TOM JOHNSON'S

Sporter Tips

Care & Servicing

How To's & Upgrading Tips

To Future Olympians, Junior Shooters, and the people who help them develop, their coaches.

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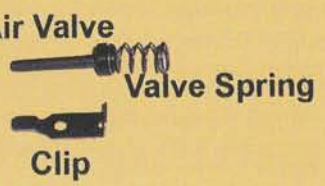
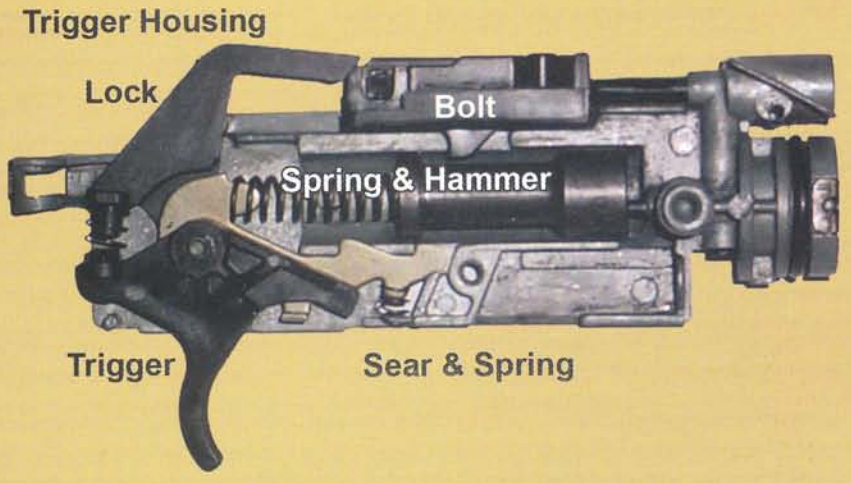
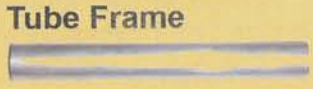
Designed by Terry Bradley, CBC Printing, EBCI
Distributed by CMP

NOMENCLATURE







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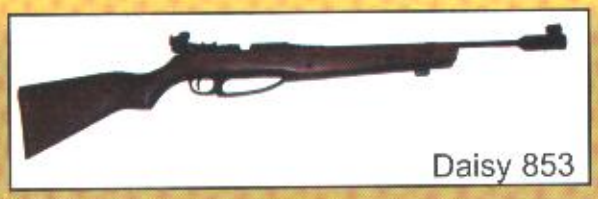
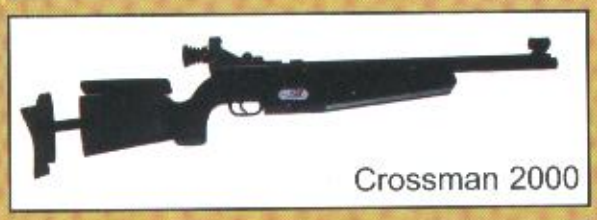

Daisy 853


Daisy 753


Crossman 2000


Daisy XSV40 Avanti


Daisy 888

Pictured above are the most common sporter air rifles, the Daisy 853 pneumatic (single and five shot), the Daisy 753 pneumatic, the Crossman Challenger 2000 CO_2, the Daisy 888 CO_2, and the Daisy XSV40 Avanti compressed air models.

The 853 has a muzzle velocity of 480 fps and holds the 7 ring from a bench rest. Its advantages are low cost for beginner shooters and, because it forces a shooter out of position to recharge and load thereby causing more attention to natural point of aim and repositioning, facilitates transfer of fundamentals to the subconscious. Its disadvantage (like the advantage) is that it forces a shooter out of position after each shot to recharge and load. It has a cumbersome trigger (sloppy pull and 5lbs. pressure) and a myriad of screws and springs causing apprehension in do-it-yourself work. The pistol grip does not facilitate a straight-back pull, and, for younger shooters, can be difficult to cock in charging.

The 753 is identical, except it has a straight-back pull pistol grip, and a raised comb. It also features more finely adjustable Gamo sights. The disadvantages are the same as the 853.

The 2000 has a muzzle velocity of 500 fps and holds a loose 7 ring. Its main advantages include CO_2, an adjustable stock (butt and comb) with an equipment rail, and a smooth trigger action. It has an ambidextrous bolt action similar to the M16 service rifle. It has more finely adjustable sights, requires little maintenance or upgrade, and does not force the shooter out of position in reloading. The disadvantages are a limited number (30+-) of rounds per powerlet before a drop in velocity, limited accuracy, and somewhat higher cost.

The 888 has a muzzle velocity of 580 fps and holds the 9 ring. Its advantages are CO_2 cylinder firing in excess of 325 rounds without a drop in velocity, relative accuracy, more finely adjustable sights, an equipment rail, and a trigger set screw to reduce slack. It also does not force the shooter out of position to reload. The disadvantages are a heavy trigger pull (again 4-5 lbs.), a pistol grip like the 853, and is cumbersome in recharging.

The Avanti has a muzzle velocity and shot group rivaling many precision makes (700 fps with groups consistently of 10s). It has finely adjustable sights, and equipment rail, a straight-back trigger pull, and an adjustable trigger in both length and weight. It also features and adjustable stock (length and comb) and is easily recharged with compressed air. It is capable of firing two full courses before recharging. It required little maintenance, no upgrade, and does not force the shooter out of position to reload. Its disadvantages includes its non-sporter performance and cost, leading some to question its utility as a "sporter".

INTRODUCTION

The world of sporter air rifle servicing and upgrade is not very large nor is it complicated. However, some coaches and maintenance personnel prefer not to be bothered. Others are unsure of their surroundings and apprehensive about digging in and getting dirty. Still others would rather upgrade equipment by spending more money in the mistaken belief that equipment makes the shooter. And, unfortunately, some believe that air rifles, especially sporters, are of little utility for marksmen (or women) and fail to realize the potential benefits to the beginning shooter.

The sporter rifle's future, however, appears secure as it is low cost for beginning and intermediate shooters and is likely to be around in good numbers because of government contracts for high school JROTC units across the nation. More experienced coaches understand the sporter's value not only as a low cost starter rifle, but also the benefit it has facilitating the learning of fundamentals in the integrated act of shooting. Most models literally force the shooter out of position every shot to reload and recharge. The shooter therefore is forced to concentrate on the fundamentals, especially the natural point of aim with each shot and, with repetition, skills are more readily transferred to the subconscious.

The marksman's mission is to release a perfectly executed shot when the position feels right, when the hold and sight picture are right, when breathing is interrupted and as the trigger releases the sear at the right moment. Having done that, he or she learns to do it over and over again...achieving consistency in perfectly executed shots. Regardless of skill level, this is easier said than done with the sporter. Most sporters have a fair amount of slack in the trigger. The pull is sloppy. Most have five pounds of pull or more making the smooth release of the shot a tall order for even accomplished shooters. What can be done to assist sporter shooters as they transition from basic to intermediate or advanced skill levels without throwing more money into the process?

Locating anyone with the experience or interest to help young sporter shooters is difficult and necessitates learning through the school of hard knocks - digging in, making mistakes, and learning. Classes developed and presented at coach certification schools, summer shooting camps and clinics prompted this do-it-yourself guide*. The points are passed in the hope that all coaches may benefit from them and be of assistance in the development of their young shooters.

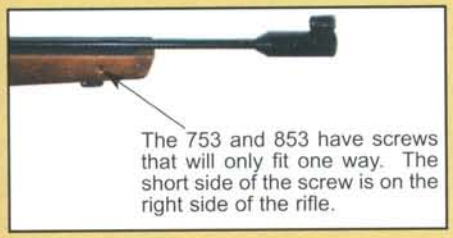
* This guide deals with the predominant sporter air rifles found in most Jr. air rifle shooting clubs and units across the nation-the Daisy 853, 853C, the 753 and the 888. All have similar stocks and identical barrels and actions.

DISASSEMBLY

Disassembly and assembly is essentially the same for all models. Where differences occur, explanations are noted in parenthesis.

1. The barrel and action are removed from the stock by first removing the upper hand guard screw assembly which has two parts. Remove the short piece from the right side as you view the piece from the top.

2. Remove the long part and set aside with the short part.



The 753 and 853 have screws that will only fit one way. The short side of the screw is on the right side of the rifle.

(The 888 has two identical hand guard screws fitted into the bracket from each side. Simply remove each and set aside.)

3. Remove the receiver screw from behind the trigger guard. This also has two parts that may remain attached together when loosened from the receiver.

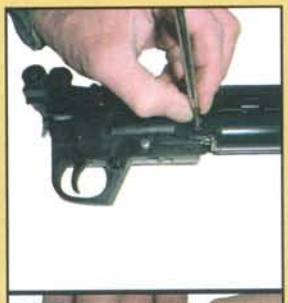
In that case, the assembly will remain in the stock until the barrel and action are removed. Simply place the safety at mid point and, pressing down on the trigger guard, separate the stock and barrel/action. Remove the left and right stock fillers, the barrel band and the receiver screw assembly and set aside with the other parts.

Separate the two pieces of the receiver screw assembly if they remained together. (if the receiver screw assembly did separate, remove the upper portion from the receiver at the rear of the trigger assembly and set aside)

Parts you should have thus far

4. Carefully remove the receiver by removing the two screws on either side of the trigger housing and lifting up on the rear to separate the front from the frame tangs.

CAUTION - hold the bolt handle and spring in place with the free hand during the process to avoid both handle and spring popping out under spring tension to places unknown!



5. Remove the pump lever assembly and frame from the barrel/trigger housing by prying out on the lugs and pulling forward on the assembly. (The 888 has no pump lever assembly. The frame, stock fillers, and barrel band are enlarged to accept the CO2 tube. However, they are removed through the same process as described above.)

6. Separate the pump lever assembly from the frame by removing the lever pin and sliding the assembly forward through the frame slot.

Slide the pump handle assembly from the bracket in this direction

Remove the pump tube from the valve body/trigger/barrel assembly by pulling forward, and set aside.

Parts you should have thus far

Let's move on to Care and Cleaning!

CARE & CLEANING

Sporter air rifles do not require the regular cleaning associated with smokeless or black powder firearms or the maintenance of the precision air rifle. Cleaning once or twice a year should suffice. Spray a couple squirts of TSI 301 down the barrel and follow with patches pushed through with a wooden dowel sized to cal.177 'til they come clean.

Inspect the pump "o" rings and replace as necessary. Remember to oil the sponge ring and keep it oiled during regular use (30wt non-detergent oil is just fine). At times, the pump itself becomes swollen due to intense heat generated during the charging process. The telltale sign is a difficult or squeaky pumping stroke. Replace the pump by using the hinge pin to knock out the pump pin, and replacing a new pump (with "o" rings) over the arm and reinserting the pin.

Clean, inspect the valve body. Replace the "o" ring as necessary. Remove the retaining clip and extract the valve/spring assembly. Inspect the valve for nicks on the shoulder; replace as necessary. Clean the body cavity with cotton swabs and TSI 301. Dry thoroughly with compressed air (pick up a bottle at nearest Radio Shack). Now is a good time to check the air plug at the base of the air channel forward of the valve assembly. Insure that it is in place and fully seated. If missing or loose, the rifle will not charge.


To remove the pump pin, simply use the hinge pin as a punch and tap it with a small hammer until it comes loose.


Remove the retaining clip to access the valve/spring assembly.

Clean the valve body with cotton swabs and TSI 301.


All of the Valve Parts

UPGRADING THE ACTION

Three things to significantly increase the effectiveness of the action and consequently provide advanced shooters a better opportunity for releasing a perfectly executed shot: S L R - not side looking radar but something as unique - Smoothen, Lighten and Reduce.

a. **Smoothen the trigger pull.** Round (file/polish) the sear shoulder edge. File and polish the hammer rim (edge). The sear holds the hammer cocked open until trigger release, at which time the hammer drives forward under spring pressure releasing the air charge. Filing and polishing the two components provides a smooth release. Filing too much, causes a partial air release upon trigger activation followed by a second without recharging the rifle (provided hammer is re-cocked).

b. **Lighten the trigger pull.** Cut two or three loops off both sear and trigger springs. Sporter rifles normally have 4 - 6 lbs of pull causing a less than satisfactory sear release for competitive shooting. The trigger can safely be adjusted to 1.5 lbs pull. Many of the new Daisy model XSV40s arrive with 8oz of pull, illegal according to current rules! Use a spring weigh scale (hardware store) or a premium trigger pull scale (RCBS manufactures an excellent model) to determine weight of pull. A dead weight such as used in equipment checks is not satisfactory for this procedure. Maintain extra parts on hand (including springs) to facilitate learning through trial and error.

c. **Reduce the length of pull** (remove slack). The 888 (and XSV 40)has a set-screw installed


Use of a magnifying glass greatly aids in determining smoothness.


Carefully file and polish the hammer rim.


Cut two or three loops off the sear and trigger springs

A shorter spring will lighten a heavy trigger.

UPGRADING THE ACTION (CONT'D)

behind the trigger guard that eliminates most slack in the rearward motion of the trigger. No rough spots; little wasted pressure to release the shot. Replicate the same accommodation in all sporters by simply drilling a hole in the back of the trigger guard at an angle toward the trigger shoulder into the housing. Thread and install a set-screw (6-30x3/8 works fine).

The procedures outlined above require disassembly of the trigger housing itself.

a. Remove the housing cover screw and separate the cover from the base, valve, and barrel assembly. CAUTION: because the hammer spring is under tension, parts will become airborne if not restrained! Pry the cover up partially, front first, with one hand. At the same time, insert the index finger of the free hand under the cover from the front, holding the hammer in place and carefully remove the cover by rotating it back and off. Now the hammer and spring can be safely removed.

b. Remove the trigger and spring and the sear and spring from the post and set aside with the cover, screw, and the hammer and spring. Now each part can be worked on as outlined above. Inserting the set-screw is easier than might be expected. A simple, hand held power screwdriver can be used to drill the pilot hole, and enlarge to size. Threading the hole is also done by hand with a simple handle or small pliers. Insert the set-screw and tighten 'til the nose begins to protrude from the base. Further tightening to desired setting is accomplished after re-assembly as noted below. Care should be taken during this procedure not to disturb the safety, spring and ball bearing as the parts require patience and dexterity to reassemble.

Re-assembly of the housing takes place in reverse order. A small amount of high-grade lithium grease can be dabbed into hammer channel on the base and in the cover before replacing the parts. The back of the hammer spring fits over the sear lug.

Holding parts with one hand, compress spring with hammer into channel and hold in place with fingers. Be careful to insure the rear tang of the cover is inserted properly at the base of the housing and rotate forward while holding the hammer and compressed spring in place. Remove the index finger as the cover is lowered.
Replace housing cover screw. If the bolt becomes disengaged during the process, simply reinsert from the front with downward pressure to engage the hammer rim.

Now is the time to complete adjusting the trigger set screw. Cock the hammer by pulling the bolt back all the way and reseating. With the hammer cocked, tighten the setscrew. Note the trigger move rearward during the process. When the sear releases the hammer, turn the set-screw one full turn counter-clockwise. The slack is now eliminated as is found in the 888. Adjust to shooter's preference as necessary.

THE TRIGGER HOUSING

1 Remove the housing cover screw and separate the cover from the base, valve and barrel assembly.

2 Pry the cover up partially and use the index finger of one hand to hold the hammer and spring in place.

3 Remove the trigger w/spring, the sear w/spring from the post and set aside.

4 Remove the housing cover screw and separate the cover from the base, valve and barrel assembly.

INSTALLING THE SET SCREW

1 The pilot hole should be drilled at an angle behind the trigger guard toward the trigger shoulder.

2 The set screw will eliminate most slack in the rearward motion of the trigger. Read the guidelines on how to adjust it.

REASSEMBLY

Like the trigger housing, rifle re-assembly is done in reverse order.

1. Insert the pump tube over the valve body by twisting over the "o" ring to avoid nicking the ring face. Insure the tube notch fits over the valve body tang.

2. Insert the frame and pump lever assembly over the tube, twisting as above to avoid nicking the "O" rings. Insure that assembly tangs are seated over housing lugs and pressed firmly in place.

3. Insert the lugs on the front of the receiver into the tangs on the top of the frame and lower partially into place.

4. Replace the bolt handle and spring into the bolt post and spring hole. Hold in place flush with the housing.

Fully seat the receiver and replace the two screws on either side of the receiver and the upper portion of the receiver screw assembly. Do not fully tighten at this time to facilitate replacing the lower half later after the barrel and action are seated into the stock.

If the rifle is an 853C (clip fed) the bolt must be in the open position to reseat the receiver.

5. Replace the barrel band and stock fillers. While holding the barrel/action with pump handle open, insert the assembly into the stock. Fully seat the components with a screwdriver to ease the safety

through the stock.

6. Replace the lower half of the receiver screw and both halves of the hand guard screws and tighten.

7. Close the pump handle and test fire. A chronograph and bench rest can be used to determine muzzle velocity (at or about 480 fps or better for the 853 and 753) and shot pattern. The 888 and XSV40 develop 580 fps, or more, and consistently "hold" the 9 ring.

STOCKWORK

A finely adjusted rifle is less than optimum for the accomplished shooter unless the stock is fitted. Check the length by placing the butt into the "crook" of the arm and checking the location of the trigger finger "pad" with regard to the trigger. Shorten or lengthen the stock accordingly.

The pistol grip can also be modified to facilitate a straight-back pull for your accomplished shooter. Using finishing nails inserted appropriately, build up the grip in layers with your favorite wood filler (Leech Professional Wood Filler is excellent) and finish with a wood rasp and sandpaper. Check to insure that the dimension does not exceed that of the 753 and that the modification is not anatomically formed (refer to the National Standard Three-Position Air Rifle Rules). The comb can also be built up facilitating the more erect head position offered by the 753 stock using the same technique.

A final thought...

Train one of your more mechanically inclined charges as an armor. You'll get the maintenance and adjusting that you want while you devote your energies to coaching, mentoring and instructing!

CHECK THE LENGTH OF THE STOCK!

The pad of the trigger finger should rest squarely on the trigger as the rifle lies in the crook of the arm. If the stock is too long, it will force the shooter to compensate by placing the rifle butt either across the top of the arm or on the bicep. Balance and comfort are essential to achieving a perfectly executed shot. A good stock fit facilitates an erect head position and decreases the effect of middle ear compensation.

Stock Modifications

Stock modification begins with the placement of wire brads just below the desired level of the finished stock. Wood filler is added in layers and allowed to dry before applying the next coat. Rasping & sanding complete the job.

The stock of this 888 has been modified to replicate the pistol grip and comb of the 753. Note stock has been lengthened to accommodate the shooter.

This 853 stock has been modified to replicate the 753 stock.

HELPFUL TOOLS

- Two Phillips Head Screwdrivers (when one half turns and the other does as well!)
- Flat Head Screwdriver (prying tangs of bracket away from valve/trigger housing assembly)
- Small Vice Grips (removing upper half of receiver screw assembly- behind trigger guard should the two halves separate during disassembly; and for a handle to thread the set screw threading for trigger slack adjustment)
- Small Three-cornered Metal File (fine toothed for rounding sear, hammer contacts)
- Magnifying Glass (to verify smoothness of sear/hammer edges.
- Wire nippers (to cut loops from sear, trigger springs)
- Tack Hammer (for driving piston (pump) from charging assembly when replacing pump)
- Feinwerkbau Grease
- JB Weld - mould & hardener (welding upper screw into receiver when stripped)
- TSI 301 Cleaning Solution
- 1/16th Starter Bit (pilot hole for trigger set screw)
- 6/30th Bit (to enlarge trigger set screw hole)
- 6/30th Threading Screw
- 6/30th X 3/8th Set Screw
- 6/30th Allen Wrench
- RCBS Trigger Pull Scale
- Allen Wrench Set
- Spare Parts Bag
- Bench Rest Device with Chronograph (for testing muzzle velocity and shot groups for specific type pellets and all types of sporter air rifles (note charging handle of 853 from bottom of bench rest vice (on pg. 6)