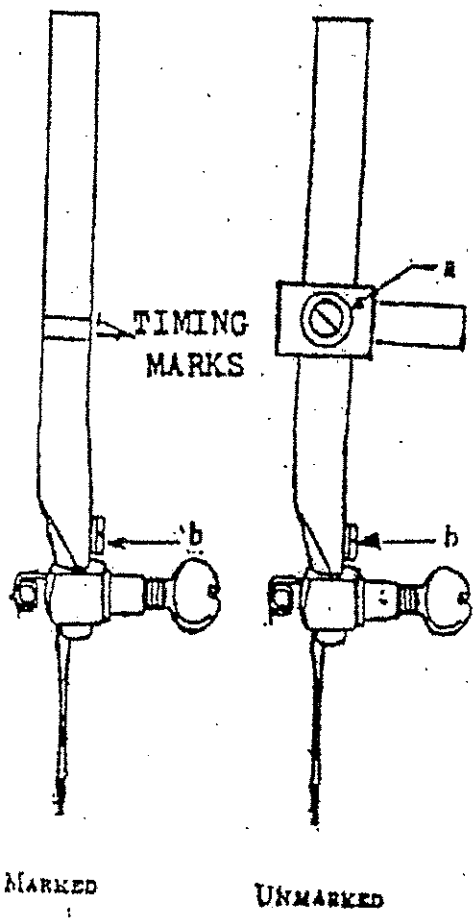
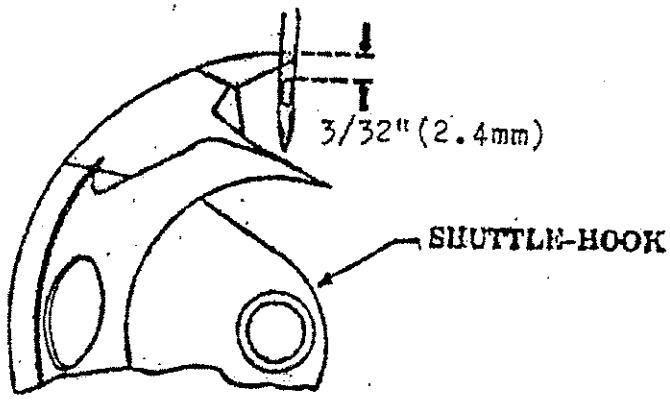
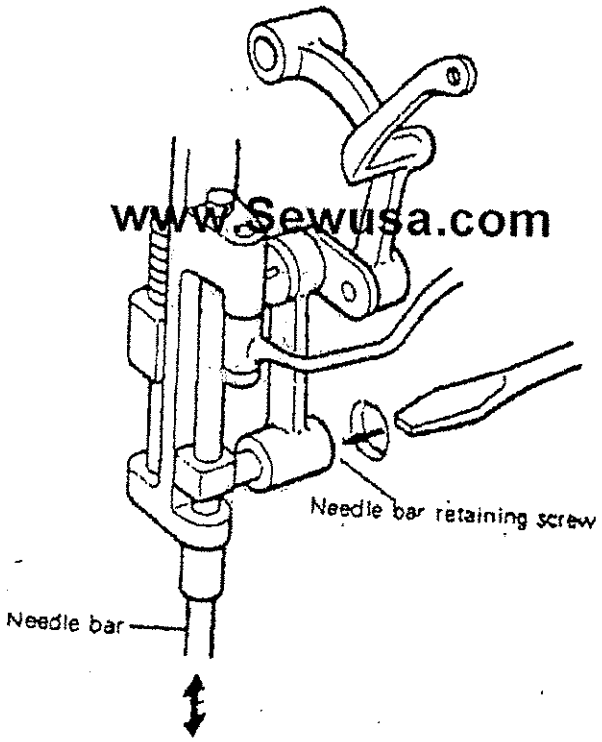
FOR TIMING
RAISING OR LOWERING NEEDLE BAR



(A) Setting Unmarked Needle Bar. If the needle bar has not been marked at the factory with two lines around it about 2 inches (5cm) from its bottom end, proceed as follows to raise or lower it.

(1) See that the hook is timed
(2) Loosen the pinch screw(a)
(3) Move the needle bar up or down as necessary to bring the eye of the needle 3/32" of an inch(2.4mm) below the point of the hook after the needle has risen 3/32" of an inch (2.4mm) from its lowest point.
(4) Tighten the pinch screw (a)
(5) Be sure stop screw (b) is in place, Otherwise timing will be off.





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In some machines the setscrew has to be reached through a hole in the head as shown.

MOST SINGER MACHINES HAVE TIMING MARKED NEEDLE BARS

(B) Setting Marked Needle Bar. A needle bar installed at a factory usually has on it two lines 3/32" inch (2.4mm) apart and about 2" inches (5cm) from the bottom of the needle bar.

To set a factory marked needle bar proceed as directed in (A) above, except that when the needle bar is at its lowest point the upper mark should be just visible at the bottom of the needle bar bushing.

See page 28

TroubleShooting

This is a "basic" troubleshooting guide that applies to a majority of machines. If your machine problem or solution isn't listed here, please refer to the owner's manual. We will be posting the original troubleshooting pages for the models we have available. Please return to the Repair page available models.

Home

Machine Pics

Manuals

Repair

Threading

Email

Problem	Possible Cause	Solution
Sewing machine suddenly stops during sewing	Sewing machine has been run at a low speed for an extended period of time. To prevent overheating, motor power will automatically turn off	Turn machine off for 20-30 minutes and the safety device will reset. Then you can continue sewing
Needle will not move	1) Upper thread has run out. 2) Presser foot is up 3) Bobbin winder shaft was left in winding position. 4) Buttonhole lever was not lowered when machine was placed in buttonhole mode.	1) Thread machine. 2) Lower presser foot 3) Move bobbin winder shaft back. 4) Lower buttonhole lever
Machine won't run	1) Wrong Presser foot and the needle hits the foot 2) Needle has come loose and is stuck in the hook	1) Change presser foot 2) Remove needle and install new one.
Upper thread breaks	1) Threading is not correct 2) Thread has a knot in it 3) Thread tension is too tight 4) Needle is bent, burred or has a sharp eye 5) Needle is wrong size 6) Needle has been inserted wrong 7) Thread take-up lever has not been threaded	1) Check Threading 2) Re-Thread Machine 3) Correct thread tension 4) Replace needle 5) Check needle size, replace if necessary 6) Properly insert needle 7) Check threading
Bobbin thread breaks	1) Bobbin has not been fully inserted in bobbin case 2) Bobbin has been incorrectly threaded 3) Bobbin does not turn smoothly in bobbin case	1) Check bobbin case 2) Correctly thread bobbin case 3) Check if bobbin has been wound evenly

	4) Lint in bobbin case or shuttle	4) Clean bobbin case and shuttle
Skipped Stitches	1) Thread tension is too tight	1) Correct thread tension
	2) Needle is bent or burred	2) Replace needle
	3) Needle is wrong size	3) Check needle size
	4) Needle and thread does not match	4) Use proper thread or needle
	5) Thread take-up lever has not been threaded	5) Check threading
	6) Light pressure on presser foot	6) Increase foot pressure
	7) Incorrect setting of needle	7) Check needle setting
Stitches not properly formed	1) Thread has not been pulled into thread sensor guide	1) Fully pull thread into thread sensor guide
	2) Threading is not correct	2) Check threading
	3) Bobbin case has been threaded wrong	3) Check bobbin case threading
	4) Spool cap is wrong size for thread spool	4) Replace the cap with correct size
Irregular Stitches	1) Incorrect size needle	1) Choose correct size needle for thread and fabric
	2) Improper threading	2) Check Threading
	3) Loose upper thread tension	3) Tighten upper thread tension
	4) Operator Pulling on fabric	4) Do not pull fabric guide it gently!
	5) Light pressure on presser foot	5) Increase pressure on presser foot
	6) Loose presser foot	6) Reset presser foot
	7) Unevenly wound bobbin	7) Check bobbin
Fabric Puckers	1) Stitch length is too long for material	1) Decrease stitch length
	2) Needle point is burred	2) Replace needle
	3) Incorrect thread tension	3) Check thread tension
	4) Light pressure on presser foot	4) Increase pressure on presser foot
	5) Fabric is too sheer or soft	5) Use underlay of tissue paper or pellon
	6) Using two different sizes or kinds of thread	6) Upper thread and bobbin thread should be the same size and kind
Thread Bunches Up	1) Upper and lower threads not drawn back under presser foot	1) Draw both threads back under presser foot

	2) Feed Dogs are down	2) Check feed dogs. Raise or adjust
Needle Breaking	1) Using to thin of a needle was for sewing a heavy weight material	1) Check Needle Size
	2) Needle has not been fully inserted into needle bar	2) Check needle
	3) Needle clamp screw is loose	3) Check needle clamp screw and tighten
	4) Presser foot is not correct one	4) Check presser foot
	5) Presser foot is loose	5) Reset presser foot
	6) Pulling on fabric as you sew	6) Do not pull on fabric! guide it gently
Loud noise-Knocking noise-Machine Jammed	1) Dust/Lint in the feed dogs	1) Clean machine
	2) Lint in the hook	2) Clean machine
	3) Thread caught in the hook	3) Disassemble hook and clean
Machine Does not feed fabric	1) Stitch length is set to zero	1) Check stitch length and pattern
	2) Pressure on presser foot is set too low	2) Check pressure setting on foot
	3) Feed dogs are lowered	3) Raise feed dogs
	4) Threads are knotted under fabric	4) Place both threads back under presser foot before beginning to sew
Threading cannot be done	Needle is not in the highest position	Turn handwheel until needle is in proper position
Needle threader will not turn	Needle threader is designed not to turn! To protect itself if needle is not up	Check needle position
Threading hook won't enter the needle eye	Needle is not fully inserted into needle bar	Check needle
The threading hook is left in the needle eye	Sewing machine was accidentally started while threading hook was still in needle eye	Slightly turn handle clockwise and remove threader.

We hope this troubleshooting guide helps to solve any problems you might have with your machine not operating correctly. Remember to check our Repair page for troubleshooting guides special for your machine and manufacturer. And visit our threading page for any threading questions you might have.

We wish you lots of luck and many stitches with your machine! **Sewusa**

SEWING MACHINE TRAINING REQUIREMENTS

Inmate Name:	Inmate signature:		
Registration Number:		Detail	
Job Title:		Department:	Unicor
Instructor:	Instructor signature:		
Date:		Employment Date:	

Training Given:

<u>Single needle lock Stitch:</u> Needle bar setting: _____ Hook Timing: _____ Feed Adjust: _____ Trimmer Setting: _____ Tension Setting: _____	Training should be given on the basic settings of a single needle lock stitch machine. The Supervisor should provided training in trouble shooting skip stitches, thread breaks and trimmer malfunction. The Supervisor should demonstrate to the Trainee step by step settings listed in the column to the left. Test: Machine should be made inoperable. Trainee should assess the problem then make the proper repairs with minimum assistance.
<u>Lock stitch Bar Tack:</u> Needle bar setting: _____ Hook Timing: _____ Feed Adjust: _____ Trimmer setting: _____ Tension Setting: _____	Training should be given on the basic settings of a lock stitch bar tack machine. The Supervisor should provided training in trouble shooting skip stitches, thread breaks, Error codes, and trimmer malfunction. The Supervisor should demonstrate to the Trainee step by step settings listed in the column to the left. Test: Machine should be made inoperable. Trainee should assess the problem then make the proper repairs with minimum assistance.
<u>2 needle Lock Stitch:</u> Needle bar setting: _____ Hook Timing: _____ Feed Adjust : _____ Trimmer setting: _____ Tension setting: _____	Training should be given on the basic settings of a 2 needle lock stitch machine. The Supervisor should provided training in trouble shooting skip stitches, thread breaks and trimmer malfunction. The Supervisor should demonstrate to the Trainee step by step settings listed in the column to the left. Test: Machine should be made inoperable. Staff should assess the problem then make the proper repairs with minimum assistance
<u>2 needle Chain Stitch Felling or Flat Bed:</u> Needle bar setting: _____ Looper Timing: _____ Feed Adjust : _____ Tension setting: ____	Training should be given on the basic setting of a 2 needle chain stitch off arm felling machine or flat bed machine. The Supervisor should provided training in trouble shooting skip stitches, thread breaks, and feeding problems. The Supervisor should demonstrate to the Trainee step by step settings listed in the column to the left. Test: Machine should be made inoperable. The Trainee should assess the problem then make the proper repairs with minimum assistance.

Over lock: Needle bar setting: _____ Looper Timing: _____ Trimmer setting: _____ Feed Adjust: _____ Tension Setting: _____	Training should be given on the basic settings of an over lock serger machine. The Supervisor should provided training in trouble shooting skip stitches, thread breaks and trimmer malfunction. The Supervisor should demonstrate to the Trainee step by step settings listed in the column to the left. Test: Machine should be made inoperable. Trainee should assess the problem then make the proper repairs with out assistance.
Parts Ordering: Ability to utilize machine parts book:_____ Parts ordering procedures:_____	Training should be given training on the correct utilization of sewing machine parts books and parts ordering procedures. The Supervisor should provided training in correctly identifying machine parts to be replaced and part requesting procedures.
Tool Room Procedures: Tool Accountability: _____	The Supervisor should provided training in procedures according to BOP policy to account for tools,
The Inmate Sewing Machine Mechanic Trainee should be able to demonstrate the above listed mechanical settings and procedures at 9 months of time in the position. At this time the Inmate Sewing Machine Mechanic Trainee shall be evaluated by the Sewing Machine Mechanic Supervisor to determine additional training needed and determine I Grade increase is warranted. . Inmate Initial_____ Date:_____ Supervisor Initial _____ Date:_____	

INMATE SEWING MACHINE TRAINING EVALUATION

Inmate Name:	Inmate signature:		
Registration Number:		Institution	
Job Title:	Sewing Machine Mechanic Trainee	Department:	Unicor
Supervisor:	Supervisor signature:		
Date:		Review Period:	

Performance Scoring: E – Excellent S – Satisfactory U – Unsatisfactory NFT – Needs Further Training

Single needle lock Stitch: Needle bar setting: _____ Hook Timing: _____ Feed Adjust: _____ Trimmer Setting: _____ Tension Setting: _____	
Lock stitch Bar Tack: Needle bar setting: _____ Hook Timing: _____ Feed Adjust: _____ Trimmer setting: _____ Tension Setting: _____	
2 needle Lock Stitch: Needle bar setting: _____ Hook Timing: _____ Feed Adjust : _____ Trimmer setting: _____ Tension setting: _____	
2 needle Chain Stitch Felling: Needle bar setting: _____ Looper Timing: _____ Feed Adjust : _____ Tension setting: _____	

Comments: