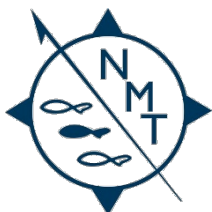


AutoFish Quick Reference Guide



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Contents

| | |
|---|----|
| AutoFish Trailer Startup | 5 |
| Sorter Calibration | 6 |
| Sorter Setup | 7 |
| Sorter Adjustment..... | 8 |
| Adjustments Independent of Fish Size..... | 8 |
| Small Fish (250 fpp to 120 fpp) | 8 |
| Medium Fish (105 fpp to 55 fpp) | 8 |
| Large Fish (45 fpp to 20 fpp) | 8 |
| Clamp Removal | 10 |
| Clamp Installation | 11 |
| Setup for New Fish Size | 12 |
| Tag Placement | 13 |
| Clipper Removal | 14 |
| Clipper Installation | 14 |
| Clipper Shimming | 15 |
| AutoFish Maintenance During Marking Season..... | 16 |
| Daily Maintenance | 16 |
| Winter Daily Maintenance | 16 |
| Weekly Maintenance | 16 |
| Processing Rejects..... | 17 |
| Mark and Tag..... | 17 |
| Tag Only..... | 18 |
| Mark Only..... | 19 |
| AutoFish Trailer Shutdown..... | 20 |

AutoFish Trailer Startup

- 1) While walking up to the trailer, turn on the air compressor and finish draining tank, close the drain valve and make sure it pressures up.
- 2) Turn on 'Water Pump' (Green Switch). Install main trough standpipe by screwing in a couple of threads deep. Do not tighten. Check the water flow valve to main trough.
- 3) Ensure main line flush valve is closed.
- 4) Visually inspect both the outflow pipe sending fish to the raceway and the excess water hose. Make sure they are connected, not leaking excessively, and are going to the correct location.
- 5) Install manual trough standpipe and ensure adequate flow over standpipe.
- 6) Close reject bucket drains, install reject bucket nets.
- 7) Turn on 'Lines' and 'Sorter' computers (Green Switches).
- 8) Turn on 'Fish Pump' and 'VE Light' (Green Switches).
- 9) Make sure water level in main trough is flowing well over the standpipe (an inch or so) and turn on 'Lines Pump' and 'Sorter Pump' (booster pumps, Green Switches).
- 10) Check the pressure gauges. 'Lines' pressure should be 30-35 psi, 'Sorter' pressure should be 50-60 psi, 'Systems' pressure should be around 20 psi.
- 11) Work from line 1 to Line 6 and verify VE Flow Meter is between 5-5.5 gpm, verify channel stop plate is down, check channel water flow at top/middle/bottom valves, check channel width and height. Install cutter, engage drive rollers, load wire, and slide MKIV into operating position. Hang camera and calibrate the line.
- 12) Turn on sorter fish pump in software, ensure it is communicating, cycle pump speed between idle and high, cycle fish valve between open and closed position.
- 13) Ensure sorter diverter air pressure gauge is at 50 psi.
- 14) For initial morning startup, tighten the sorter aperture wires slightly, lower the aperture roof height and turn up the jets on the sorter.
- 15) Get fish into the trailer.
- 16) Press 'System Feed' button on sorter software to begin sorting fish, check the first hundred fish to ensure the computer is reading the tip of the snout and tip of longest lobe of the tail and images look good.
- 17) Begin at the line with the most fish in the VE. Start line and verify tag placement on first couple of fish, check clip quality on 10 fish.
- 18) Once all lines are running check the sorter numbers, percentage going to each line and big/smalls, also unsafe holds and multiples, ideally you want 3% or less unsafe holds and minimal multiples and rejects. Focus on the last 10-minute values.
- 19) If the sort is good and the throughput is below the target number, start opening up the aperture wires and roof height a little at a time, and turning down the sorter jets. Ensure the unsafe holds and multiples don't increase to an unacceptable level.
- 20) Once things are up and running, check the outflow pipe again to ensure water and fish are going to the intended location. Check for mortality at the outflow pipe and tailscreen of the receiving pond. Look for deep clips in the pond.
- 21) Perform necessary QC checks and documentation.

Sorter Calibration

- 1) Turn off water to the sorter, including the VE flow meter, transition water, and jets.
- 2) Press the 'Sorter Setup' button on the sorter software.
- 3) Place channel 1 in calibration mode.
- 4) Ensure there is no water in the sorter channels and place the calibration rod in channel 1 in the fish imaging region and ensure the imaging system is accurately finding both ends of the rod and it is measuring a consistent 80 mm. If the measurement length is inconsistent increase the Gradient Threshold, this will make the imaging system less sensitive to noise. The Gradient Threshold is looking for edges to find the tail accurately. The Background Threshold is determining what percentage of brightness equals black.
- 5) Press the 'Calibrate' button for channel 1 and verify the measured length is 80 mm.
- 6) Remove the calibration rod and repeat the procedure for channel 2.
- 7) Press the 'Close' button in Sorter Setup window to return the software to normal operation mode.
- 8) Turn water back on to the sorter, including the VE flow meter, transition water, and jets.

Sorter calibration should be completed when the trailer has been moved or if an issue with the imaging system is suspected.

Sorter Setup

- 1) Estimate the fish size and configure the sorter ports accordingly.
- 2) Press the 'Sample' button on the sorter software.
- 3) Run 500 to 1000 fish through the sorter to get a reasonably accurate size distribution.
- 4) Press the 'Prediction' button in the sorter software. Ensure that the data source is 'Sample' and press the 'Suggest' button.
- 5) While these fish are being measured, make changes to the ports to accomplish the three goals:
 - a) Cover as much of the distribution as possible with the six lines
 - b) Even out the percentages going to each of the six lines
 - c) Raise the minimum default setting 2.5-4 mm on each line (the smallest size line may not be raised as high to capture the largest percentage of the population).
- 6) Once it has been decided what size plates are going to be installed on the lines, press the 'Sample' button again to return the software to normal operational mode.

Sorter Adjustment

The performance of the sorter depends on the behavior of each individual group of fish. The following is a good starting point for different sized fish, but the range of adjustments should be used to maintain the balance of throughput and separation.

Adjustments Independent of Fish Size

1. The sorter VE should be level side to side and front to back.
2. Water flow to the sorter VE should be between 5 and 6 gpm.
3. The water depth should be just above the dorsal fin.
4. The roof height should be set just above the largest fish.

Small Fish (250 fpp to 120 fpp)

1. Jet angle should be set at 30 degrees.
2. When triggered, the jet pressure should be set between 0.5 and 1.0 gpm.
3. The transition water flow should be set between .5 and 1.5 gpm.
4. Trigger sensor 1 should be used for smaller fish.
5. The wires of the aperture should be adjusted all the way together.

Medium Fish (105 fpp to 55 fpp)

1. Jet angle should be set at 20 degrees.
2. When triggered the jet pressure should be set between 1.0 and 1.5 gpm.
3. The transition water flow should be set between 1.0 and 2.0 gpm.
4. Trigger sensor 2 should be used for medium sized fish.
5. The wires of the aperture should be adjusted somewhere in the middle for medium sized fish.

Large Fish (45 fpp to 20 fpp)

1. Jet angle should be set at 15 degrees.
2. When triggered, the jet pressure should be set between 1.0 and 2.0 gpm.
3. The transition water flow should be set between 1.0 and 2.0 gpm.
4. Trigger sensor 3 should be used for large sized fish.
5. The wires of the aperture should be adjusted somewhere between the middle and the open position for large fish.

If the recommended adjustments do not provide adequate separation or throughput, follow these possible remedies:

Fish are too Fast (High Unsafe Holds and Multiples):

1. Increase the pressure of the jets.
2. Increase the angle of the jets.
3. Close the wires of the aperture.
4. Lower the water level in sorter VE.
5. Decrease the trigger sensor number being used.

Fish are too Slow (Low Throughput):

1. Decrease the pressure of the jets.
2. Decrease the angle of the jets.
3. Open the wires of the aperture.
4. Increase the water level in the sorter VE.
5. Increase the trigger sensor number being used.

Fish are Jumping in the Imaging Area (High Shape Errors):

1. Adjust the amount of water in the transition. Try decreasing the amount of water first, if the desired results aren't achieved, try increasing the transition water.
2. Ensure that the sorter VE is level front to back and side to side.
3. Ensure sorter setup is correct (aperture wires, roof height, water depth in VE).

Clamp Removal

- 1) Slightly loosen the left shoulder screw in the trapdoor linkage using a 9/64 T-handle hex wrench.
- 2) The right shoulder screw in the trapdoor linkage must be removed from the main plate but may remain in the linkage. The trapdoor should now pivot downward.
- 3) Using a 3/32 hex wrench, loosen the four mounting screws for the outside clamp and slide the clamp off the mounting plates on the holder mechanism.
- 4) Using a 5/64 hex wrench loosen the two mounting screws for the inside clamp and slide the clamp off the mounting plates on the holder mechanism.
- 5) Loosen the two mounting screws at the base of the trap door and remove trap door from the linkage using a 5/64 hex wrench.
- 6) Using a 3/32 hex wrench remove the nose sensor from either side of the head mold.
- 7) Using a 7/64 hex wrench loosen the set screws on the MKIV collar and remove the head mold.

Clamp Installation

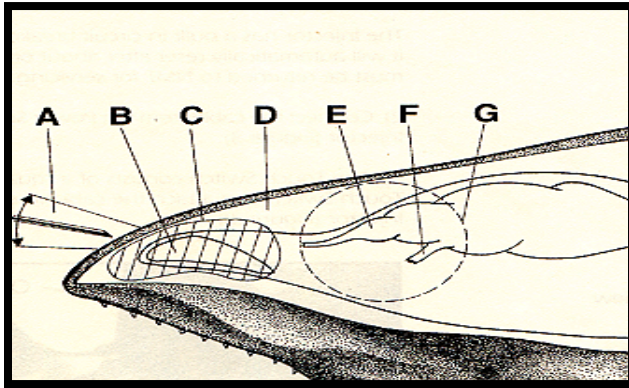
- 1) Slide the inside clamp over the inside mounting plates on the holder mechanism.
- 2) Slide the clamp all the way up into position and tighten the two mounting screws using a 5/64 hex wrench.
- 3) Attach the fish ejector fitting to the nozzle on the inside front clamp.
- 4) Install head mold on the MKIV using a 7/64 hex wrench.
- 5) Using a 3/32 hex wrench install nose sensor on the head mold.
- 6) Slide the MKIV into operating position and lock in place.
- 7) Place the trapdoor into the linkage. Slide the trapdoor all the way back and tighten the two mounting screws using a 5/64 hex wrench.
- 8) Using a 9/64 T-handle hex wrench reinstall the shoulder screws on the trapdoor linkage.
- 9) Using the 'Motor' function on the tablet, cycle the trapdoor to determine:
 - a. The shaft on the trapdoor linkage is centered in the link when the trapdoor is placed in the 'Home' position.
 - b. When the trapdoor is cycled, the door closes completely every time without stalling.
 - c. The spacing above and below the snout hole in the head mold is of equal distance.
- 10) Slightly loosen the left shoulder screw in the trapdoor linkage using a 9/64 T-handle hex wrench.
- 11) The right shoulder screw in the trapdoor linkage must be removed from the main plate but may remain in the linkage. The trapdoor should now pivot downward.
- 12) Slide the outside clamp over the outside mounting plates on the holder mechanism.
- 13) Slide the clamp all the way into position and tighten the four mounting screws with a 3/32 hex wrench.
- 14) Reinstall the shoulder screws on the trapdoor linkage using a 9/64 T-handle hex wrench.
- 15) Using the 'Motor' function on the tablet, move the trapdoor into the 'Close' position.
- 16) Using the 'Motor' function on the tablet, cycle the front and rear clamps to ensure they are closing completely without stalling.
- 17) With the trapdoor in the closed position, use the tablet to disable the front and rear clamps and manually push the clamps into the closed position to ensure there are no interferences.
- 18) Using the tablet, enable and place the front and rear clamps in the home position.

Setup for New Fish Size

- 1) Configure the marking and tagging software to match the new fish size.
- 2) Refer to the Clamp Installation instructions to install the hardware for the new fish size.
- 3) Put the line software into the 'Align' mode and align the camera. Ensure the yellow box traces the edges and bottom of the clamp window and the area between the two blue horizontal lines is comprised of solid black vertical clamp edges.
- 4) Adjust the channel height and width for the new fish size.
- 5) Before sorting any fish to the line, change the sorter software to match the new fish size.
- 6) Calibrate the line and ensure that the calibration image correctly identified the point of the chevron.
- 7) Process some fish and check tag placement immediately.
- 8) Once tag placement is set, ensure that all mechanisms are functioning properly and evaluate fin clip quality.

Tag Placement

The CWT should be placed into the adipose or connective tissue within the snout, see images below. CWT placement that is not completely within the target area can cause damage to the fish or result in poor tag retention.



A - Usual range of needle angle; B - Muscle, adipose, and fibrous tissue; C - Tag target area; D - Cartilage; E - Olfactory lobe and nerve; F - Optic nerve; G - Eye position

For proper tag placement, it is important to place the MKIV and trapdoor in the proper location. The MKIV height should be set so the roof of the front inside clamp rests evenly between the top of the head mold and the top of the snout hole. The stop block on the trap door should be set so that the area between the bottom of the snout hole and the trap door matches the area between the top of the head hole and the roof of the inside clamp.

Adjusting Tag Placement:

- 1) If the tag is too deep or too shallow:
 - a) Check the 'Show' to make sure the end of the wire is between the middle of the bevel of the needle to just behind the end of the needle, but never beyond the end of the needle.
 - b) Adjust the head mold in (if too shallow) or out (if too deep) to place the tag properly. For initial setup position the head mold depth so that two red lines are visible on the head mold base. A shallow tag is easier to find than a deep tag.
- 2) If the tag is too high or too low:
 - a) Ensure that the clamping and trap door mechanisms are functioning properly.
 - b) Adjust the stop block on the trap door.
 - i) If the tag is too low move the stop block on the trap door down slightly. If the tag is still too low move the MKIV down slightly.
 - ii) If the tag is too high move the stop block on the trap door up slightly. If the tag is still too high move the MKIV up slightly.

Clipper Removal

- 1) Using a 3/8 and 5/16 box end wrench, loosen the tension lock nut to ease the removal of the clipper block.
- 2) Using a 5/16 nut driver remove the two nylon lock nuts and bolts holding the clipper block assembly in the clipper assembly carrier.
- 3) Using a small-bladed screwdriver, carefully remove the e-clip, nylon washer, and spherical bearing from each pivot shaft on the clipper.
- 4) Push the blade and anvil together and carefully remove the block from the clipper assembly. Make sure to place the clipper assembly in a position so that the plungers and springs are not lost.
- 5) Remove the inside spherical bearing off each pivot shaft of the clipper block.

Clipper Installation

- 1) Place a spherical bearing on each pivot shaft of the clipper block.
- 2) Place the clipper block into the marker assembly with the anvil side in toward the line controller box and the blade side out.
- 3) Place another spherical bearing on the end of each pivot shaft followed by the small nylon washer, then secure it with an e-clip.
- 4) Slide the clipper block assembly into the clipper assembly carrier, position the bolts through the holes, and hand-tighten the nylon lock nuts.
- 5) With the power off to the line, manually push the clamps into the closed position and move the marker assembly into the clamp window.
- 6) Lift up on the clipper rocker arm inside the line controller box to manually close the clipper assembly. Move the clipper side to side until the middle of the closed clamps are aligned with the center of the closed clipper.
- 7) Once centered, tighten the lock nuts using a 5/16 nut driver and double check that nothing moved during the tightening process.
- 8) Using the tension nut adjust the tension of the clipper. Proper tension is when the clipper can effectively clip through a piece of doubled up 3M Super 33 or Super 88 electrical tape.
- 9) Tighten the tension lock nut using a 3/8 and 5/16 box end wrench.

Clipper Shimming

- 1) Place a new blade or anvil into the block and reassemble leaving the knife holder bracket screw loose.
- 2) Place the anvil or blade block into the base of the shimming tool.
- 3) Slide down the top assembly on the dowel pins over the blade or anvil block. Do not force; top assembly should slide down easily. There is on small L-shaped shim in each side of the top assembly that centers the blade or the anvil in the block. Caution must be taken when sliding the assembly down so as not to bend the shims. There are spare shims located on the back of the base if replacements are needed.
- 4) Place the appropriate number of large height adjustment shims between the plastic block and the stainless steel knife holder bracket. Much of the time 3 shims will achieve the proper depth for clipping, occasionally 4 shims will be needed.
- 5) Tighten the plastic thumb screw lightly, finger tight.
- 6) Slide the parallel bar down the dowel pins over the blade or anvil.
- 7) Using a 1/16 hex wrench tighten the knife holder bracket screw while applying even downward pressure on both sides of the parallel bar.
- 8) Loosen plastic thumb screw and remove parallel bar, large shims, and top assembly.
- 9) Repeat this process with the mating piece of the clipper block.
- 10) Once both sides of the clipper block have been properly assembled, slide the two together to ensure that the blade and anvil come together square. There should be no visible light between the blade and anvil when in the closed position.

AutoFish Maintenance During Marking Season

Daily Maintenance

- 1) Thoroughly rinse lines to remove silt and fin buildups. Hang nets to dry.
- 2) Remove MKIV cutter, clean thoroughly, store with cutter block and pin separated in 70% alcohol solution.
- 3) Disengage the drive rollers and leave MKIV covers open to dry. Clean back of needle/needle carrier.
- 4) Open drain valve on the air compressor to allow excess moisture to escape.
- 5) Turn on heaters and open windows slightly to allow moisture to escape.

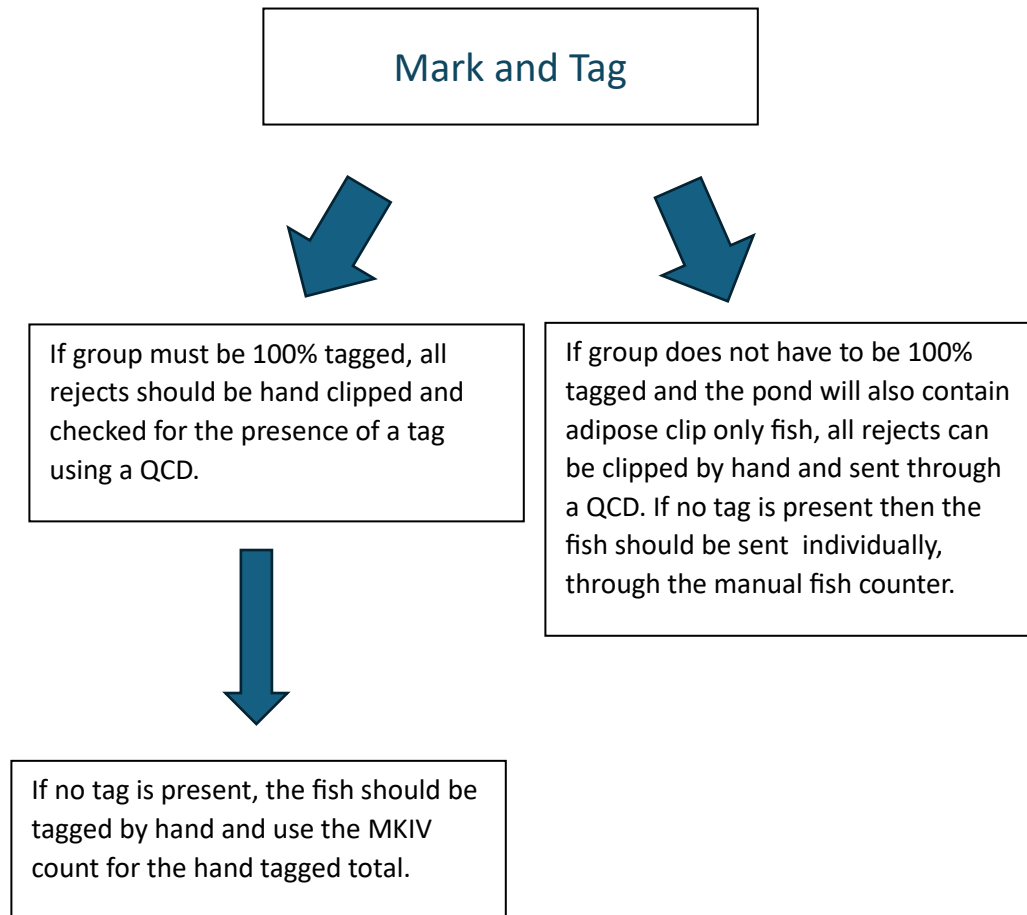
Winter Daily Maintenance

- 1) If power or heat is not available open all valves so water can drain from the plumbing.
- 2) Remove the pump hose from both the trailer and the pump and drain water from the hose. Always leave the pump submersed in water during freezing conditions as removal may damage the internal structure.
- 3) Drain water from the booster pumps, the fish pump, and the high-pressure system plumbing, including the bypass valve located behind Line 1.

Weekly Maintenance

- 1) Clean and lubricate the marker X and marker Y shafts.
- 2) Clean and lubricate the holder mechanism shafts.
- 3) Remove and clean all strainers and filters.
- 4) Apply oil to air cylinder shafts and to each air hose fitting.

Processing Rejects



Use the tagged number from the batch for "total" when in Mark and Tag mode. To report the Mark Only fish, use the Manual Fish Counter number.

Tag Only



Check all rejects for tags by sending through a QCD.



If the fish is tagged, it will go directly to the pond.



If no tag is present, the fish should be tagged by hand and use the MKIV count for hand tagged total.

Use the 'Tagged' number from the batch report for "total" when in Tag Only mode.

Mark Only



Clip all rejects by hand and send to the pond via the Manual Fish Counter.

Use the 'Total' number from the batch report for total when in Mark Only mode.

AutoFish Trailer Shutdown

- 1) Anticipate how many fish are left in the trailer as the shift winds down. Ensure manual section isn't getting overwhelmed with outsizes/rejects.
- 2) Clean all fish out of the main trough and through the sorter. Use ALT Settings button in sorter software (you will have to hand net some fish at the end). Remember to change back to normal settings when finished.
- 3) Turn the 'System Feed' off and press the 'Clean Out' button on the sorter software. Disconnect the fish supply hose and drain into a large dipnet to ensure all fish are removed from the fish pump housing. Take these fish to the manual section.
- 4) Process all fish through the Lines VE's. Take improperly sorted and misshaped fish to the manual section.
- 5) Take all fish from reject buckets to manual section.
- 6) Drain reject buckets and take out the nets.
- 7) Drop the MKIV's back.
- 8) Turn off Lines and Sorter Booster Pumps (Green Switches).
- 9) Turn off Fish Pump and VE Light (Green Switches).
- 10) Slowly drain the main trough.
- 11) Once all fish have been processed in the manual section, press 'Reset and Print Batch' button on the marking and tagging software.
- 12) Pull the standpipe and drain the manual trough.
- 13) Turn off Lines and Sorter Computers (Green Switches).
- 14) Pull out booster pump filter and rinse with hose outside trailer door.
- 15) TURN OFF ANESTHETIC PUMP. Drain the anesthetic trough and MS sink. Rinse the fins out of the nets and sink area. Hang anesthetic nets to air out overnight.
- 16) Rinse floor starting at the nose of the trailer working towards the manual section. Starting at Line 1 remove the camera and hang it, thoroughly rinse fins and debris from headmold, clamping and clipping area. Rinse fins from line frame as well as reject bucket and reject nets then spray it all towards the back of the trailer. Hang reject nets to air out overnight.
- 17) Open flush valve to flush any remaining fish out of trailer and outflow pipe, check the collection box outside the back of the trailer.
- 18) Clean MKIV cutters, drive rollers, and needle carriers leaving door open to air out overnight.
- 19) Turn on the two small wall unit heaters and open windows slightly to allow excess moisture to escape. Turn off the furnace.
- 20) Turn off all lights and lock up trailer.
- 21) Turn off air compressor and drain, leave drain valve open overnight.