NJ Trout in the Classroom

Maintenance Manual

NJ Division of Fish and Wildlife and Trout Unlimited, 2011

Revised October 2012

Welcome to NJ Trout in the Classroom

Trout in the Classroom (TIC) is a science-based program that teaches children about the importance of coldwater conservation through a hands-on approach to learning. Through the process of raising brook trout from eggs to fingerlings, the size they are at release time, students learn about the importance of clean, cold water, not only for the brook trout they are raising, but also for the other organisms, including people.

The Trout in the Classroom program began in New Jersey in 1991 with one school and stayed at one for many years. In 2006, Trout Unlimited realized the value of this unique program and adopted it in the hopes of making it grow. Run on a volunteer basis, the program grew exponentially. Now, coordinated by the NJ Division of Fish and Wildlife, the program continues to grow at a phenomenal pace.

There are schools from nineteen of New Jersey's twenty-one counties participating in the program, including some of the most urbanized counties in New Jersey. This program exposes students to the importance of cold water from rural areas of NJ to major NJ cities and unites them in their quest for understanding the importance of our coldwater resources. All together, there are more than 13,000 students participating in the program and more than 10,000 adults are exposed to the program annually through soil conservation districts, nature centers and at nature preserves around the state.

Trout Unlimited plays a vital role in the success of the program. Volunteers from the supporting chapters of Trout Unlimited deliver brook trout eggs, help teachers with equipment, maintenance and water quality, conduct programs, help with releases and more.

The Division of Fish and Wildlife hopes that the Trout in the Classroom program will continue to grow at the phenomenal rate that it has been over the past few years. Through the in-depth, hands-on approach to the program, students are developing a connection to the environment that they will take with them when they leave the program.

With more than one hundred and twenty schools participating in the program, it requires a lot of help - help that we get from Trout Unlimited volunteers. Volunteers who express an interest in helping with Trout in the Classroom should be energetic, enthusiastic, patient, and kind. A successful TIC program needs volunteers who are willing to give some of their time to be a complimentary resource for teachers and their students. Volunteer interest and encouragement means a lot to both teachers and students. Teachers know that they have help they can turn to in case of emergencies or with questions, and students will absorb the information that you pass on about trout and coldwater conservation. You will help model our future conservationists.

We are looking for help with the following:

1. Tank equipment repair
2. Egg delivery
3. Emergency services
4. Stream release help
5. Classroom visits and teaching opportunities

To ensure quality and consistency in our Trout in the Classroom Program, the following policies and procedures have been formulated for volunteers.

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Partners

Special thanks to John Norstedt, NJ's Chiller Repairman, for all the information on chillers.

Tank set up instructions are courtesy of NY TIC program.

Trout in the Classroom – Who's Involved

Due to the size and scope of the Trout in the Classroom program, there are many people that are needed to ensure that the program runs as effectively and efficiently as possible. This is a list of the key players in the programs and a general description of their jobs as related to Trout in the Classroom.

TIC State Coordinator: Prior to late 2008, this position was held on a volunteer basis by a member of Trout Unlimited. The program grew exponentially and in late 2008, was taken on by a full time employee of the New Jersey Division of Fish and Wildlife. The job of the State Coordinator is to maintain communication between teachers, volunteers and coordinators, develop new educational materials and provide guidance on educational materials, help coordinate programs, releases, paperwork, files, etc. The TIC State Coordinator will spend approximately 75% of their time on the program.

Trout Unlimited TIC Chapter Coordinators: There are currently 10 active chapters of Trout Unlimited in New Jersey. Each chapter has selected a Trout in the Classroom Chapter Coordinator. It is the job of the Chapter Coordinator to maintain contact with teachers and work closely with the State Coordinator. Chapter Coordinators also oversee the TIC Chapter Volunteers. Chapter Coordinators actively seek volunteer help for egg delivery day and coordinate delivery schedules. They check in with the teachers and students via phone or email to make sure that the tanks, fry and equipment are doing well throughout the year. Chapter Coordinators should seek volunteer help for releases if requested by teachers. Chapter Coordinators may be asked to deliver more eggs or fry to schools that have lost them, or to seek a volunteer who can do this. Chapter Coordinators should be active within their chapter and be able to recruit Chapter Volunteers. Chapter Coordinators will house and maintain their chapter's spare chiller. If contacted by a teacher or the State Coordinator, the Chapter Coordinator will coordinate pickup of broken chiller, replace broken chiller with the chapter spare within 24 hours, bring the broken chiller to the Chiller Repair Person, pick up fixed chiller and return it to the school, swap it for the spare chiller and return spare chiller to storage. The Chapter Coordinator will assist teachers in year end tank and chiller maintenance if needed. TIC Chapter Coordinators should spend approximately 2-4 hours a month, depending on the time of year, with TIC.

Trout Unlimited TIC Chapter Volunteers: Each chapter has volunteers that come out and help with special TIC occasions, such as egg delivery, programs, releases and possibly new egg/fry delivery. Chapter Volunteers work closely with the Chapter Coordinator to ensure that these volunteer opportunities run as efficiently as possible and that everyone has a positive experience from their interactions. TIC Chapter Volunteers should spend approximately 8 hours a year on TIC.

Trout Unlimited TIC Chiller Repair Person: The Chiller Repair Person trouble shoots and repairs all chillers received for repair. The Repair Person maintains an inventory of replacement parts sufficient to repair any chiller within a day or two, and orders spare parts as needed. The Chiller Repair Person will maintain a log of repairs and submit expense reports quarterly for repayment. The Repair Person should expect to spend as much time as needed to get chillers in working order. The amount of time spent will be determined by the number of chillers in need of repair and the scope of the repairs needed.

Trout in the Classroom Teachers: Teachers work closely with the students to ensure an active Trout in the Classroom program throughout the year. An activity guide was developed for teachers to use with their students. Lessons covered in the guide are correlated to state science standards and are targeted for middle school age

children. Topics covered include trout biology, ecology, conservation, history, life cycle and more. Teachers maintain contact with the State Coordinator and the Chapter Coordinator throughout the year and are responsible for release applications, scheduling releases and programs, reports, etc. Teachers should contact Chapter Coordinators in case of emergencies and for general questions. Teachers may also contact the State Coordinator with questions and problems. Teachers should spend approximately 1 hour per week on TIC, but this will be dependent on the teacher.

Students: The students are an integral part of the TIC program. They work closely with the teacher to ensure that the tank environment is healthy and meets the habitat requirements of the brook trout. Students monitor water quality and hatchling status. They clean and maintain the tank to ensure a healthy trout population. Students feed the fish and monitor water temperature. Students participate in lessons about trout that the teachers supplies. Students should expect to spend at least 5-15 minutes a day observing their tank. More time may be needed dependent on the activities scheduled by the teacher.

TIC State Coordinator Expectations

1. *Late August-early September:* The State Coordinator will collect all relevant information from teachers interested in TIC for the upcoming year and will makes sure that all the registration paperwork is complete. Schools will be assigned to chapters.

2. *Early-Mid September:* The State Coordinator will send the list of teachers to the chapters so that they know what teachers are assigned to them and how many teachers their chapter is responsible for. This helps Chapter Coordinators plan for Egg Day when they will need lots of volunteer help. The State Coordinator will prepare educational materials and maintain communication between teachers and chapters.

3. *Mid-Late September:* Teachers will be sent instructions for setting up their tank. Final registration paperwork will be entered into the database. Completed databases will be sent to the Chapter Coordinators. The State Coordinator will begin prepping everything needed for Egg Day, as well as coordinating Egg Day and schedules with chapters.

4. *Late September – Mid October:* The State Coordinator will send out instructions about Egg Day. Included will be what to bring, such as a cooler, what to expect upon arrival at the hatchery, how to tell a dead egg from a good egg so you can show the teachers and students, what you should do at the school, list of teachers and their contact information and estimated Egg Day date. The date of Egg Day will vary depending on the success of the egg take at the hatchery.

5. *Mid-Late October:* The State Coordinator will check with the teachers to make sure that they are ready for Egg Day. State Coordinator will make sure that the chapters are prepared for Egg Day. Instructions about when to arrive at the hatchery, reminders to bring coolers and ice wrapped in towels, to have their directions to the schools and teacher contacts handy. State Coordinators should let chapters know that they should be checking the water temperature (should be 50-52 degrees Fahrenheit) at the school before putting the eggs in the net basket and checking that chillers are at least 12 inches off the floor. State Coordinators should remind chapters that they represent Trout Unlimited, Fish and Wildlife and TIC. Chapters should take the time to show students how to cull out dead eggs and remind them that they have to do this daily, show teachers and students the different food sizes and remind teachers to look in the Activity Guide for information on when to feed the fish each size food, apply

the TIC stickers to new tanks to help brand the program, and make sure that all intakes are covered with the mesh screen and secured with a rubber band.

6. *November - June:* Eggs will start hatching and fish will start growing. Coordinator will continue to provide communication with the teachers, develop lesson plans, maintain the website, etc.

7. *January-December:* Coordinator should promote the TIC program to schools, teachers, chapter and other people that they know. Encourage them to get involved.

TIC Chapter Coordinator Expectations

1. *Late August-early September:* Coordinate all necessary volunteers for Egg Day deliveries. Plan to have a few extras on call, because teachers are still registering with the State Coordinator to receive their eggs.

2. *Early-Mid September:* The State Coordinator will be sending out your teacher lists for your chapters. Email or call the teachers in your chapter and introduce yourself, let them know your role in TIC and let them know that you are there to answer any questions or help with any problems that may arise. Make sure tanks and equipment are set up correctly.

3. *Mid-Late September:* Teachers should be setting up their tanks. Contact the teachers assigned to the chapter and make sure that all parts of their equipment are working and that water quality is okay. Make sure that the teachers have tested their chillers for at least a day to make sure that they are chilling the water properly. Make sure that they have their net breeders in the tank and ready for eggs. Make sure that the back, sides and top of the tanks are covered to prevent sunlight from getting into the tank. Eggs and alevin are sensitive to sunlight. Make sure tanks and equipment are set up correctly.

4. *Late September – Mid October:* The State Coordinator will send out instructions about Egg Day. Included will be what to bring, such as a cooler, what to expect upon arrival at the hatchery, how to tell a dead egg from a good egg so you can show the teachers and students, what you should do at the school, list of teachers and their contact information and estimated Egg Day date. The date of Egg Day will vary depending on the success of the egg take at the hatchery. Chapter Coordinators should make sure that all of the Chapter Volunteers receive this information. Chapter Coordinators should assign Chapter Volunteers to teachers for Egg Day, and ensure that the Chapter Volunteers have the contact information for the teachers they are responsible for, as well as an address for the school or directions to the school. Make sure tank and equipment are set up correctly.

5. *Mid-Late October:* Chapter Coordinators should check with the teachers to make sure that they are ready for Egg Day. Make sure that the tank and equipment are set up and working correctly. Chapter Coordinators should also check with Chapter Volunteers to make sure that they are prepared for Egg Day. Chapter Coordinators should remind Volunteers about when to arrive at the hatchery, remind them to bring coolers and ice wrapped in towels, to have their directions to the schools and teacher contacts handy. Chapter Coordinators should let Volunteers know that they should be checking the water temperature (should be 50-52 degrees Fahrenheit) at the school before putting the eggs in the net basket and checking that chillers are at least 12 inches off the floor. Chapter Coordinators should remind Volunteers that they represent Trout Unlimited, Fish and Wildlife and TIC. Volunteers should take the time to show students how to cull out dead eggs and remind them that they have to do this daily, show teachers and students the different food sizes and remind teachers to look in the Activity Guide

for information on when to feed the fish each size food, apply the TIC stickers to new tanks to help brand the program, and make sure that all intakes are covered with the mesh screen and secured with a rubber band.

6. *November - June:* Eggs will start hatching and fish will start growing. Coordinators should check with the teachers in their chapter periodically to see if they have any questions or concerns. Let them know you are there to help them. Offer programs such as fly tying, macro invertebrate studies, fly casting. Ask if the teachers would like your assistance at their release.

7. *April – June:* Chapter Coordinators should contact teachers and offer to help with their releases. If the Chapter Coordinator can not make it, they should ask a Chapter Volunteer to assist the school. While on the release trip, take pictures of the event. Develop a write-up for your website or newsletter and let the teacher know about it. This will help the kids realize that they are part of the bigger picture when it comes to coldwater conservation and will help your chapter members realize that they are part of the bigger picture as well. Releases are better with a trout expert and who better than a member of Trout Unlimited.

8. *January-December:* Coordinators should promote the TIC program to schools, teachers, chapter and other people that they know. Encourage them to get involved.

Trout Unlimited TIC Chiller Repair Person Expectations

1. *September - June:* The Chiller Repair Person will coordinate all necessary repairs for chillers that are in need of maintenance. The Repair Person will maintain an inventory of spare parts and will restock the inventory as needed, submitting financial reports to the State Council. When asked by a Chapter Coordinator, the Chiller Repair Person may pick up a problematic chiller from a school, fix it and return it. The Chiller Repair Person will keep the TIC State Coordinator and Chapter Coordinators aware of any repairs being made and to which schools.

TIC Chapter Volunteer Expectations

1. *Late August-early September:* Let the Chapter Coordinator know that you would like to help with Egg Delivery. With so many schools in the program, Chapter Coordinators need a lot of help to ensure that eggs are delivered to schools and taken care of as quickly as possible.

2. *Late September – Mid October:* Chapter Volunteer should have the direction and contacts for the schools that they are responsible for. A sensible driving route should be mapped, so that eggs are received at the schools as quickly as possible.

3. *Mid-Late October:* Chapter Volunteers should arrive at the hatchery or their assigned meeting place at the assigned time on Egg Day. Chapter Coordinators will tell you when you should arrive and where. Volunteers should have a small cooler with them and ice wrapped in towels to keep the eggs cold. Volunteers should get their assigned school's eggs, two pieces of screening per teacher, a TIC sticker per teacher and one bag or each size food. Upon arrival at the school, Volunteers should show the teacher and students how to pick out the dead eggs, remind them that this is something they need to do daily, check the water temperature and make sure the chiller is at least 12 inches off the floor, make sure the tanks are protected from the sun on all sides but the front, place the TIC sticker on the front of the tank to promote the program, show teachers and students the different size food

and remind them to check the Activity Guide for feeding charts and information, and make sure that all intakes are covered and secured with the mesh screen that you just delivered.

4. *November - June:* As the year goes on, some schools will lose eggs or fry, or have some sort of equipment failure. Chapter Coordinators may not be able to help a teacher in need right away. Chapter Volunteers should let the Chapter Coordinator know that they are willing and available to help in emergency situations as needed.

5. *November – June:* Many schools would like an opportunity to invite Trout Unlimited in to help with a program. If you have a knowledge of fly tying, fly casting, macro invertebrate identification or anything else that is pertinent to the TIC program and would like to offer yourself as a teacher for the day in your chapter's assigned schools, please let your Chapter Coordinator know. If a request comes in to your Chapter Coordinator for a program, he/she will be able to call upon their corps of volunteers to help with a program at the schools.

6. *April – June:* Chapter Coordinators may ask a Chapter Volunteer to assist a school with a release. While on the release trip, take pictures of the event. Develop a write-up for your website or newsletter and let the teacher know about it. This will help the kids realize that they are part of the bigger picture when it comes to coldwater conservation and will help your chapter members realize that they are part of the bigger picture as well. Releases are better with a trout expert and who better than a member of Trout Unlimited.

7. *January-December:* Volunteers should promote the TIC program to schools, teachers, chapter and other people that they know. Encourage them to get involved.

TIC Teacher Expectations

1. *September:* Teachers are expected to fill out their registration paperwork and return it to the State Coordinator by the deadline. At the end of the month, teachers should put their tank together and make sure that all equipment is in proper working order. Start preparing your students for Egg Day and the rest of the TIC year. Introduce them to the tank and the tests that they will need to perform daily once the eggs arrive. Register on the TIC website to participate in the forum and get monthly activities from the State Coordinator.

2. *October:* A week before Egg Day, chillers need to be turned on to bring the temperatures down. Egg hatching baskets should be placed in the tank or hung on the side of the tank in preparation for eggs. Gather Petri dishes and eye droppers so that when eggs arrive, students will be immediately hands on with the program by removing the dead eggs.

3. *November:* Watch the eggs hatch and the fry grow. Use lessons in the Activity Guide to help your students learn about trout and coldwater conservation. Start thinking and planning about your release day.

4. *December:* Watch the fry grow. Use lessons in the Activity Guide to help your students learn about trout and coldwater conservation. Fill out the application for the trout release. They are due at the end of the month. Prepare for your holiday break by doing a big water change and replacing the charcoal in your filters. Plan a field trip to the hatchery.

5. *January – April:* Watch the fry grow. Use lessons in the Activity Guide to help your students learn about trout and coldwater conservation. Plan a field trip and your release day.

6. *April – June:* Release your trout. Break down and clean your tank and store it for next year. Fill out the end of the year report for Trout in the Classroom.

7. *January – December:* Keep in touch with Trout Unlimited chapters and the State Coordinator. We are here for you and will help in any way possible to make your program a success. Talk to other teachers you know and spread the word about the TIC program.

TIC Student Expectations

1. *September – June:* Learn about trout, coldwater conservation and the benefits of clean, healthy coldwater habitats. Students should be as hands-on with the tank as possible, monitoring water quality, temperature, fish health, etc. Students are the future conservationists.

TIC Tank Monthly Maintenance

1. *September*

- Order the equipment. Inventory what you receive. Set up the equipment. Make sure all the equipment is in working order. There could have been damage from shipping or storage. Some things to keep in mind as you are setting up the equipment are:
    a. Chillers need to be a minimum of 12 inches off the floor and have 10-12 inches of free air on all sides to ensure that they are working properly and not getting over stressed. This will keep the dust from the floors out of the chiller and will extend chiller life.
    b. Your tank should not be near a heater because that will stress the chiller. If it is near a heater, you will need to have the heat cut off to that corner of the room or block the vent in some way.
    c. Your tank should not be near the windows. If it is, make sure to cover the back, bottom and sides with Styrofoam (available at hardware stores). The front of the tanks should remain open so the students can see in. Eggs and young fish are extremely sensitive to UV light, which is why your tanks should be covered. Prolonged exposure to sunlight will kill eggs and sac-fry. Once your fish start swimming you can uncover the tank, put your tank hood on and turn on the lights. You may want to leave the Styrofoam on the tank to help keep the tank cool, especially if your room gets really hot later in the year. This will help prolong the chiller life.
    d. All TIC classroom electrical equipment must be protected by a ground fault interrupter (GFI). The electrical supply of all classrooms where electrical equipment is in contact with water must have this protection -- just as is required in bathrooms and kitchens. Some of the older schools may be in violation. The recoil of an electrical shock causes more harm than the electricity itself.
    e. Run water through your chiller once it is out of storage to remove the scale in the evaporator tubing. Do this in the sink, not at the tank.
    f. If you did not thoroughly clean your chiller at the end of the season (recommended) you need to do that now. See the instructions under the chiller maintenance section of this document.
    g. Make sure the chiller control temperature and your actual tank temperature are within a degree or two of each other.
    h. Check on with the fire marshall, electric and structural engineers of your school before you set up your tank. They may not approve a location because of wiring, safety or weight of the tank when filled with water.
- Let the TIC State Coordinator know you are ready to receive eggs and submit the registration paperwork.

- Download the Trout in the Classroom Activity Guide from www.njtroutintheclassroom.org and start planning your lessons.
- Register as a member on the site, www.njtroutintheclassroom.org, so that you can interact with the State Coordinator, Chapter Coordinators and other teachers around the state and get access to some great lessons.

2. *October*
- Turn your chiller on a week before Egg Day, so the water is 50 degrees, the same temperature as the hatchery water. This will prevent heat shock to your eggs when they are added to the tank.
- Make sure all equipment is working properly *before* Egg Day.

3. *October – November* – When all of your eggs have hatched and yolk sacs have been absorbed, unhook the hatching basket and let it sink in the water. Adventurous fry will swim out. The less adventurous will remain in the basket a few more days.

4. *November – December* – Do a small water change, only if your testing numbers are high.

5. *November – June* – Clean the chillers air filters each month.

6. *December* – Change your filter media and do a large water change right before the holiday break.

7. *January – June* – Do a small water change, only if your test results are high.

8. *June* – Break down all the equipment. Clean everything with a 10% bleach solution and rinse very well. Store in a safe place. Reorder your supplies for next year. Things to order are water test kits, stress zyme, Chemi-pure filter media, foam block for Fluval Filter, Tap Water Conditioner (if needed), Sandstone 12" Airstone, 1 pack of check valves. These can be ordered in a refill kit from That Fish Place.

TIC Tank Set Up

1. Unpack all materials and compare to shipping list. Ensure that nothing is missing or broken. Check plastic pieces for cracks, particularly the filter components.



2. Place tank in a location away from heat, excessive light, and activity. If next to a window, make sure that the window shade is down until the fry are swimming around, or that there is some protection around the tank.

Do not put the tank next to an active radiator. Because a filled tank will be top heavy, place it away from areas where students might accidentally bump into it. Clean out any dirt inside the tank with a wet paper towel. Do not use soap or any cleaning chemicals.

3. Locate the electrical outlet and plug in the power strip. This should be close enough to the tank that all electric devices can reach. Ideally, this should be right behind or underneath the tank. Turn the power strip off.



4. Place the chiller to the side of or below the tank with the front facing out. Make sure that the chiller is at least 12 inches off the floor. Please ensure that there are at least 10 inches on every side for airflow. Open the plastic bag with chiller parts and remove two water nozzles. Screw these in place on the chiller, tighten them by hand. You may carefully tighten these further with pliers, but be mindful of the limitations of the plastic.

5. Measure a length of chiller tubing that will reach from the chiller to the bottom of the tank without stress or kinks, be generous with length because a tube can always be made shorter but not longer. Cut this length of tubing and slide one end over the chiller input nozzle. Measure a similar length of tubing for the output nozzle of the chiller and cut this piece. Attach this piece of tubing by sliding it over the chiller output nozzle. Tight tubing can be made more flexible by dipping it in very hot water. You may need to remove the nozzle, also. Depending on chiller design, there may not be any specific input or output side.

6. Next slide the metal hose clamp over the tube to the nozzle on the chiller. Screw the clamp in place over the end of the tube so that the outer edge of the clamp and the tube are matched. The clamp should be tight but not forced.



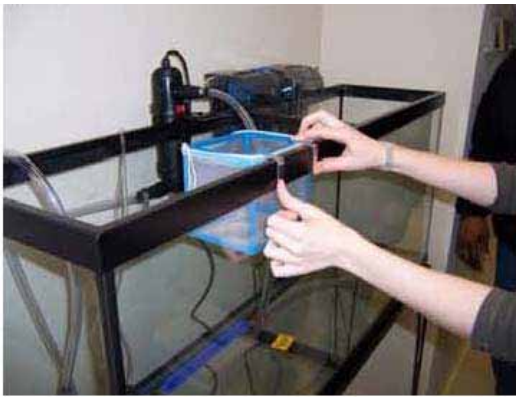
7. Remove the pump from its box and locate the plastic adapter nozzle for the pump. Screw this nozzle in place, and slide the other end of the input chiller tube over the nozzle on the pump. This connection does not need a

clamp. Install the pump filter if one is included but not attached. Gently place the pump inside the tank, place the pump power cord near the power strip.

8. Unpack and assemble the filter according to the included directions. Place the filter on the back side of the tank. Make sure that the filter intake tube is as close to the tank bottom as possible. Place the filter power cord near the power strip.

9. Unpack the airstone, air pump, and airstone tube. Attach one end of the airstone tube to the airstone, and the other to the air pump. Place the air pump on the ground near the power strip. The rubber feet of the air pump should be on the ground to prevent excessive noise. Place the airstone in the tank, away from the filter intake tube. You should use a check valve to prevent backflow of water in the airstone tube. To do this, make a cut in the air tubing and use the check valve to connect the two pieces back together. Air should push the flap and compress the spring inside the valve.

10. Assemble the hatching basket by stretching the net over the outside of the plastic frame, or carefully securing the net to the inside of the frame. Hang the basket on the tank wall by bending the metal clips.



11. Fill the tank with tap water using any clean container or tubing. The water level should be no more than 2 inches from the top of the tank, but should not be so close that it might spill. Use a cup to fill the filter chamber with water until it overflows back into the tank.

12. Plug in all electric cords using the power strip, but keep the power off. Once everything is plugged in, stand back from the tank to double check all connections and ensure that everything is ready for operation. The output tube should be secure; a student can hold this tube in place. Have some paper towels on hand in the event of a leak.

13. Turn on the power strip and check for any leaks on the chiller. The bubbler should be creating a large volume of small bubbles. The chiller may beep, and is now warming up. The chiller will beep once it is energized. The filter system will be quite loud as it pumps water into the motor for the first time. Remove the output hose from the water carefully to ensure that there is good water flow. The filter should start to pump water into the tank and will become much quieter. If the filter fails to pump water after 1 minute, check to make sure that the chamber is still filled with water.

14. Adjust the chiller temperature to the appropriate setting. See instructions in the chiller manual on how to do this. You may have to wait a few minutes before the chiller begins to operate fully. You will probably hear the chiller fan or compressor operating in a few minutes.

15. If you have Biozyme, add a small pinch at this time to the tank to allow the colony to start the nitrogen cycle in the tank.

16. Fill a container with tap water to be aged for the first water change.

Chiller setup: Unpacking and chiller placement

These directions are based on an Aqua-Chill 1/4 HP chiller. With different chillers, installation may vary, but the general procedure is similar for most chillers that have water pumped into them (inline). It is, however, important to consult the chiller manual before use.

Please unpack the chiller carefully to ensure that nothing is damaged or lost. Chillers will arrive as boxes inside larger shipping boxes. Keep all materials including shipping receipts, chiller directions, and small parts. Check that nothing is missing.

Small chiller parts will probably be in a bag attached to the chiller. These might include plastic nozzles, a spare fuse, and twist ties for securing tubes. Pull the chiller out of the box and pace it on the floor with the front facing out. The front is the side with a display on it, and the top is the side that has two openings for water.

The chiller can be placed in many locations around the tank, but it is best to be as close as possible. The most common locations are to the side, behind, or below the tank. Placement below the tank can save room, but also might require longer lengths of tubing. Regardless of location, the chiller needs to be 12 inches off the floor and

have 10-12 inches of clearance on all sides for proper airflow. The chiller should be close to a power source, and away from any sources of heat. For young students, it might be a good idea to keep the chiller out of reach.

Chiller setup: Attaching nozzles and preparing tubing



If the chiller comes with closure caps, please remove them first. Some chillers will arrive without this protection. Remove nozzles from the plastic bag and follow any assembly directions. This chiller requires the addition of two rubber gaskets to the nozzle by hand. This is a very important step because a mistake here will likely cause a leak. Please take all the time you need for this part of tank setup, it is far better to spend an extra 10 minutes now than clean up a leak later. Once the nozzles are ready, please check all plastic parts for cracks or dirt which might cause problems.



Carefully place the nozzles into the chiller with the threaded collar facing down (it will only work one way). It is most important to have the nozzle straight. As tight as you make the connection, there is no replacement for good alignment. Next screw the nozzles in place while pressing down on the top. Make this connection as tight as possible by hand. If you want to gently use pliers or a wrench to tighten this more, it can be helpful, but remember that plastic can be easily damaged. The nozzles should be facing in a direction which points towards the nearest side of the tank. This reduces the amount of bending tubes will be exposed to.

Once the chiller is ready to be attached to the tubing, it is time to cut the tubing to size. The tubing used for chiller operation is the largest tubing included. There is usually extra left over at the end of tank setup, but please do not discard it as some might be used later. Measure the length of tubing needed to loosely fit between the chiller input nozzle (or if one is not specified, either one) and the bottom, inside of the tank nearest to the chiller. This length of tubing will run from the pump to the chiller. Always cut extra because tubing can be shortened but not made longer. Cut this length with scissors or a sharp knife; the best cut makes an even tube end. Now take the other piece of tubing and test to see if it can reach from the other chiller nozzle to the bottom of the tank. Cut off any extra, after making sure that there will be enough.

Chiller Setup: Attaching tubing

Once you are ready to slide the tubes over the nozzles, place a metal hose clamp over each tube. Then slide each tube over the nozzle as far as it can go by hand. This should be about 1 inch (more is better) or about three ridges. If the tube is too loose, and slides on and off the nozzle with ease, either the tube or the nozzle might be the wrong size. If this is the case, check the chiller box for different sized nozzles. If the tube is too tight, you can use hot water to make it soft, or use a tool to gently stretch the tube end.

Once the nozzle is in place, slide the metal clamp over the connection point so that the end of the clamp is flush with the end of the tube. With the screw facing up, tighten the clamp with a screwdriver until it is tight. Do not force this, however, because it may damage the plastic. The image to the right (above) shows a completed nozzle setup. You can assemble it off the chiller if that helps facilitate the process.

At this point, the chiller is ready. Please do not turn the chiller on until the rest of the tank system is ready. You may plug the chiller in to a power strip that is turned off. The chiller system requires a few minutes for the cooling process to begin.

Common Chiller Problems

Leaks: Leaks most often occur where the nozzle screws into the chiller, or where the tubes attach to the nozzles. In the event of a leak, turn off the power strip for the tank system and unplug the chiller unit. Paper towels or a rag should be able to clean up most leaks. To stop a leak, the water must be removed from the tubing. To do this, place the output end of the tubing in a bucket, and hold the other end in the air. If this fails to drain the water, you can blow the water out by taking the pump off of the input end blowing into it. You can now repair the leaking connection. Check for alignment, and also make sure that connections are tight but never force parts.

Chiller will not turn on: If the chiller does not turn on after being plugged in, and after the chiller power switch is pressed, you can check the fuse. The chiller fuse is generally located near the power switch. You can unscrew the fuse to check it. If there is a continuous metal ribbon inside the fuse, it has not blown. It is likely that the chiller needs to be repaired or replaced by the vendor. Please do not open the chiller container or attempt to repair internal parts yourself.

The chiller turns on but isn't cooling the water: The chiller system requires as few minutes to warm up. If after 30 minutes the chiller still has not started to cool (a louder cycle which produces noticeable airflow) but the tank water is warmer than your target temperature, there may be a problem with the chiller. If this is the case, please notify the vendor.

Filter Setup:
Filters vary a great deal from one to the next, it is best to follow the included instructions. Filters are often made of particularly brittle plastic; indeed the filter shown here was found to have a crack in it. Because of this, please check your filter for cracks when you unpack it and leaks when you fill it with water.

Carefully unpack the filter and lay out all of the parts. Because filters often have so many small parts, it is easy to misplace something. Check for the instructions, and read them before attempting setup for the first time. Make sure that nothing is broken or missing from the filter. Often small parts might be inside the filter chamber, so look here for items as well.

Most filters will include a carbon, or activated charcoal filter component. These help with mechanical and chemical filtration of tank water. Often, because of carbon dust, these filters need to be cleaned with tap water before installation. But please refer to the filter directions for this. Do not use soap to clean any part of the tank system. There are two biological filters (surface area on which bacteria grow) and two carbon filters packs. Water enters the system at the top of the filter passes through the filter media, and is pumped back into the tank.

The filter should be placed on a rear or side wall of the tank with the siphon in the water. The filter should not be directly above an airstone or any other source of bubbles because bubbles can cause problems with the filter pump. Cheesecloth or plastic netting should be placed over the filter intake to keep small fish from getting hurt. This can be held in place with rubber bands, and cleaned regularly to maintain flow.

Common Filter Problems:
The filter is not pumping any water, and is very loud: When dry, filter pumps are very loud because they are working in air which does not reduce the noise and vibration they make. Also, filter pumps are generally not strong enough to draw water up from the tank without first being primed. By filling the filter chambers with water, this helps the pump draw more pressure with water. If a filter does not start after 30 seconds, check to make sure that there is still water in the chambers.

There is a crack in my filter, the filter is leaking: Due to the hazards of shipping, one should check for cracks before assembly of any plastic parts. If there is damage to your filter, you should either replace it, or repair it if you have the materials to do so. It is quite possible to fix minor filter cracks with materials obtained from a pet store. Please do not use chemicals or materials which might harm the fish, such as glue that can dissolve in water. Serious cracks, or damage to the filter pump, require that you replace the filter. A replacement should be provided free of charge by the vendor in the event of damage from shipping.

Tube Problems:
Sometimes tubing is too tight to fit over tank parts. Often it is hardest to simply get the tube on the part in the first place. There are several ways to help fix this. First, you can heat tubing with very hot water; this makes the tube softer and more likely to stretch. The water has to be steaming hot to work best. Soak the tube for a minute in water, then quickly remove it and try to reapply it. The tube will quickly cool and harden again so it may require several tries. As always, please exercise caution when dealing with water hot enough to burn. It appears best to heat only the first inch or two of tube so that you can still use the cooler, more rigid part above to push against. Two set of hands are better than one: With two people taking turns, you can be sure that each person will have a chance to rest. Once the tube is on the nozzle or other part, it is simply a matter of slowly moving it higher up. If the tube doesn't fit after heating, you can try to stretch the first inch of tube with a tool such as scissors or pliers. This will flare out the end and help with that most difficult first step.

If tubing still fails to fit at all after all these methods, it is possible that the tube is the wrong size, or the wrong nozzle is being used. If this problem occurs with a chiller nozzle, check the chiller parts for nozzles of a smaller size that might work better.

TIC Holidays and Vacations

Here are a few things to keep in mind for long breaks:

1. **Trout are wild animals.** Yes these fish are wild despite the fact that they have now been in your classroom for several months. As wild animals, they are used to surviving in lean times, such as drought times and times of little food. They can survive for up to 14 days without eating! That means that you don't have to drop by and visit with them or get a trout sitter while you are away. They'll survive.

2. **Trout need clean water.** Clean water is probably more important than food, so before you go away make sure you do a water change to provide them the best water possible. You should also clean your filter and replace your charcoal filter cartridges one week before so that waste is removed more efficiently. Charcoal helps remove ammonia from the water.

3. **Prepping for vacation:** In the days leading up to your break, continue feeding as usual. You may want to feed them a bit less, just to help prevent the possibility of ammonia build up while you are gone.

4. **Tank Temperature:** As you are doing your water change, you will want to keep an eye on your water temperature to make sure that the temperature doesn't fluctuate more than 5 degrees.

TIC Releases

It is encouraged that the teachers and students participating in TIC, go out to an approved stream and release the fish that they have cared for all year.

Teachers will need the following in order to release fish without damaging them during transportation:

- a stocking permit, available by applying through the Trout in the Classroom Coordinator
- a cooler, such as an Igloo, that you can fill with water and trout
- cold water and bags of ice to keep the water cool during transportation
- a small battery-powered aerator, available at stores that sell fishing equipment which provides the oxygen for the trout
- small cups so that each kid can release a fish into the river

TIC Crises and Their Prevention

Always have buckets waiting with tank-ready water (dechlorinated by sitting 48+ hours).

If you come in and all fish are lethargic, unmoving at the bottom of the tank or your fish don’t respond to food—**WATER CHANGE**.

During the first few weeks, initial ammonia spikes from overfeeding are likely. Water changes (removal of ammonia) are the only solution.

It is also good to “boost” your tank with Stress Zyme as often as once a week.

Change your filter media before your long winter break, one section at a time. This allows the bacteria from the remaining section to colonize the new media.

What if I come in to school many trout have died? What to do?
Remove healthy fish first. Put healthy fish in a reserve water bucket, no matter its temperature. Put a battery-operated aerator or tank’s airstone in the bucket. Add Stress Zyme to the bucket—follow package instructions. You may also add one small, clean ice pack to the bucket. Remove as much water from the tank as possible (80%). Leave pump and filter intake covered. Clean tank with clean scrub sponge. Remove as much crud as possible. Suck up gunk with turkey baster. Refill tank with any water available (including chlorinated tap). Cool water with ice or freeze packs. Replace at least one charcoal filter. Add Stress Coat, Stress Zyme, Tap Safe, etc. if on hand, or as soon as possible. Replace fish in tank. The next day, add more Stress Zyme and/or Stress Coat.

TIC Tank End of the Year Maintenance

At the end of the TIC season, it is important to clean your aquarium set-up in order to ensure a successful next year. If you take a few minutes to make sure everything is clean, your equipment will have a much longer life. Here are a few pointers for cleaning the various components of your chilled aquarium set-up:

Aquarium Tank
1. Empty the tank almost all the way, by your usual method--many people like to use the electric pump to do this work. Then turn off the electrical pumps, chillers, filters, etc.
2. Finish emptying the tank, disconnect tubing.
3. Using a solution of 1 part Chlorine bleach (Clorox) and 10 parts water, wipe down the interior and exterior of the tank. A soft sponge (dedicated to this use only) can be used to scrub hard to remove scale and algae growth.
4. You can use the 1:10 bleach solution for cleaning out the tubing (clean tubes using long brushes you can buy at any pet shop).
5. Wipe the tank dry with clean cloth, or let air-dry.
6. If you have any pebbles or gravel in the tank, they should be removed, washed, and dried by laying out on a cloth or towel in the sun or a ventilated area. They can also be sterilized with the Clorox solution, but they also *must* be completely dried.

Filter
Take apart your filter and scrub out the plastic parts with your 1:10 bleach solution. Thoroughly rinse out all filter cartridges (filter sponges, charcoal, etc.) with regular water, and dry them in the sun or a well ventilated area. For most filters, it is suggested that you buy new filter cartridges for the following year. You can also use this year’s filters that you rinsed out. Thoroughly air-dry entire filter apparatus. Use Vaseline and rub it into the o-rings, particularly the large rubber gasket to prevent cracking.

Aquarium Chiller
The maintenance that needs to be done to prevent the chillers from crashing is actually a very simple process. You will need to have an air compressor handy. If your school or a local school has a shop, they should have one, or perhaps one of the student’s fathers has one. Either way, it won't take long to get this done and your chiller will run not only more efficiently, but should last more than twice as long as they have in the past!

Importance of Sizing a Chiller Correctly

Aquarium chillers are primarily designed for tropical fish applications where water temperatures are around 70 degrees F. Trout need water temperatures of 52 – 55 degrees F. Most applications – home and offices – have well controlled room temperatures between 68 and 72 degrees F.

In school applications, the room temperatures run much higher – many times as high as 80 – 85 degrees F. In most instances the room temperature is not within the control of the teacher.

Both of these conditions mean the chiller has to work a lot harder than it was designed to work. While a 1/6 HP chiller may be good for a 55 gallon tank of tropical fish in a home, it is not good for trout in a classroom. NJ uses a 1/3 or 1/4 HP chiller so that the chiller does not have to work as hard to cool the water.

Finally, the atmosphere in a classroom is dusty and dirty. As the dust gets into the chiller it quickly becomes less efficient. The less efficient it is, the harder it has to work. This is why you need to have your chiller at least 12 inches off the floor with a 10 - 12 inch clearance on all sides.

How the Chiller Works (Refer to Sketch)

An aquarium chiller operates on the same principles as a refrigerator or air conditioner. There is a temperature controller and temperature sensor on all chillers which allow you to set the optimum temperature for your water to be at – for TIC application 52 – 55 degrees F. (The controllers are designed to be accurate to plus or minus 2 degrees F.)

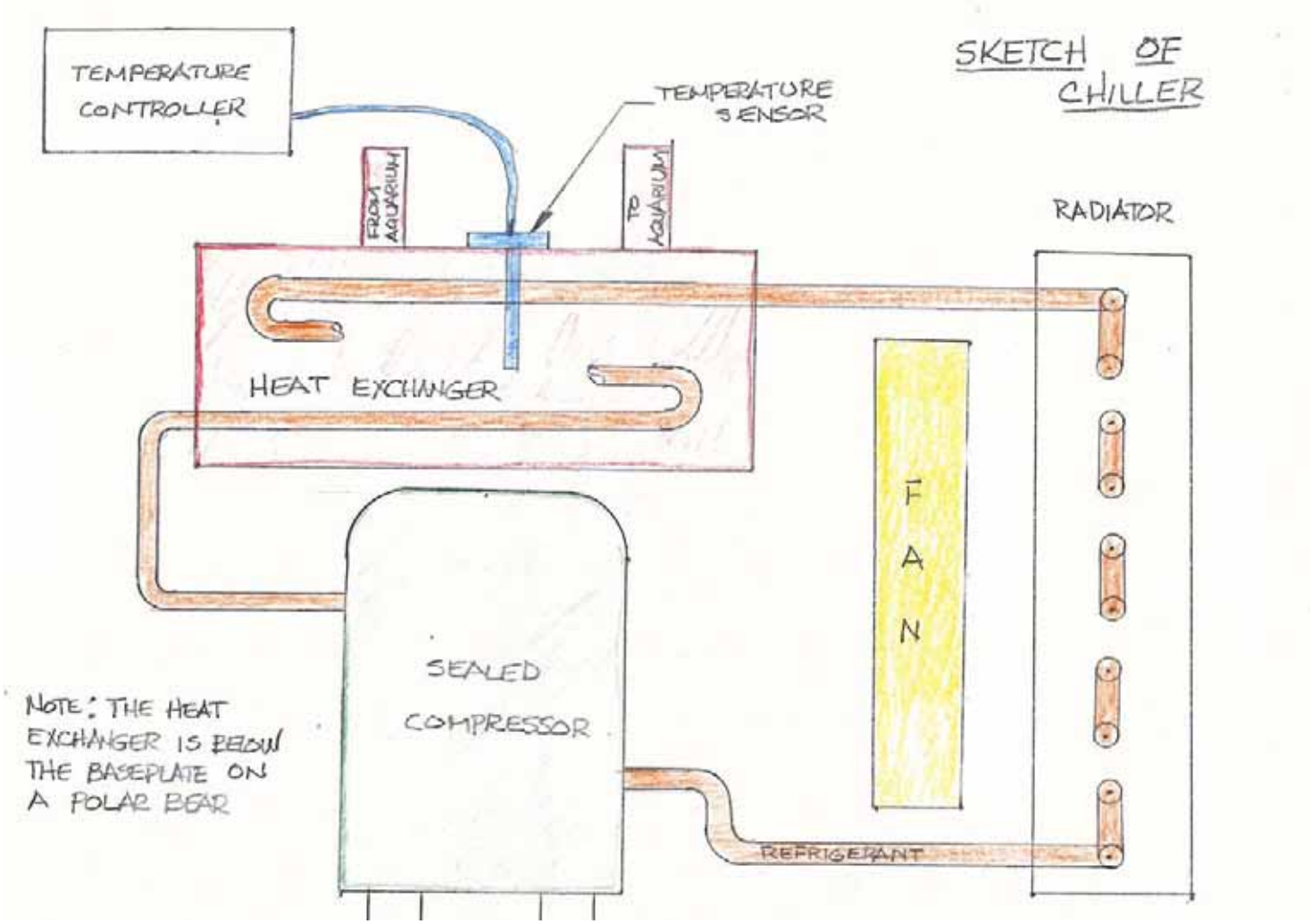
Chillers function using four main parts – a compressor, a heat exchanger, a radiator and a fan. The operation is based on the principles of gas expansion and contraction.

A refrigeration gas, in this case R-134, is compressed which results in a loss of temperature. This compressed gas (seriously cold at about minus 300 degrees F), flows through the heat exchanger where it picks up heat from the aquarium water being pumped through the heat exchanger.

The gas carries the heat back to the compressor but on the way encounters an expansion valve which allows the pressure to drop suddenly. As the temperature drops, the gas gives up heat to a radiator, which dispels the heat into the surrounding air with the aid of a fan. Hence the water returning to the aquarium will be at a lower temperature than when it entered the chiller.

The gas ultimately continues back to the compressor. The refrigeration system is sealed; the cycle is continuous.

Unfortunately the fan sucks air from the room in order to blow air on the radiator. Dust and dirt come in with the air and are blown at the radiator. The fins on the radiator get covered and clogged. Their ability to dissipate heat is reduced. The chiller's efficiency gets severely compromised as a result of the dust and dirt.



Avoiding Early Failures/Annual Maintenance

The chiller must be positioned well off the floor – like on a milk crate – and have at least ten inches of free air space all around it.

Every day someone should compare the temperature shown on the controller with the temperature of a good thermometer placed in the tank.

The Aqua Chill, Oceanic, and Prime chillers have easily removable front panels behind which are mesh filters. During the school year, these filters should be vacuumed or brushed weekly.

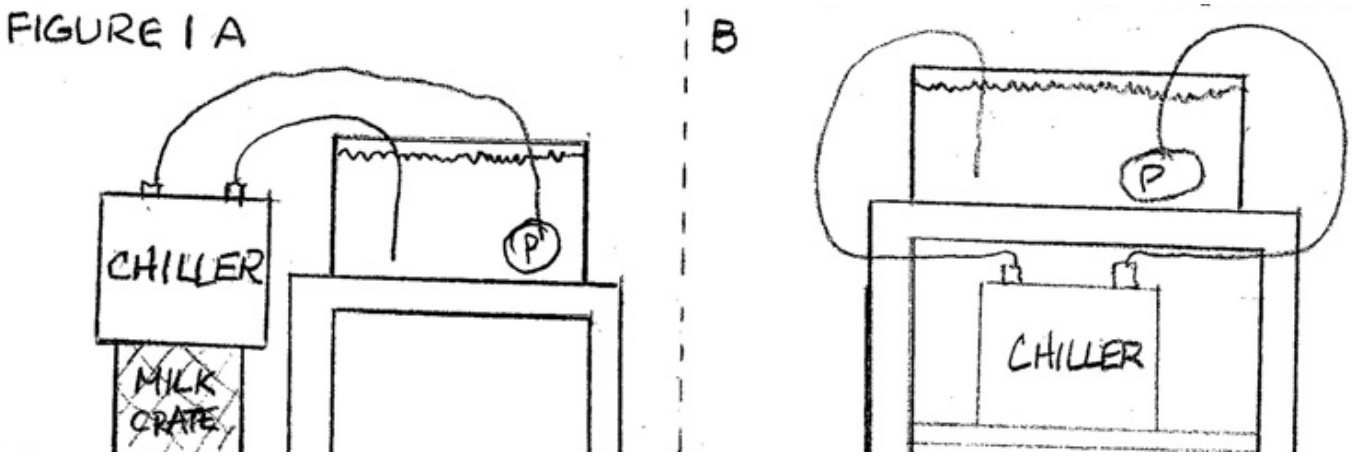
Every chiller should be thoroughly cleaned at the end of the year. A compressor with a blow off nozzle is required. Most schools are equipped with a small compressor. The annual maintenance does not require a HVAC person. Anyone who can handle a screwdriver can do it.

Each chiller is slightly different, so make sure you are using the directions for your chiller. There are some chillers that our Chiller Repairman has not seen yet, so there is a set of generic instructions for those chillers that are not specified.

And remember, that preventive maintenance is the key to keeping this program low cost.

Changing a Chiller with No Mess

Replacing a defective chiller in a TIC system with a new chiller or a spare or even a repaired chiller can result in a mess in the classroom. On the other hand, if one understands the system (and a little physics), a chiller can be exchanged without losing a drop of water.

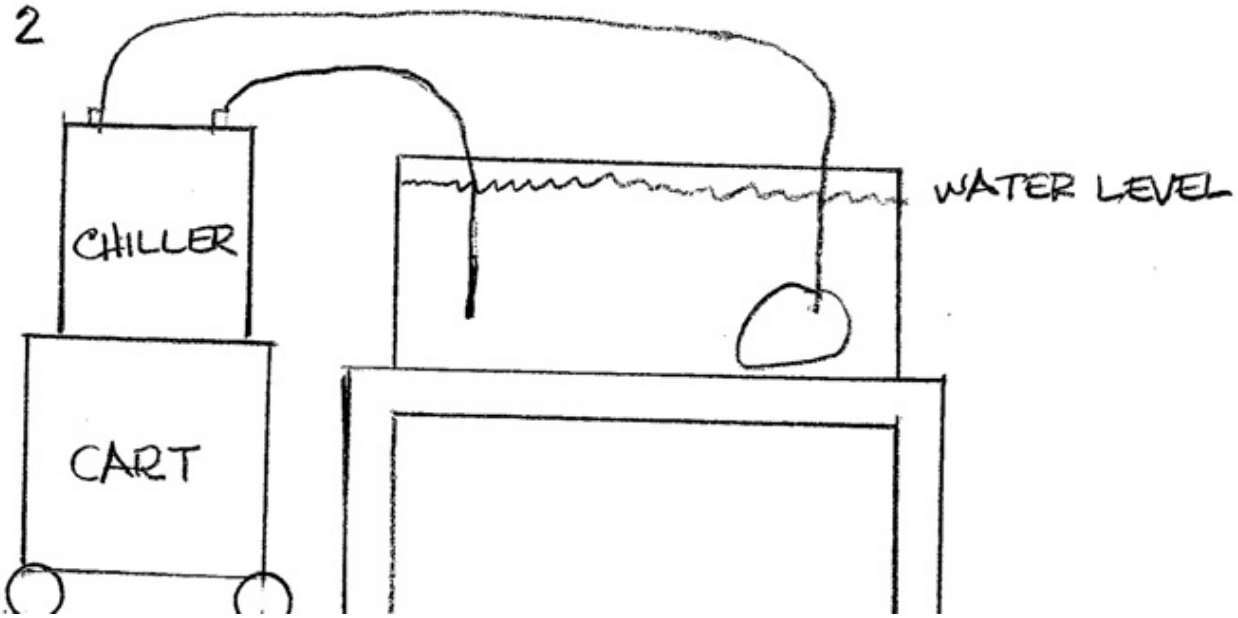


Note that the water level of the tank is higher than the water level of the chiller. If you loosen either the inlet or outlet fittings in either arrangement, water immediately begins to flow out the fittings.

At this point, regardless of which arrangement you have, disconnect the power from the chiller and the pump (pull out the plugs).

If the system is similar to Figure 1A, raise the chiller to the point where the inlet and outlet fittings are higher than the water level of the tank (see Figure 2). If there is a cart in the classroom, ask the teacher for permission to use it. Otherwise, stack several milk crates if possible. A wastebasket used upside down may work. Ask the teacher what else may be available.

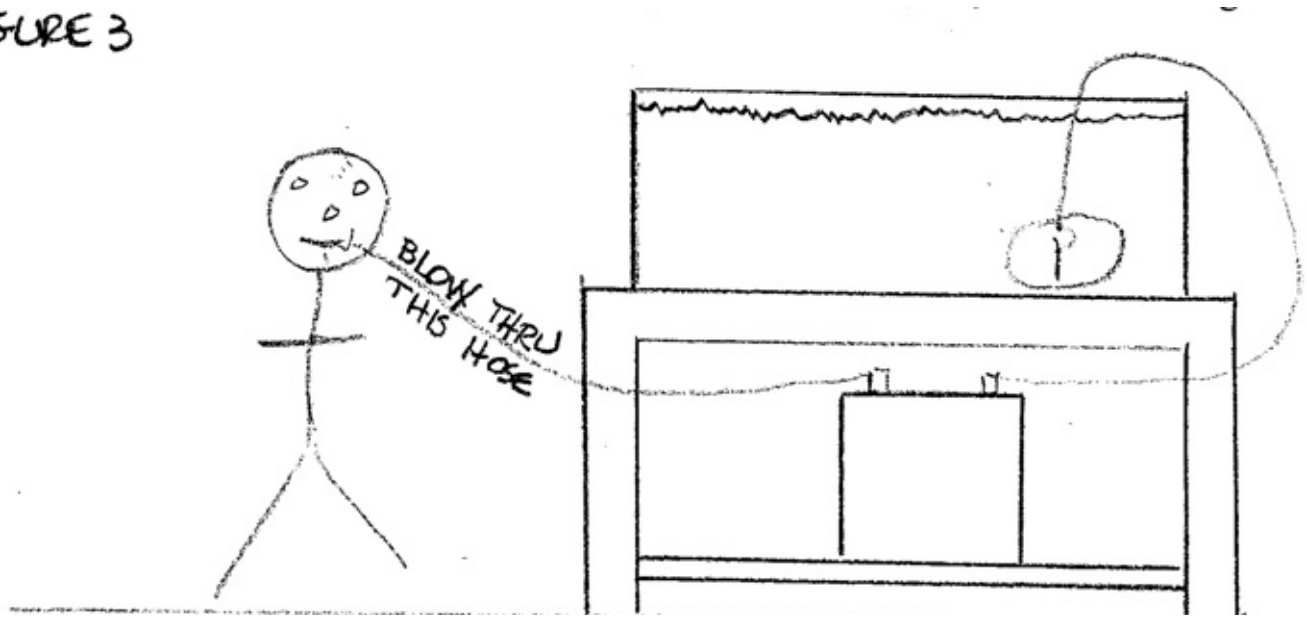
FIGURE 2



Once the chiller has been raised to the appropriate level, disconnect the inlet/outlet fittings. Always keep the fittings and hoses above the tank water level. If you need to change the fittings to accommodate a different chiller, do it above the water level of the tank.

If the system is similar to Figure 1B, where it is difficult to raise the chiller above the water level of the tank, the approach is different. This method is a little easier if you have a helper (a student or a teacher). Refer to Figure 3.

FIGURE 3



Take the outlet hose from the chiller out of the tank. Tell the helper that you are going to blow through the hose and that they are ultimately going to see air bubbles at the pump. After the air bubbles come, ask the helper to pick the pump out of the water, using the hose, and hold it above the tank, along with the hose you just blew through.

At this point, the chiller and the hoses have no water in them and you can do whatever is necessary to exchange chillers. You may have to change fittings to adapt to the replacement chiller.

Once the exchange has been completed and the fittings and/or hose clamps are tight, reposition the pump in the tank. Hopefully, it will go back where it was. Then drop the chiller's output hose back into the tank, making sure that in its final position, the hose isn't pointing up.

Make sure there are no kinks in the hoses. Plug the pump in. Instantly air bubbles will be seen at the chiller output hose. In a few seconds, the air bubbles will stop and only water will flow through the tube.

Plug in the chiller. The first number you see on the controller is the temperature "set" number. After a few seconds the tank water temperature will be displayed. It should be within two degrees of the actual water temperature of the tank as measured by a thermometer generally mounted on the outside of the tank.

If the temperatures correlate, wait until you hear the fan and compressor turn on. This takes about three minutes.

Finally if the "set" temperature was 52-55 degrees Fahrenheit, you are done. If the "set" temperature is not in the safe range for trout, press the SET button, then press the UP or DOWN arrows until the "set" temperature is correct. Press the SET button again. Now you are done.

Generic Preventive Maintenance Instruction

1. Position the chiller on a table or bench at a convenient working height. Remove the inlet and outlet hose fittings as well as any nuts and gaskets that might secure the inlet and outlet pipes to the housing. Channelock pliers are probably best for removing these nuts.

2. Remove the front cover by removing screws or depressing locking tabs. Disconnect the wires going to the temperature controller by "splitting" the nylon connectors. With both connectors, the locking tabs must be disengaged before the connectors will come apart. Move the front cover aside.

3. On 1/2 HP chillers it may be necessary to remove screws holding the front and rear panels to the housing.

4. Remove the screws holding the housing to the base. Lift the housing off the chiller. Sometimes the inlet and outlet pipes need to be slightly shifted to free the housing. At this point the chiller is ready to be blown out. In most chillers air will travel from the compressor end of the unit to the radiator end. The dirt and debris collect on the fan side of the radiator. Some of the dirt travels through the radiator fins and is on the outside, but 90 plus percent is on the inside and difficult to see. A compressor capable of delivering 90 – 100 PSI with an appropriate blow off nozzle is required to remove the dirt. A throwaway, nylon bristled paint brush and a tooth brush will also help with the dirt removal.

5. Begin by blowing from the outside of the radiator, through the fins, toward the fan. While most of the dirt will be blown out, some will remain trapped in the fins behind the fan shroud. Use both the brush and tooth brush to help dislodge it and continue the blowing process, both from front and back, in side to side and up and down motions. Eventually, and it may take up to fifteen minutes, all of the dust and dirt will be gone. If you can remove the fan, this job is a lot easier.

6. If there is a large accumulation of dirt on the fan, air is probably traveling in the other direction. In that case, blowing from the fan side to the outside of the radiator will remove the largest amount of dirt.

7. Clean off the other components on the chiller base with a brush and air. Clean the inside and outside of the housing with a brush and air. Position the housing on the chiller base being careful to seat the housing around the inlet and outlet pipes. Re-assemble the screws holding the housing to the base. Re-assemble any gaskets and nuts to the inlet and outlet pipes. Do not over-tighten. On 1/2 HP chillers it may be necessary to re-assemble front and rear panels to the housing and base.

8. If there is a filter on the front cover, remove it and thoroughly clean it with brush and air. Re-assemble the filter to the front cover.

9. Position the front cover to the chiller. Re-connect the electrical wires making sure that the connector locking tabs are engaged. Re-install the front cover on the housing or front panel.

10. Maintenance is complete.

Aqua Chill Preventive Maintenance Instructions

1. Position the chiller on a table or bench at a convenient working height. Remove the inlet and outlet hose fitting as well as the plastic nuts and rubber gaskets securing the inlet and outlet pipes to the housing. Channelock pliers are probably best for removing the nuts.

2. Remove the (4) screws holding0 the front panel to the housing. Carefully move the panel away from the chiller. Disconnect the wires going to the temperature controller by "splitting" the nylon connectors. With both connectors, a locking tab has to be disengaged before the connectors will come apart. Be particularly careful when disengaging the small, black sensor wire connector. Move the front panel aside.

3. Remove (11) screws and flat washers holding the housing to the base. Lift the housing off the chiller. Sometimes the side handles get caught under the evaporator and need to be dislodged and sometimes the inlet and outlet pipes need to be shifted slightly to free the housing.

4. The fan assembly needs to be removed in order to adequately clean the radiator. Carefully position the chiller on its side. Remove the two Allen head machine screws and nuts holding the fan bracket to the chiller base. Re-position the fan assembly out of your way.

5. At this point the chiller is ready to be "blown out". Since the air travels from the compressor end of the unit to the radiator end of the unit, the dirt and debris collect on the fan side of the radiator. Some of the dirt travels through the radiator fins and is on the outside, but 90 plus percent is on the inside and difficult to see. A compressor capable of delivering 90 – 100 PSI with an appropriate blow off nozzle is required to remove the dirt. A throwaway, nylon bristled paint brush and a tooth brush will also help with dirt removal.

6. Begin by blowing from the outside of the radiator through the fins toward the fan. While most of the dirt will be blown out, some will remain trapped in the fins behind the fan shroud. Use the brush and the tooth brush to dislodge it and continue the blowing process, from both front and back in side to side and up and down motions. Eventually, and it may take up to fifteen minutes, all the dust and dirt will be gone.

7. Clean off the fan and bracket with brush and air. Re-assemble the fan bracket to the chiller base. Make sure the fan turns freely after re-assembly.

8. Clean out the inside of the housing with a brush and air. Position the housing to the chiller base, being careful to seat the housing around the inlet and outlet pipes. Reassemble the (11) screws and flat washers holding the housing to the base.

9. Remove the two screws holding the mesh filter to the plastic front panel. Thoroughly clean the filter and panel. Re-assemble the filter to the panel.

10. Position the front panel to the chiller. Re-connect the electrical wires, making sure the connector locking tabs are engaged. Assemble the front panel to the housing with the (4) screws removed earlier. Re-assemble the gaskets and plastic nuts on the inlet and outlet pipes. Do not over-tighten.

11. The maintenance is complete.

Note: You will be able to do a better cleanout job if you remove the fan shroud. This is done by drilling out the "pop" rivets with a 5/32 drill bit. Drill thru the shroud and mounting holes on the radiator. When re-assembling, use 6-32x1/2 screws, #6 flat washers, #6 lock washers and 6-32 nuts.

Replacement Parts

Fan – Available from any Grainger warehouse. Grainger Part Number is 4M180.

Glacier Drop In Chiller Preventive Maintenance

1. Disconnect the line cord from the chiller.

2. Place the chiller, complete with cooling coil on a table or bench. Make sure that there is no stress on the cooling coil or the four foot line between the chiller and the coil. Note the position of the temperature sensor.

3. Remove the six screws holding the housing to the plywood base. Carefully lift the housing and move it away from the base (as much as possible). Be careful to ensure that the cooling coil line does not twist and fall on the floor.

4. At this point the chiller is ready to be "blown out". On the Glacier, air travels from the front of the radiator toward the fan and compressor. The dirt and debris collect on the outside of the radiator as well as the fan motor and other components mounted on the base.

5. A compressor capable of delivering 90 – 100 PSI with an appropriate blow off nozzle is required to remove the dirt. A throwaway, nylon bristled pain brush will also help with the dirt removal.

6. Begin by blowing from the fan side of the radiator through the fins toward the outside of the radiator. Some dirt will be trapped on the fan side of the radiator so it is necessary to blow from the outside toward the fan side also. Continue blowing from both sides in side to side and up and down motions until all the dirt is gone.

7. Use a brush and air to clean the dirt and debris on the other components mounted to the base.

8. Clean the inside of the housing and replace it on the base. Secure the housing with the six screws removed earlier. Check the integrity of the cooling coil and the connecting line as well as the position of the temperature sensor.

9. The maintenance is complete.

Replacement Parts

Temperature Controller – Ranco ETC Store(On-line)

Oceanic Preventive Maintenance Instructions

1. On a monthly basis, "snap out" the three filter assemblies, clean them thoroughly and re-assemble them to the front and sides of the chiller.

Polar Bear Preventive Maintenance Instructions

1. Place the chiller on a table/bench at a convenient working height. Remove the power cord. Remove the (8) flat, Philips head screws holding the housing to the base. Lift the housing off the base slowly, turn it upside down, and place it along side the base assembly. (Sometimes a "tap" or some gentle prying with a screw driver is necessary to dislodge the housing from the base.)

2. You will note that the electrical wires and temperature sensor wires from the temperature controller to the base are" tight". To avoid doing any damage to the connections, remove the temperature controller from the housing. The temperature controller comes off by removing (4) Philips head screws.

3. At this point the chiller is ready to be "blown out". Since the air travels from the compressor end of the unit to the radiator end of the unit, the dirt and debris collect on the fan side of the radiator. Some dirt travels through the radiator fins and is on the outside, but 90 plus percent is on the inside and difficult to see.

4. A compressor capable of delivering 90 – 100 PSI with an appropriate blow off nozzle is required to remove the dirt. A throwaway, nylon bristled paint brush and a tooth brush will also help with the dirt removal.

5. Begin by blowing from the outside of the radiator through the fins and toward the fan. While much of the dirt will be blown out through the fan, other dirt will be trapped between the fan shroud and the radiator, Continue blowing from both back and front in side to side and up and down motions. Eventually, and it may take up to fifteen minutes, most the dust and dirt will be gone.

6. There is no question that if you remove the fan shroud and fan you will do a better job. About 30% better. Because of the copper tubing near the fan shroud mounting hardware, this is a "tricky" job. If you decide to do it, I suggest you replace the stainless steel metric screws and nuts with plain steel 6-32x1/2 screws and 6-32 nuts when you re-assemble. Further, you will find it easier to re-assemble if you reverse the direction of the screws so

that the screw head is on the radiator side of the assembly and the nut is on the shroud side, 6-32 nuts require a 5/16 wrench . The original hardware requires a 7 mm wrench. An offset screwdriver is helpful.

7. Clean off the temperature controller and housing with a brush. Re-assemble the temperature controller to the housing with the (4) Philips head screws you removed earlier. Then carefully replace the housing on the base and secure with the (8) flat, Philips head screws removed earlier. Replace the power cord.

8. The maintenance is complete.

Replacement Parts

Temperature Sensor, Temperature Controller, and Inlet and Outlet Fittings – Available from Commodity Axis, 1011 Avenida Acaso, Suite A, Camarillo, CA 93012. Fax Number is 805-383-3565.

Note: A parts order must be faxed on a Via Aqua Purchase Order form, copy attached.

Fan – Available from any Grainger warehouse. Grainger Part Number is 2RTK6.

Current USA (Prime) Preventive Maintenance Instructions

1. Position the chiller on a table or bench at a convenient working height. Remove the inlet and outlet hose fittings as well as the plastic nuts and gaskets securing the inlet and outlet pipes to the housing. Channelock pliers are probably best for removing these nuts.

2. Depress the tabs located low on the sides of the housing and carefully remove the front cover. Disconnect the wires going to the temperature controller by "splitting" the nylon connectors. With both connectors, a locking tab has to be disengaged before the connectors will come apart. Be particularly careful when disengaging the small, black sensor wire connector. Move the front cover aside

3. Remove the fan assembly by removing the four allen head screws, washers and nuts. Position the fan out of your way.

4. Remove (9) screws holding the housing to the base. Lift the housing off the chiller. Sometimes the side handles get caught under the heat exchanger and need to be dislodged and sometimes the inlet and outlet pipes need to be slightly shifted to free the housing.

5. At this point the chiller is ready to be "blown out". Since air travels through the radiator to the compressor end of the chiller, the dirt and debris collect on the outside of the radiator. Some of the dirt travels through the radiator fins and is on the inside, but most is on the outside. A compressor capable of delivering 90 – 100 PSI with an appropriate blow off nozzle is required to remove the dirt. A throwaway, nylon bristled paint brush and a tooth brush will also help with dirt removal.

6. Begin by blowing from the fan side of the radiator, through the fins, toward the outside. While most of the dirt will be blown out, some will remain trapped in the fins behind the fan shroud. Use both brush and tooth brush to help dislodge it and continue the blowing process, both from front and back, in side to side and up and down motions. Eventually, and it may take up to fifteen minutes, all of the dust and dirt will be gone.

7. Clean off the other components on the chiller base with a brush and air.

8. Re-install the fan assembly. Be sure the fan rotates freely.

9. Clean off the inside and outside of the housing with a brush and air. Position the housing on the chiller base being careful to seat the housing around the inlet and outlet pipes. Re-assemble the (9) screws and washers holding the housing to the base. Re-assemble the rubber gaskets and plastic nuts on the inlet and outlet pipes. Do not over-tighten.

10. Remove the screws holding the mesh filter to the front cover. Thoroughly clean the filter and cover (including the temperature controller) with air. Re-assemble the filter to the cover.

11. Position the front cover to the chiller. Re-connect the electrical wires, making sure that the connector locking tabs are engaged. "Snap" the front cover into the housing.

12. The maintenance is complete.

Note: You will be able to do a better cleanout job if you remove the fan shroud. This is done by drilling out the "pop" rivets with a 5/32 drill bit. Drill thru the shroud and mounting holes on the radiator. When re-assembling the shroud, use 6-32x1/2 screws, #6 flat washers, #6 lock washers and 6-32 nuts.

Replacement Parts

Fan Assembly
A suitable replacement fan can be purchased from Johnstone Supply. The fan is manufactured by Acme of Miami. The Part Number is BB-750. It is 1/50 HP.

The blade is a 7 in aluminum blade with a 19 pitch and a hub for a 1/4 in shaft. It is available at Johnstone Supply or any Grainger warehouse.

The fan bracket has to be fabricated.

TIC Equipment Problems and Solutions

1. *A teacher call or emails you about dead or dying fish, what do you do?* Contact the State Coordinator. Dead or dying fish indicates a problem within the tank environment. The State Coordinator will work with the teacher to determine the cause of the problem. Once the problem has been identified, the teacher will take the steps suggested by the State Coordinator to ensure that the problem has been resolved. If it is early in the TIC year, new eggs or fry may be delivered to the school by the Chapter Coordinator or a Chapter Volunteer. Arrangements for delivery will be worked out by the State Coordinator, who will work with the hatchery staff, Chapter Coordinator/Volunteer and the teacher.

2. *A teacher call or emails you and says there is something wrong with the chiller (its not cooling, its making weird noises, etc), what steps should be followed?* First, check all your tubing for the chiller. They may be clogged. Unclog it and the problem may be solved. Most chapters have a spare chiller. The Chapter

Coordinator/Volunteer will take the spare chapter chiller to the school. The Chapter Coordinator/Volunteer should help the teacher install the spare chiller. The broken chiller should be taken from the school by the Chapter Coordinator/Volunteer and brought to John Norstedt, who is New Jersey's chiller repair team. John will fix the broken chiller and will let the Chapter Coordinator/Volunteer know when it is ready to be picked up. The Chapter Coordinator/Volunteer will pick up the repaired chiller and return it to the school. The teacher and the Chapter Coordinator/Volunteer will reinstall the repaired chiller and will take the chapter spare chiller back to the chapter. Chiller problems need to be attended to ASAP.

3. *A teacher contacts you and says there is no way they can release their fish this year.* Chapter Coordinators or Volunteers may pick up the fish and release permit from the school and release the fish themselves. It is always better to do this with the students, but schools may not have the funding for buses.

4. *A teacher contacts you and says a piece of the input/output valve broke off and they need to have it fixed.* Number one, have the teacher contact the company for a replacement part or, two, contact the Chiller Repair Person to see if he/she has a spare.

5. *A teacher contacts you and says the fan on the chiller isn't spinning.* Advise the teacher to put a standing fan in front of the chiller to keep the air circulating in the chiller. This is a band-aid approach until you can get the teacher a spare and bring the broken chiller to the Chiller Repairman.

6. *A teacher calls or emails you to let you know that the brand new chiller isn't working and there's an error code.* Most chillers come with a one-year warranty. If it's a new chiller and still fits within the warranty time frame, have them contact the chiller company.

7. *A teacher calls to say the chiller is leaking from the bottom and from up near the tubing.* Contact your TU TIC Chapter Coordinator for a spare. Have the teacher contact the chiller company of the chiller is under warranty.

8. *The chiller thermometer and the digital thermometer are reading different temperatures. Is that okay?* Yes. Your digital thermometer will show the actual tank temperature. The chiller temperature reading will be a degree or two higher.

9. *How does the filter open?* Read the filter instructions. The suction of the water may make it difficult to remove the top.

10. *The TIC equipment isn't working? What to do?* Check to make sure it is plugged in. Silly, but it can happen. There have been numerous schools where equipment was unplugged over a weekend resulting in fish loss.

11. *What if the chiller isn't working?* First, unplug everything and make sure the chiller is clean. Follow the steps outlined in this document to clean the chiller. A junked up chiller will prevent it from cooling. If that doesn't work, contact your TU TIC Coordinator for help.

12. *The temperature on the chiller won't drop. What could be wrong?* It may be the temperature sensor. Contact the chiller company for a replacement.

TIC Commonly Asked Questions

Program Questions

1. *Can I start TIC whenever I want?* No. Eggs are only available in mid-October, determined by the egg take at the hatchery. If you want to participate in the program, you need to plan to have your equipment by the end of September at the latest.

2. *I am a homeschooler, can I join this program?* The fish will need to be in a public place, such as a public school, environmental education center, museum, etc that will allow you to come in and work with the tank. Hatchery fish can not go into private homes.

3. *Can I volunteer to help with TIC?* If you are interested in helping with the Trout in the Classroom Program, contact your local chapter of Trout Unlimited and talk to the TIC Chapter Coordinator. There are many times when they can use help with egg delivery, releases, etc.

4. *How do I sign up to get trout?* If you have never been in the program before, set up your equipment and contact the TIC State Coordinator for registration paperwork. If you are returning for another year, the paperwork will be emailed to you.

5. *Is there a curriculum?* There is an Activity Guide designed for middle school students and correlated to the NJ Science Core Curriculum Contents for middle schools. However, the activities are easily adaptable to any age level and we currently have students in preschool-college using the same guide.

6. *When is Egg Day?* Egg Day depends on how well the egg-take goes for the hatchery stock. It usually happens in mid-late October. The TIC Coordinator will email everyone as soon as the hatchery knows when it will be.

Equipment Questions

1. *What is the yellow fungus on the bottom of the tank?* That's fish food gone bad! If there is still food in the tank after 5 minutes, it needs to be removed. Remove all fish and equipment from the tank. Clean everything with a 10% bleach solution and make sure everything is rinsed off really well before putting fish back in the tank. Keep the temperature of the tank around 52 degrees to slow algal or fungal growth.

2. *My tank has white fungus growing in it. What can I do?* That's fish food gone bad! If there is still food in the tank after 5 minutes, it needs to be removed. Remove all fish and equipment from the tank. Clean everything with a 10% bleach solution and make sure everything is rinsed off really well before putting fish back in the tank. Keep the temperature of the tank around 52 degrees to slow algal or fungal growth.

3. *When can I remove the covers from my tank?* You should keep the tank covered until the fry are swimming freely. It is recommended that you keep the Styrofoam on the back, bottom and two sides of the tank, leaving the front open for viewing. The Styrofoam will help maintain a low tank temperature and will help the chiller not work as hard.

4. *Which of the chiller cleaning instructions should I follow?* The one designed for your type of chiller. If your brand of chiller isn’t one of the ones specified, use the generic plan.

5. *What size tank do I need?* We recommend a 55 gallon glass tank. The kits that include most of what you need to start TIC in NJ are designed around a 55 gallon tank.

6. *Can I add rocks to my tank?* Yes. We currently have gravel as part of our starter kit. You can also get river rocks from your local trout stream to add to the tank. It makes the tank look more like a natural ecosystem, as well as provide places for beneficial bacteria to grow.

7. *Where do I get my equipment from?* A list of equipment is available on www.NJtroutintheclassroom.org. Equipment can be ordered as a kit from That Fish Place, which offers a discount to TIC teachers. The equipment in the kit includes everything needed to get started except the tank, tank stand and hood with light. Those can be purchased from any pet store.

8. *Should I get an acrylic tank or a glass tank?* We recommend glass because the acrylic tanks scratch easily, making it difficult to view the fish.

9. *What kind of tank stand should I get?* If you have a sturdy lab table, you can use that. Otherwise, get a metal tank stand.

10. *I have trout food left over from last year, can I use it?* The trout food has a short shelf life due to the high oil content. If you have left over food, get rid of it.

11. *Can I put other fish in my tank after I release the trout?* No. Your equipment needs to be kept for trout only. The eggs you receive from the hatchery are disease free. At the end of the year, your fish go into trout maintenance streams. We do not want to introduce diseases into our waterways and there is a possibility that other fish may harbor disease.

12. *How much charcoal should I buy?* Read the instructions that came with your filter. They will tell you what replacement charcoal to purchase.

13. *Where does my egg box go?* If you are using a net breeder, which came with your start up kit, it has metal clips that you bend so that the net breeder is hanging onto the side of the tank. Make sure that the bottom (where the eggs are) is submerged in the water. Keep the basket out of the main flow of the filtered water and aeration system. If you have a Vibert box, you can either use paperclips to secure it to the top of the tank as you would a net breeder, or after the eggs are in the box, sink it to the bottom of the tank and use a heavy river rock to keep it weighted on the bottom.

14. *I ran out of fish food, can I get more?* The hatchery supplies you with enough food to feed 400 fish. If you run out of food, you were overfeeding them. Get more at a pet store.

15. *Can I use the same river rocks from year to year?* Yes. However, if they were out of your tank for the summer, there won't be any beneficial bacterial on them to boost your tank. If you want a bacteria booster, change the river rocks. The gravel in the tank is fine.

16. *Why is the tank water smelly?* In truth, it shouldn't be. If yours smells, check the filters for dead fish. Sometimes, they get sucked inside and create an order as they decompose.

17. *What is the white foam floating on the water surface in my tank?* If you have eggs that are hatching, the foam is a result of the egg shells breaking down.

18. *My chiller is leaking from the bottom and from up near the tubing. What should I do?* Contact your TU TIC Chapter Coordinator for a spare.

19. *When should we do the major water replacement?* Don't change the water, unless you are getting bad readings on your tests.

20. *Where do I get test tubes for checking water quality?* The water testing kit that is included in your start up kit (and which you need to replace) includes test tubes. If you lose yours, order another testing kit because you'll need it anyway. If not, ask the science lab where they get theirs from.

21. *Can I use tap water for the tank?* Yes. However, make sure that your town doesn't use chlorine. If it does, you will need to let the water sit at least 48 hours before putting it in the tank with the fish.

22. *I have a broken chiller sitting in my closet, can someone look at it and see if it can be fixed?* Yes. We have a Chiller Repair Person who will look at any broken chillers and try and repair them. Contact your TIC Chapter Coordinator to set up a repair schedule.

23. *Our town water has a high pH (near 8.0) but we have successfully raised trout in past years with this water, should I be concerned?* Ideally, the pH should be between 6.5 -7.5 pH, but trout are pretty adaptable. Do what works.

24. *How often should the charcoal in the filter be changed?* Replace the charcoal before the eggs arrive and just before leaving for the long holiday break.

25. *Should I have a back up power supply in case the school loses power?* There are no schools that have back up systems. They are pricey and may be used very rarely. However, if it makes you more comfortable to have one, feel free.

26. *Why does my water look murky?* If the water is dark, do a 50% water change, and make sure you vacuum out the bottom of the tank. Murky water is a sign of excess waste and debris. Change the filter media.

27. *Will someone clean the chiller at the end of the year?* There is a $25 fee for the service, as well as a charge of $0.50 per mile that TU is on the road, picking it up, dropping it off, returning it and getting back to their house. A check will be made out to **NJSCTU** for the amount.

28. *My tank is green. Is that good?* Yes. Green algae is okay in your tank.

29. *Where do I get Styrofoam?* Sheets of Styrofoam can be purchased from places like Home Depot. You will want to attach the sheets to the bottom, back and two sides of your tank. This will help protect the fry from UV light and will help maintain the tank at a cool temperature, helping to ensure a longer life for your chiller.

30. *How do I sink the food?* Size 0 food will need to be sunk down to the fish. This is easy to do. Use a spoon or even your hand to gently agitate the water. Any unfinished food should be removed in 5 minutes.

31. *My pH in the tank is up. What can I do?* There is a product called pH Down available at pet stores that can help with high pH problems. Make sure that you are adding Bacteria Boost to the tank every week. Healthy bacterial colonies will help maintain water quality in the tank.

32. *My chiller isn't cooling the water. What can I do?* Check to see if you have crimped lines in your hoses. A crimp in the line will reduce water flow into the chiller and will cause it not to function properly. Uncrimp them. If that doesn't help, contact your TU TIC Coordinator.

Trout Biology

1. *Can I choose when I get my eggs?* No. Egg Delivery Day is determined by the success of the egg take for the hatchery stock. The State Coordinator will work with the hatchery staff to determine the best day for Egg Delivery Day. If you will not be at school to meet Trout Unlimited and get your eggs, please leave your classroom open so that the eggs can be placed in the hatching basket.

2. *Can I tell Trout Unlimited when I want my eggs delivered on Egg Delivery Day?* No. Trout Unlimited volunteers determine the best route for their deliveries based on the number of schools that they are delivering to and how long they spend at each school. If you can not meet Trout Unlimited, please leave your classroom door open and the volunteers can put your eggs in the egg hatching basket for you.

3. *Will the trout in my tank eat another one?* Yes. Trout are carnivorous and will eat whatever protein they can, including one of their tank mates. Try feeding your fish a bit more food. If you have an aggressive fish in your tank, separate it from the others.

4. *What does a dead alevin look like?* Dead alevins will lose their color and the eyes will appear whitish. They will not move if you gently shake the hatching basket.

5. *Our fish are all dead and have "exploded" bellies. What happened?* Our biologist hadn't heard of it happening before, but we thought it could have been from bad food, or a possible parasite, or a bacterial infection. Tapeworms are transmitted from humans to fish (rumor has it). A bacterial infection will cause swelling in a very short period of time. It could also be dropsy, which can spread the parasites if the fish explodes. There is also something called gas bubble disease. Gas bubble disease refers to the development of gases in a fish's bloodstream. This can occur when its aquarium or pond water is supersaturated with gases. Gas bubble disease damages the fish's tissue, causing tiny gas bubbles to form in the gills, fins, and eyes of the animal. This tissue damage, if extensive, can even lead to the fish's death. Fishes are cold-blooded creatures, meaning their body temperature depends on the temperature of their environment. The water they live in and their bloodstreams can become supersaturated with gases when there is a sudden rise in water temperature or a sudden rise in pressure. When the cold water in the aquarium is suddenly heated, it can release and trap gases within the water causing gas bubble disease in the aquarium fish. Similarly, pond or tank water can become supersaturated with gases when they are filled with well water through a submerged hose. These gases can also lead to gas bubble disease. Gas bubble disease can be prevented by slowly heating up water when it is added to the aquarium. Also, do not submerge the hose when filling up a pond. Instead, spray water from above, as this will allow all the gases to be harmlessly released into the air.

6. *How long for the yolk sac to be used up?* It takes about two weeks for the yolk sac to be absorbed. At this point your fish are called swim ups because they will be swimming up to the surface looking for food.

7. *When do I empty the fry into the tank: at the yolk sac phase or wait until they are fry?* Its up to you. For me, I think they are easier to manage in the hatching basket until they are free swimming. I can easily see which ones didn't make it.

8. *Our fish hatched, but aren't swimming. Is that normal?* Yes. It takes about two weeks for them to reabsorb their yolk sac which weighs them down. After it is absorbed, they'll start swimming.

9. *Our janitors are off over the holidays. How often do the fish have to be fed?* They don't have to be fed over the long holiday breaks. Trout can live up to 14 days without food.

10. *How do you tell the sex of the trout?* The sex of the trout can not be determined until they are about 1 years old. At that time, the male trout will start developing a hooked up jaw called a kype, which is typical in salmonids.

11. *When should I start feeding my fish?* After hatching, the trout will stay on the bottom of the hatching basket or tank until the yolk sac is absorbed. At that point, they will start swimming up to the surface looking for food. Once you have swim up fish, you can start putting food in the tank. They won't eat much (if anything) yet, but you are getting them used to the food. Size 0 food will need to be sunk down into the tank. Agitate the water with your hand, a spoon, etc.

12. *My school is turning off the power for a while, will the trout survive?* If your tank is insulated and you sink bags of ice into it, that will help keep the water cool. If your aerator isn't running, you should use your portable aerator that you use for releases.

13. *Some of my fish have big heads and skinny bodies, why?* These are called pinheads and they are either not eating because they never learned to or the competition for food is fierce. Try isolating that one and see if he eats.

14. *What type of trout are these?* Schools receive brook trout eggs to hatch and raise. Brook trout are New Jersey's only native trout and is the State Fish.

15. *Can the fish be deformed?* Yes. There are times when we get Siamese trout from the eggs, misshapen jaws, missing fins, albinos, etc. These fish will most likely not survive, but are a great lesson for students.

16. *My fish are covered in a cottony fungus, what can I do?* There are medicines available at pet stores for fungal growth treatment of aquarium fish.

17. *I see a tail sticking out of another trout's mouth. How do I stop this?* Trout are carnivores and will eat other trout if they are hungry. If you see this occurring in your tank, you should either feed all of your fish more, or isolate the aggressive one with a barrier and keep it separate from the other fish.

18. *I released my fry from the hatching basket and now they are buried in the gravel. Should I be worried?* No. When trout are hatched in a stream, the female first builds a nest, called a redd. This is a depression cleared of gravel. The male will stimulate the female to release her eggs, at the same time releasing his milt, the fluid that contains sperm. Fertilization occurs outside of the body. The female will then use her tail to cover the fertilized eggs with gravel. The eggs will remain in the redd until they hatch, and the young fry will continue to stay hidden

among the gravel where they are protected from predators, UV light from the sun and strong currents. They will emerge when they are strong enough to swim in the streams.

19. *My fish has an extended lower jaw that seems to be disintegrating*. This is most likely a deformity and will eventually die from not being able to eat adequately.

Programs, Releases and Trips

1. *Can my TIC fish be released anywhere I want?* No. State biologists have developed a list of appropriate release sites for TIC fish. An appropriate site will be able to support trout year-round. While many areas in the state are stocked with hatchery fish, they are not suitable for year-round survival of trout. You will have to release your trout at the location you apply for on your release permit application. If you can't release your trout yourself, contact your Trout Unlimited TIC Coordinator for assistance.

2. *When is a good time to visit the hatchery?* The hatchery is open year round for programs. For a list of programs and when they are offered, visit the Pequest site at www.njfishandwildlife.com.

3. *When is a good time to ask for Trout Unlimited to do macroinvertebrate (onion sack) sampling in the school?* The best time is April – June for looking at a variety of macroinvertebrates.

4. *Can I release fish at Pequest?* Fish can not be released in the Pequest because of possible contamination to the hatchery. There is a list of approved TIC release sites to choose from on the website at www.njtroutintheclassroom.org.

5. *When do I release my fish?* It is up to you when you release your fish. Most schools release them in May or June. A few release them as early as April. You must have your release permit from the state on you when you release the fish.

6. *Where do I get trout to dissect?* Your local grocery store may be able to get you some. Just make sure that you ask them to leave them whole for you.

7. *Why are most release sites in the northern part of the state?* The release sites are picked by our biologists based on their river/stream studies. There are few if any holdover trout streams in Middlesex County. Most of the trout streams are found in the northern part of the state. These are the streams where there is good oxygen, low water temps, plenty of cool water, good shelter and adequate food that can support a population of trout year-round. As streams run through the more populated areas of the state, the water temp increases due to non-point source pollution and all the asphalt.

8. *Can I change my release date?* Yes. The permits to release are issued for a one month time span. If you need to change the time frame, contact the state TIC Coordinator who will work with the biologists to change it for you.

9. *How do I release the fish?* You should have a cooler (Igloo or otherwise) that will hold water and fish. You should also have a small battery operated aerator. These are available at bait stores and some sporting goods stores. Put ziplock bags of ice in the cooler with the fish to keep the water temperatures down.

10. *What is the best way to handle the release?* Bring small cups and give each child a bit of water and a fish. Have them place their cups in the water so that the fish can swim out when it is ready too.