

GS MANUFACTURING
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New Rascal Chopper Units Utilize The MEKP Slave Pump System, Refer To The Following:

CATALYST PUMPING SYSTEM

The unique slave assembly consist of the slave arm, pump, gauge, relief valve, siphon and return lines. This assembly is attached to the air motor of the resin pump and is driven by a shaft on the top of the motor. Removal of one connecting pin that attaches the shaft to the slave arm allows each material to be pumped separately. The location of the pump on the slave arm determines the flow rate of MEKP therefore altering the ratio of catalyst. There is an inlet filter screen on the inlet. There are 2 return lines: 1 manual and 1 automatic that has been pre-set at the factory.

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RASCAL CHOPPER SYSTEM

IT IS THE OPERATORS RESPONSIBILITY TO INSURE THAT THIS SYSTEM IS OPERATED SAFELY. LOCAL CODES AND OPERATING INSTRUCTIONS MUST BE FOLLOWED. EQUIPMENT OPERATORS SHOULD READ AND UNDERSTAND THE LOCAL CODES AND OPERATING INSTRUCTIONS BEFORE USING THIS SYSTEM.

1) **INTRODUCTION**

Each system built by GS MFG. is completely assembled and fluid pressure checked prior to shipping. The purpose of this quality control procedure is to insure that all components of the system function properly. During the preparation for shipping, we dis-assemble as little as possible to make it easier for you to get the new system into production.

2) **SYSTEM DESCRIPTION**

The Rascal System is composed of six sub systems:

1. Air System
2. Resin Pumping System
3. Catalyst Pumping System
4. Rascal Gun
5. Rascal Chopper Motor
6. Solvent Purge System

AIR SYSTEM

The air system performs two basic operations. First, it controls the air-operated trigger assembly on the gun, which permits positive and simultaneous delivery of resin and catalyst, and provides air to the chopper motor via the two-stage trigger. The air trigger requires only minimal finger pressure that allows the long periods of continuous

operation without operator fatigue. Secondly, the air system provides power to the pumping system.

RESIN PUMPING SYSTEM

The resin pump is the heart of the Rascal System. It draws material from a drum or bulk-fed resin supply. There is an inlet filter and outlet filter. The pump is controlled by an air regulator, which is used to establish the flow rate of resin that is required.

CATALYST PUMPING SYSTEM

The unique slave assembly consists of the slave arm, pump, gauge, relief valve, siphon and return lines. This assembly is attached to the air motor of the resin pump and is driven by a shaft on the top of the motor. Removal of one connecting pin that attaches the shaft to the slave arm allows each material to be pumped separately. The location of the pump on the slave arm determines the flow rate of MEKP therefore altering the ratio of catalyst. There is an inlet filter screen and an additional in-line filter attached to the in-line shut off valve on the stainless steel braided MEKP hose.

RASCAL GUN

The ultimate internal-mix flow coating gun is CNC machined from billet aluminum with independent resin and catalyst passages, each of which is terminated with solid fluid needles seating in the fluid plate. These needles are spring loaded in the "closed or off" position and provide positive shut-off when the gun is not in operation. The air trigger assembly simultaneously operates the valves in the first stage (partial triggering). When the trigger is fully engaged (2nd stage), air will flow from the gun to the chopper motor.

There is an air shut-Off valve on the back of the gun, which will deactivate the trigger.

THIS VALVE IS THERE FOR YOUR PROTECTION. WHEN THE GUN IS NOT BEING USED OR IF YOU ARE REMOVING THE NOZZLE, THE VALVE SHOULD BE IN THE OFF POSITION.

THE GUN IS BASICALLY AN AIR-PISTOL WITH MODULAR PLATES ATTACHED TO THE FRONT. NEVER SUBMERGE THE GUN AND CHOPPER MOTOR IN SOLVENT.

CHOPPER MOTOR

GS has developed a chopper motor/cutter, which is both powerful and quiet. Air is fed to the motor from the gun/trigger assembly. There is a large knob on the rear of the

gun, which is attached to a bulkhead that controls the volume of air supplied to air motor. Fiberglass (single or double) strands enter the rear of the cover and are drawn into the roller, idler bearing and cutting head assembly and chopped and distributed out the front into the chute and into the resin flow streams.

3) SYSTEM ASSEMBLY

1. Remove all items from the box.
2. Mount the mast/pump to the cart using the bolts in the cart.
3. Attach the cart handle (M7) and the mast support brace to
The cart using the bolts in the cart.
4. Connect the brace to the mast-using bolt in the mast.
5. Lay the entire boom pieces flat on the floor.
6. Attach the spring/elbow (RB5) to the main boom (RB1) using
The bolt, nut and washer in the boom.
7. Slide the front boom into the spring. (The farther in-the
More tension on the spring).
8. Remove and reverse the eyelet extension (RB14) on the end
Of the boom and attach the 2 small eyelet's.
9. Insert the pin (RB3) into the square tubing end of the main
Boom. Slide the hose guide (RB4) through the hoses and pin
Up to the bottom of the square tubing. Fold the front boom
Over and set the boom assembly on top of the mast with the
Pin inserting into the mast.
10. Mount the solvent pail rack on the cart.
11. Attach the solvent pail cover to the solvent pump, mount on
A CLEAN bucket and set it in the rack.
12. Attach the MEKP bottle rack to the mast.
13. Attach the material filter (P31) to the PUMP.
14. Attach the siphon hose assembly to the bottom inlet swivel
on the resin pump.
15. Attach the air manifold assembly (M15-SF).
16. Screw the remaining eyelets into the boom.
17. Mount the MEKP slave pump/arm assembly to the air motor
Of the resin pump.
- **MAKE SURE THE BRACKET-ARM SHAFT IS IN LINE-**
18. Connect all hoses as marked, including the MEKP siphon
Hose assembly.

4) SAFTY PRECAUTIONS

The Rascal spray gun is a high-pressure spray system and must be treated as such. You must never place your hand in front of the spray gun when the gun is operating. It is possible to inject the resin under the surface of your skin using this spray gun, causing a very painful and harmful wound. This is true for any spray system.

To reduce the chances of injury, shut-off the air valve on the back of the spray gun when you are not spraying. Even if you stop just long enough to chance molds. The second bit of advice we offer is to follow the operation instructions step-by-step. Do not connect the air to the system until you complete the initial operating instruction and it is safe to do so.

NOTE: Operator Responsibility

It is the operator responsibility to insure that the Rascal Chopper System is operated safely. Local codes and operating instructions must be followed. Equipment operators should read and understand the local codes and operating instructions before operating this spray system.

NOTE: Never Submerge R100 or RC100 in any Solvents.

5) OPERATING INSTRUCTIONS

The operating instructions will give you step-by-step directions on how to bring your system up to the operating state. We suggest that the instructions be carefully followed, checking off each instruction as it is executed. Also at this point, it might be worthwhile to go back and review the system description. You are now ready to prepare the system for operation.

- 1) Place the Lubricant, Dibutyl Phthalate, in the resin pump Lubricant reservoir, approximately $\frac{1}{2}$ cup.
- 2) Remove the faceplate from the spray gun, using the Allen wrench, set the faceplate to one side until after both resin and the Catalyst Systems are purged.
- 3) Obtain two plastic containers. One container will be used to purge the resin, the other fill half with water and us to purge the Catalyst System.
- 4) You are now ready to connect the airline and purge the resin. Verify that you have shut off all the valves to insure that the starting point is the same for each system.
- 5) Connect the airline to the air manifold. Air requirement-120 lbs. @ 17 CFM.
- 6) Place the dip tube in the resin container.

- 7) Open the air valve in the back of the spray gun by turning the handle parallel with the airline.
- 8) Turn the speed control valve marked R38 all the way in. This will shut off the air supply to the Chopper, which you will activate later, while you continue purging operation.



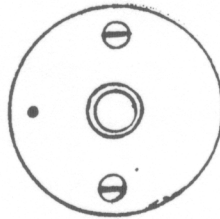
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- 5.4.1 The next step is to prepare for the calibration of the system for your resin. Start by cleaning the face plate and the spray gun with solvent and checking to insure that the fluid tips are properly installed. As you look at the front of the face plate, rotate the plate until the alignment hole is at nine o'clock, now the resin tip is on the top and the MEKP tip is on the bottom. ALSO THE TIPS SHOULD BE IN A HORIZONTAL POSITION.



If the tips are not in this position, adjust tips with tip wrench.

- 5.4.2 Align the face plate on the spray gun using the alignment pin. Tighten with the allen wrench.
- 5.4.3 Set the air regulator to the resin pump at approximately 35 psi. Open the air valve on the back of the spray gun and the valve with the blue handle in the resin fluid line.
- 5.4.4 To test the spray pattern, hold the gun approximately twelve inches from the surface of a sheet of cardboard and activate the trigger very quickly just to obtain a pattern of the spray. The ideal pattern will be an oval as shown:



If the pattern you see has a small oval with dots at both ends, increase the pressure at the air regulator 5 psi at a time until the pattern you see approximates the ideal situation.



The standard resin spray tip provided has a .036 orifice IF YOU HAVE A GOOD SPRAY PATTERN BUT NOT ENOUGH VOLUME, THEN YOU'LL NEED TO INCREASE THE ORIFICE SIZE, AS OVER PRESSURIZING CAUSES OVER-SPRAY.

- 5.4.5 Set the fluid pressure regulator on the catalyst at 20 psi (1.5%) and spray; the catalyst should impinge the resin at 1 inch in front of the spray gun. Looking down along side the spray gun, you should be able to see the fluid fans. Check the gel time of your resin. If the gel time is



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- 5.4.5 cont. slow, then adjust the catalyst by increasing the fluid pressure regulator in 5 psi (.5%) increments. Spray a test panel and check gel time. Repeat until the desired gel time is achieved. FINDING YOUR EXACT CATALYST PERCENTAGE CAN EASILY BE DONE WITH THE GS RATIO HEAD. BOTH SPRAY TIPS ARE MOUNTED IN THE RATIO HEAD. AT ACTUAL OPERATING PRESSURES (PRODUCTION LINE) MAKE A SHORT SHOT INTO TWO SEPARATE CONTAINERS, (ONE FOR RESIN AND ONE FOR MEKP) THEN WEIGH EACH CONTAINER. THE WEIGHT OF RESIN DIVIDED INTO THE WEIGHT OF THE MEKP GIVES YOU YOUR EXACT PERCENTAGE.
- 5.5 RC100 - When initiating operation of the cutter, keep in mind the trigger should be pulled completely back to allow air to pass to the motor.
- 5.6 The air directional knob (RC29) should be oiled twice daily and before start-up. The cutter will turn between 12,000 and 14,000 RPM wide open which will produce approximately 4 to 5 lbs. of chopped strand, depending upon the type of glass. Each unit is tested for output before leaving the factory.
- 5.7 In order for the unit to operate, the cover (RC23) must be on the cutter. O.S.H.A. requires covers for safe operating conditions.
- 5.8 After having primed the motor, introduce the strand into the top hole in the cover towards the rear of the gun so that when the motor engages the strand will pass under the idler bearing.
- 5.9 To adjust the volume of glass you may increase or decrease the speed of the motor with the R36 speed control adjustment.
- 5.9.1 The RC29 air directional control moves the flow of glass from left to right as it exits the motor cover. The glass should be evenly dispersed in the resin spray pattern as it comes in contact with the mold. If the glass is all in the middle of the pattern, tilt the chopper down towards the front of the gun so the glass enters the resin fan earlier.

VI. CLEAN-UP

- 6.1.0 Short term shut down.
- 6.1.1 Close air valve to gun.
- 6.1.2 Close the red and blue line valves in the fluid lines.
- 6.1.3 Wipe the face of the tip plate off with solvent.
- 6.1.4 Disconnect the main air supply.
- 6.1.5 Hang gun face down.
- 6.2.0 Long term (overnight) shut down.
- 6.2.1 Close air valve on gun.



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- 6.2.2 DON'T ACTIVATE TRIGGER. LEAVE FULL FLUID PRESSURE IN THE LINES. DISCONNECT-AIR SUPPLY WILL NOT BLEED FLUID PRESSURE.
- 6.2.3 Repeat steps 6.1.2 through 6.1.4.
- 6.2.4 Remove tip plate from gun using allen wrench.
- 6.2.5 Clean gun body with rag saturated with solvent.
- 6.2.6 Clean tips and tip plate with clean solvent. DO NOT USE ANY KIND OF PROBE TO CLEAN TIPS. USE A SMALL AIR NOZZLE AND BLOW THE AIR FROM THE FRONT SIDE OF THE TIP TOWARDS THE BACK.
- 6.2.7 To assemble the face plate, place the fluid tip on the end of your finger and set the face plate down over the fluid tip; then carefully holding the fluid tip, turn the face plate over and insert the teflon O Ring from the back side. Use this procedure for both fluid tips. The tips when properly aligned, will be horizontal and parallel as illustrated.

VII. MAINTENANCE

- 7.0 Weekly maintenance of filters. CAUTION: IT IS NECESSARY TO RELIEVE THE FLUID PRESSURE FROM THE SYSTEM BEFORE ATTEMPTING ANY WORK.
- 7.1 Connect the air line to the air manifold.
- 7.2 Close the slide valve to the resin pump and the air valve on the catalyst pump.
- 7.3 Open both inline fluid valves, the red and the blue handles. Open the air on the back of the spray gun.
- 7.4 Hold the spray gun over a plastic bucket and pull the trigger. The flow of material will start in its normal manner, but will drop off very quickly as the pressure drops. When the fluid flow stops, the pressure is relieved.
- 7.5 Close the air valve on the back of the spray gun, the two inline fluid valves with the red and blue handle. Disconnect main air supply. CAUTION: WEAR PROTECTIVE GLOVES THAT WILL NOT BE AFFECTED BY EITHER RESIN OR CATALYST AND SAFETY GLASSES. BOTH THE RESIN AND CATALYST FILTERS ARE FULL OF FLUID AND YOU WILL NEED CONTAINERS TO DISPOSE OF THE FLUIDS.
- 7.6 Loosen but do not remove resin fluid fitting outgoing from filter. This will insure pressure has been released. Remove knurled cap, spring and guide button.
- 7.7 Remove filter tube and screen. Do not force tube and screen, it may be necessary to rotate the filter body assembly 15 degrees on the resin pump so that the tube and screen will clear.



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- 7.8 Wash the resin filter in solvent, blow dry. Reassemble filter in reverse order.
- 7.9 To clean catalyst filter, shut off red valve and disconnect the line fitting going from the catalyst filter and allow the catalyst in the line to drain into a polyethylene container.
 - 7.1.0 If you examine the catalyst filter body, you will see "separate here to clean". Do so and clean in solvent.
 - 7.1.1 Reassemble the filter in the reverse order that it was disassembled.
 - 7.1.2 The final step is to bleed the air entrapped in the catalyst line and the resin filter. This can be accomplished by spraying again on a piece of cardboard until both nozzles stop spitting air. (Only a few seconds)

VIII. TROUBLE SHOOTING GUIDE

1. Trigger pulled, unit does not operate.
CAUSE: A. No air supply.
SOLUTION: A. Connect main air line.
B. Check main air supply.
C. Turn on air to gun.
2. Spitting of air out of exhaust hole at bottom of the trigger with no fluid emerging from tips.
CAUSE: A. Fluid valves closed.
B. Air supply to pumps shut off.
C. Fluid tips are plugged.
D. Fluid needles stuck.
SOLUTION: A. Open fluid valves.
B. Engage shut-off valves to pumps.
C. Take off tip plate and clean tips with brush and solvent. Check for blockage at resin outlet on fluid plate (R16). Clean in same manner.
3. Fluid emerging from between plates R16 and R22.
CAUSE: A. R19 bushings are damaged.
SOLUTION: A. Replace bushings.
4. Fluid drips from between R11 tip plate and R16 fluid plate.



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4. cont. CAUSE: A. R12 O Ring's worn.
SOLUTION: A. Replace O Rings.
5. Intermittent catalyzation.
CAUSE: A. Tip obstructed.
B. Catalyst filter screen B24 is clogged.
C. Air in catalyst line.
D. Catalyst gauge fluctuating. (Rising when gun is off)
E. Catalyst gauge fluctuating. (Dropping while spraying)
SOLUTION: A. Clean tip with air nozzle and solvent.
B. Remove screen and clean.
C. Purge catalyst system.
D. Clean catalyst regulator valve seat CR6.
E. Clean catalyst regulator valve screen CR9.
6. Resin fan pattern fluctuating or spitting.
CAUSE: A. Resin too viscous.
B. Resin filter plugged (P-31).
C. Loose fittings on suction side of pump.
D. Lack of air volume.
E. Resin too cold.
SOLUTION: A. Check batch of resin with your material supplier. Recommended viscosity of resin to be used is 350 C.P.S. These figures are derived from a Brookfield R.V.T. Viscometer.
B. Clean resin filter in solvent.
C. Tighten fittings. Reapplication of teflon tape to threads advised.
D. Check air line length from air compressor (main air supply) and diameter of line, minimum I.D. advised under 25' is 3/8", over 25' is at least 1/2". 17 C.F.M. is minimum delivery of air volume recommended.
E. Heat resin by storing in warm room or drum heater.



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7. Chopper running too slow.
- CAUSE:
- A. Lack of air supply.
 - B. Speed control valve R38 closed too far.
 - C. Cutting head bearings (C22) and motor bearings (C2) are worn.
 - D. Anvil sleeve (C26) tension too tight.
 - E. Too much drag on roving guides (B9).
 - F. Motor rotor (C4) gummed up.
- SOLUTION:
- A. Same as solution 6-D or open speed control valve.
 - B. Open speed control valve.
 - C. Replace bearings.
 - D. Loosen tension.
 - E. Readjust guides.
 - F. Lubricate rotor with air motor oil. (Twice daily)
8. Roving continually breaking off.
- CAUSE:
- A. Roving going over idler bearing (RC16) instead of under.
- SOLUTION:
- A. Re-route roving under idler bearing.
9. Chopper strand not matching resin fan pattern.
- CAUSE:
- A. Cutter (RC100) not adjusted properly.
- SOLUTION:
- A. Loosen RC32 and rotate cutter down so that chopped fibers intersect with resin fan pattern closer to nozzle.
10. Chopped fibers extending in length.
- CAUSE:
- A. Blades are worn.
 - B. Anvil sleeve adjustment too loose.
- SOLUTION:
- A. Replace blades.
 - B. Tighten anvil sleeve adjustment in slight increments.
11. Roving winding around cutting head and stops motor.
- CAUSE:
- A. Roving wet or contaminated.
 - B. Bad batch from factory.
- SOLUTION:
- A. Wipe cutting head clean with saturated rag of acetone or methylene chloride. Eliminate all wet or contaminated strands.
 - B. Check with factory representative.



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RASCAL GUN DIS-ASSEMBLY

RELIEVE FLUID PRESSURE FROM MATERIAL LINES BEFORE ATTEMPTING ANY DIS-ASSEMBLY

- A. Turn pumps off.
 - B. Pull trigger on gun to relieve fluid pressure.
 - C. Turn resin and catalyst valves off (red and blue handles) and pull trigger once again.
 - D. Disconnect air supply.
1. Disconnect air, resin and MEKP hoses from gun.
 2. Remove RC32 bolt.
 3. Loosen RC35 fitting at the gun and remove chopper motor and lead-in hose as a unit.
 4. Remove R10 bolts and R11 tip plate.
 5. Remove R13 bolts, R15 guard and R16 fluid plate.
 6. Remove R18 needle seats from R16 fluid plate. (use an 1/8" drill bit and insert from the front side of the fluid plate material port outlets to push needle seats out.)
 7. Remove R36 bolts, R35 plate, and entire air bulkhead assembly will come out as a unit.
 8. Remove R31 locknut.
 9. Remove R13 bolts. R22 back plate and valve carrier/needle assembly will come out as a unit.
 10. Remove R24 valve carrier from R22 back plate.
 11. Remove R27 spring from valve carrier.
 12. Remove R19 bushings from back plate.
 13. Remove R20 and R21 orings from back plate.
 14. Remove R29* piston from gun body.
 15. Remove R49 air valve.
 16. Remove R46 trigger valve. Hold R50 pin to loosen trigger valve.
 17. Remove R41 pull bar.
 18. Remove R42 button.
 19. Remove R40 bolt and R39 handle.



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PREPARATION FOR RE-ASSEMBLY

1. Remove all old orings and teflon bushings.
2. Clean all aluminum parts thoroughly in solvent. Make sure all flat surfaces are free from built-up material, and all holes and ports are COMPLETELY clean.
3. Inspect R23 fluid needles. Surfaces must be clean and needles must be straight. Remove to clean if necessary.
4. The cleaner the gun parts are, before re-assembly, the longer the gun will last in production. Orings and bushings need clean surfaces to obtain their individual sealing capabilities.

RASCAL GUN RE-ASSEMBLY

1. Place R44 and R43 orings in top of the handle.
2. Mount handle on gun body using R40 bolt (through bottom of handle.)
3. Install R42 button in handle.
4. Use R12 bolt to mount R41 pull bar.
5. Place R47 orings (2) on front end of R46 trigger valve. (Being careful not to cut orings.)
6. Place R48 orings (2) on rear portion of R46 trigger valve. (Being careful not to cut oring.)
7. Lubricate R47 and R48 orings thoroughly with silicone oring lube or all-purpose white grease.
8. Screw R46 valve into R42 button from the rear of the handle with large screwdriver. Hold R50 pin to secure R46 valve.
9. Screw R23 fluid needles into R24 valve carrier. This assembly should fit loosely into R22 back plate.
10. Install R25 and R26 orings on valve carrier and lubricate with silicone oring lube. (Air-assist R25 is not used.)
11. Slide a clean R27 spring over valve carrier. This spring rides over the R22 plate into R28 gun body. Make sure that the spring does not tear the oring out of it's groove.



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RASCAL GUN RE-ASSEMBLY CONT.

12. Slide valve carrier and needle/spring assembly into R22 plate and install this assembly into R28 gun body using R13 bolts (2). (Air-assist R23A needle on bottom.) Tighten bolts down evenly one turn at a time.
13. Place R30 oring on R29 piston.
14. Lubricate lower section of piston chamber (through rear of gun body) and R30 piston oring.
15. Push R29 piston and oring through rear of gun body and attach to R24 valve carrier with R31 lock-nut. LOCK NUT WILL BOTTOM OUT ON VALVE CARRIER. DO NOT OVER TIGHTEN.
16. Screw in R49 air valve into R39 handle.
17. Connect gun to air supply ONLY and test for proper trigger action. 1st stage will pull fluid needles back and 2nd stage will open air chamber to the rear of the R29 piston. Dis-connect air hose.
18. Replace R34 orings on R33 bulkhead. Grease orings and air chamber in gun body with a small amount of all-purpose white grease.
19. Slide bulkhead assembly into rear of gun body and secure R35 plate with R36 bolts.
20. Place R20 silicone oring (red) carefully over R23 needle on the bottom. (Closest to handle.)
21. Place R21 oring (black) carefully over R23 needle on the top side of the gun.
NOTE: There are three different orings that can be used with the material needle.
 1. KALREZ - Gun comes equipped with this oring. It is compatible with heat, all solvents and polyesters and can be cleaned and re-used if not broken.
 2. TEFLON CUP - Spring loaded teflon seal.
 3. VITON - Low cost but does not have the life of kalrez or telon.
22. Place R19 bushings over R23 needles.
23. Carefully insert R18 nylon seats into clean fluid ports of the R16 plate. (Rear side of plate.)
24. AIR-ASSIST ONLY - Insert LW244 sleeve into bottom fluid port, small shoulder first. (R23A needle port). Make sure small hole in LW244 sleeve is clear. Make sure small hole in R23A needle is clear. Make sure small hole in R16A plate is clear. (MEKP port)
25. Attach R16 plate and R15 guard to the gun with R13 bolts (2). Tighten bolts one turn at a time, being careful not to bend needles.