LUDATRONICS

Updated 1st June 2011 - now including information on tip care & general soldering

Frequently Asked Questions (FAQ's) are updated on a regular basis

(General)

Q/ Can the De-Soldering gun/soldering iron be used for lead free solder?

A/ Yes, all Aoyue products (Soldering & De-Soldering) can reach a maximum temperature of 480 deg C which is more than enough for lead free solder. **N.B. Please see general information on soldering & Tip care further down**

Q/ Why then are some Aoyue products stated as lead free & others are not?

A/ Basically it is only some of the newer models which uses the new type of tips (with built in heater element) that say they are lead free compatible, the reason for this is the new type tips are more tolerant to the higher temperatures used & the more corrosive effect of lead free solder. Therefore the tips will last a bit longer than the standard (Hakko type) tips. N.B. All the Aoyue models we sell are now designed to work up to a maximum of 480 deg C & are therefore suitable for lead free solder.

Q/ Can you tell me how to repair my Nagamishi T342 Colour TV & what Aoyue model do I need?

A/ Please understand that our products can repair 1000's of different types of electronics equipment, we have customers which repair items such as Old Jukebox's, Old Arcade game consoles, Vintage radio's & TV's, Modern surface mount electronics & even guided missiles (Australian Navy) therefore we cannot be an expert on every single electronic product that has ever been sold. We will endeavour however to help as much as possible as regards any questions regarding Aoyue products. The analogy of this is would you buy a set of spanners (or similar tools) from an auto shop & then expect the shop owner or assistant to explain to you how to repair your Ford Falcon etc, with them?

Q/ I'm very new to soldering/hot air equipment etc. Can you suggest what tips, nozzles or soldering stations I need.

A/ Due to us being a part time business we have very limited time to go into great details replying to emails, often we are asked lots of very basic questions by newcomers on which tips, solder, flux's etc. are recommended for even our most lowest price stations. We will endeavour to help as much as possible, however it would be appreciated that questions are only asked about particular products. The internet is an amazing free source of information on soldering, especially for the newcomer.

Q/ I want to start repairing Xboxes & games consoles, what Aoyue products do I need & how do I repair them.

A/ Please also see answer above, again we have never repaired Xboxes & other game consoles ourselves so are therefore not qualified to give this type of advice. However all we can do is recommend what other buyers have bought who repair this type of equipment. We often get asked very basic (& sometimes stupid) questions about soldering of which makes us believe that some people have never used a soldering iron (let alone a hot air or de-soldering gun) before. It is therefore recommended that a bit of investigation & homework are done on the internet (& books etc.) before purchasing our equipment. If you have not had experience with soldering before maybe it would be worth purchasing one of our basic soldering stations (936 at $49) & practice before expanding into the world of hot air/surface mount & BGA repairs, therefore please make sure you have the expertise on using soldering equipment before purchasing some of our hot air rework stations. Please Note: YouTube have a number of good (& bad) videos on using Aoyue equipment & general soldering/hot air working.

Q/ Why are your prices for Aoyue equipment sometimes more expensive than what I can buy on the internet?

A/ We try & be as competitive as possible, we are only a small part time company (at the moment) & luckily we don't have to rely on the profits from our sales to pay a mortgage, rent for retail premises, wages, expensive cars etc. Therefore because our overheads are low we try & keep our prices as competitive as possible, However unlike someone personally ordering from overseas (i.e. eBay) they do not have to pay import duties, custom charges & GST etc, of which we have to. However we believe that because of our very competitive shipping charges, warrantee period of 12 months (most internet sellers only offer 6 months), & equipment designed for the Australian market (not 220 volts which is designed for the European market) & not to mention our extensive stock of very low price spares & consumable items. We therefore believe that we win every time against the slightly lower prices sometimes found on the internet (however watch out for the highly inflated shipping charges some internet suppliers charge to offset the lower equipment prices!!) Also please note that we are GST registered with the ATO, therefore we send a tax invoice with each order, and subsequently if you run a company which is also GST registered you are able to claim back the 10% GST.

Q/ What warrantee do you offer with your products

A/ We offer a 12 months return to base warrantee, however this excludes consumable items such as heater elements, tips etc.- N.B. Because we aim our products mainly at the hobbyist, small tradesmen etc, we therefore don't recommend that Aoyue equipment (most products under $400) are used in a commercial/production type environment – we therefore reserve the right to offer a limited 90 day warrantee if used commercially.
Please see our "Terms & Conditions" on our website for further details or please emails us for further details

FAQ's on Delivery & Payment

Q/ How do I pay you?

A/ We accept payment by Cheque, Direct Bank Deposit, PayPal (2% surcharge may occur for PayPal transactions) & even cash!

N.B We are now able to accept payment via Credit Cards via email or phone (no surcharge)

Q/ How much are shipping charges?

A/ This all depends on where you live & how quickly you want the goods. We use both Auspost as well as a national courier company. The courier company we use are very competitively priced & includes online tracking, Prices for delivery of a normal rework station works out at between $7-$15 to most metropolitan areas. Auspost is recommended (& often quicker/cheaper) for delivery to more rural areas. Overnight or express delivery can also be arranged, please ask. We only charge basic postage & packaging costs, we don't overcharge our customers on shipping charges of which other companies use to offset their lower equipment prices. Please note that goods sent by Auspost normally have the price of postage on the parcel, however please note this doesn't include packaging costs (most boxes cost us around $2 each & that's without the cost of tape, printing address label etc.) also note that most Auspost parcels are sent registered post, therefore the extra $2.90 paid is not shown on the postage label.

FAQ's about the De-soldering Gun.

Q/ What is the tube of Silicon Grease used for?

A/ Regularly smear a small amount around the O ring seals on the filter assembly to keep a good airtight seal, lack of a good seal will imper the operation of the de-soldering gun due to reduced vacuum.

Q/ Should the small circular filter (ceramic) be moistened with water?

A/ Yes, it is not mentioned in some of the user manuals, however please keep the filter damp when using the unit.

Q/ Do I need to regularly replace the spring type filter?

A/ No, depending on the amount of use it should last a long time (there is a spare supplied with the unit), however be careful when removing solder from it. If solder is passing though the spring filter (i.e. gaps in the spring) & accumulating on the circular filter it needs to be replaced.

Q/ How long do the de-soldering nozzles/soldering iron tips last?

A/ This is one of the most asked questions by inexperienced users, How long is a piece of string?, it all depends on the amount of use, temperatures used, solder used (lead free needs higher temperature so therefore the tips will wear out quicker) also different types of fluxes can wear out the tips quicker. However with normal use they should last between 2-12 months **N.B. Please see general information on soldering & Tip care further down**

Q/ The red/blue vacuum indicator is sometimes indicating into the red even when the unit is new, is this normal?

A/ Yes, they vary from gun to gun, however the smaller the tip the more vacuum is needed, therefore you might see the indicator going into the red sometimes especially when using the smaller tips, this is quite normal. Please make sure you moisten the circular filter pads when using the gun. Only when the indicator is totally in the red should you investigate further (make sure the tip is not blocked & the filters are clean) If you are concerned remove any tips (& make sure the filters are clean) & try the unit, it should indicate blue.

FAQ's about soldering & tip care etc.

Q/ Can you give me more info on better soldering & tip care etc.

A/ Please see general information below (N.B. The below has not been written by Ludatronics, therefore please read it as general information which is not just applicable to Aoyue products but to a number of other manufacturers, the info below is readily available via the internet)

Soldering Iron &Tip Care

Most iron tips today are a copper core surrounded by iron, hence the term 'iron clad' that is then nickel or chrome plated. Because solder won't stick to nickel or chrome the plating on the chisel end of the tip is removed to expose the iron cladding. Solder does stick to iron. To keep the tip from rusting you must keep it coated with a layer of tin, hence the term tinning and why solders used in stained glass are a mixture of tin and other metals. It will ensure that you are receiving the maximum heat at the tip surface. You will extend the life and improve the performance of your soldering iron and tips by following a few simple guidelines:

Tip Care

1. Make sure to use good quality solder. Impurities in the solder can build up on your tip, effecting heat transfer and making it difficult to solder.

Alloy	Tin ‰	Lead ‰	Solid to	Liquid at	Pasty Range
50/50	50	50	361°	421°	60°
60/40	60	40	361°	374°	13°
63/37	63	37	361°	361°	0°

·**60/40 Solder:** Composed of 60% tin and 40% lead, this solder melts at 374 ºF (190 ºC), but doesn't become completely solid until it cools to 361ºF (183 ºC). This means it has a "pasty range" or "working range" of 13 ºF or 7 ºC

·**50/50 Solder:** This is composed of 50% tin and 50% lead. It's liquid at 421ºF (216 ºC), solid at 361ºF (183 ºC) and has a range of 60 ºF (16 ºC)

·**63/37 Solder:** This solder is 63% tin and 37% lead. It becomes liquid at 361ºF (183ºC), and solid at 361ºF, (183ºC), with a pasty or working range of 0 degrees. This solder is called a eutectic alloy, which means at 361ºF (183ºC), you can go instantly from solid to liquid to solid just by applying or removing the heat source.

·**Lead-Free Solder:** Depending on the specific mix of metals, lead free will produce differing liquid, solid, and pasty range temperatures. Check with the solder manufacturers for these specifics.

2. Keep the tip of the iron clean while you work. Have a damp sponge handy to occasionally wipe your tip on while soldering to keep it clean. Properly cleaned tips are bright and shiny. Keeping it clean ensures you receive the maximum heat at the tip surface. You can also use metal mesh pads made for the same purpose.
3. Keeping the tip clean is important but constantly wiping it on a wet sponge can cause early tip failure. Excessive wiping causes the tip temperature to drastically rise and fall and the different metal layers in the tip to repeatedly expand and contract. This cycling leads to metal fatigue and ultimately tip collapse. The more frequently you wipe the tip, the more you stress it.
4. Avoid the practice of dipping your tip into flux in order to clean it. Flux is corrosive Never use sandpaper or any abrasive material to clean a tip. The best way to minimize your tip maintenance is to find a good quality solder. Use one that has a high tin content and high metal purity.
5. At the end of a soldering session, wipe the tip clean, flood the tip with solder (63/37 or 60/40 is best), wipe it again and then unplug the iron. This will flush and re-tin your tip, protecting it from oxidation and corrosion.
6. Prevent the tip from seizing (becoming stuck) in the barrel by loosening the nut or screw that secures it. This is an especially good practice when storing your iron. If your tip seizes, you can easily damage the heating element trying to remove it. It is best to return your iron to the manufacturer for removal.
7. When reinserting tips, make sure they are properly seated in the barrel
8. If your tip becomes "blackened," and isn't coming clean using the wet sponge, you might try a tinning block or a brass brush. A "tinning block" (sal-ammoniac) is used by placing a small amount of flux on the block and rubbing the tip of your hot iron in it.Wipe the tip on a damp sponge to remove debris. You may need to repeat this several times if your tip is very dirty. Do be aware that the sal-ammoniac block is abrasive and excessive use can wear away the iron cladding, exposing the copper core and make the tip unusable. You can also gently use a soft brass bristle brush to clean your tip and then re-tin.
9. For a list of the most common causes of tip failure read tipfailure.htm

Soldering Iron Care

1. Always place your soldering iron in a stable iron stand whether it is being used or not.
2. Make sure you plug the iron into the correct type of outlet.
3. Try not to use an extension cord. If you must, use a heavy duty one.
4. Regularly check the cord for burns or cracks and have a professional electrician replace worn cords before using.
5. Make sure that the cord is not hanging in such a way that it can be pulled off of the table.
6. Don't drop or bang the iron. Ceramic heaters are especially easy to crack or break.
7. Do not allow the iron to idle at operating temperatures for extended periods. This could burn out the element or even the iron. If you are using a rheostat, turn it down to a low "idle" setting. If not, unplug the iron.
8. Occasionally, remove the tip and lightly tap the barrel of wire wound heater irons to remove debris.
9. If you will not be using your iron for an extended period of time, you may want to store it (after it has fully cooled) in a zipper type bag to protect it from corrosion and humidity.

Better Soldering

Purpose

We hope this short manual will help explain the basics of Soldering. The emphasis will be on the care and use of equipment.

Overview

Soldering is accomplished by quickly heating the metal parts to be joined, and then applying a flux and a

solder to the mating surfaces. The finished solder joint metallurgically bonds the parts - forming an excellent electrical connection between wires and a strong mechanical joint between the metal parts. Heat is supplied with a soldering iron or other means. The flux is a chemical cleaner which prepares the hot surfaces for the molten solder. The solder is a low melting point alloy of non ferrous metals.

Solder and Flux

Solder is a metal or metallic alloy used, when melted, to join metallic surfaces together. The most common alloy is some combination of tin and lead. Certain tin-lead alloys have a lower melting point than the parent metals by themselves. The most common alloys used for electronics work are 60/40 and 63/37. The chart below shows the differences in melting points of some common solder alloys.

Tin/Lead	Melting Point
40/60	460 degrees F (230 degrees C)
50/50	418 degrees F (214 degrees C)
60/40	374 degrees F (190 degrees C)
63/37	364 degrees F (183 degrees C)
95/5	434 degrees F (224 degrees C)

Most soldering jobs can be done with fluxcored (or multicore) solder (solder wire with the flux in a "core") when the surfaces to be joined are already clean or can be cleaned of rust, dirt and grease. Flux can also be applied by other means. Flux only cleans oxides off the surfaces to be soldered. It does not remove dirt, soot, oils, silicone, etc.

Base Material

The base material in a solder connection consists of the component lead and the plated circuit traces on the printed circuit board. The mass, composition, and cleanliness of the base material all determine the ability of the solder to flow and adhere properly (wet) and provide a reliable connection.

If the base material has surface contamination, this action prevents the solder from wetting along the surface of the lead or board material. Component leads are usually protected by a surface finish. The surface finishes can vary from plated tin to a solder - dipped coating. Plating does not provide the same protection that solder coating does because of the porosity of the plated finish.

The Correct Way to Solder

Some Reasons for Unwettability

1. The selected temperature is too high. The tin coating is burnt off rapidly and oxidation occurs.
2. Oxidation may occur because of wrong or imperfect cleaning of the tip. E.G.: when other material is used for tip cleaning instead of the original damp Weller sponge.
3. Use of impure solder or solder with flux interruptions in the flux core.
4. Insufficient tinning when working with high temperatures over 665 degrees F (350 degrees C) and after work interruptions of more than one hour.
5. A "dry" tip, i.e. If the tip is allowed to sit without a thin coating of solder oxidation occurs rapidly.
6. Use of fluxed that are highly corrosive and cause rapid oxidation of the tip (e.g. water soluble flux).
7. Use of mild flux that does not remove normal oxides off the tip (e.g. no-clean flux).

The Soldering Iron Tip

The soldering iron tip transfers thermal energy from the heater to the solder connection. In most soldering iron tips, the base metal is copper or some copper alloy because of its excellent thermal conductivity. A tip's conductivity determines how fast thermal energy can be sent from the heater to the connection.

Both geometric shape and size (mass) of the soldering iron tip affect the tip's performance. The tip's characteristics and the heating capability of the heater determines the efficiency of the soldering system. The length and size of the tip determines heat flow capability while the actual shape establishes how well heat is transferred from the tip to the connection.

There are various plating processes used in making soldering iron tips. These plating operations increase the life of the tip. The figure below illustrates the two types of plating techniques used for soldering iron tips. One technique uses a nickel plate over the copper. Then an iron electroplate goes over the nickel. The iron

and the nickel create a barrier between the copper base material and tin used in the solder alloy. The barrier material prevents the copper and tin from mixing together. Nickel-chrome plating on the rear of the tip prevents solder from adhering to the back portion of the tip (which could cause difficulty in tip removal) and provides a controlled wetted area on the iron tip. Another plating technique is similar but omits the nickel electroless plating, leaving the iron to act as the barrier metal.

How to Care For Your Tip

When soldering with temperatures over 665 degrees F (350 degrees C) and after long work pauses (more than 1 hour) the tip should be cleaned and tinned often, otherwise the solder on the tip could oxidize causing Unwettability of the tip. To clean the tip use a wet sponge (no rags or cloths).
When doing rework, special care should be taken for good pretinnng. Usually there are only small amounts of solder used and the tip has to be cleaned often. The tin coating on the tip could disappear rapidly and the tip may become unwettable. To avoid this the tip should be retinned frequently.

Additional Tip and Tiplet Care Techniques

Listed below are suggestions and preventative maintenance techniques to extend life and wettability of tips and desoldering tiplets.

1. Keep working surfaces tinned, wipe only before using, and retin immediately. Care should be taken when using small diameter solder to assure that there is enough tin coverage on the tip working surface.
2. If using highly activated rosin fluxes or acid type fluxes, tip life will be reduced. Using iron plated tips will increase service life.
3. If tips become unwettable, alternate applying flux and wiping to clean the surface. Smaller diameter solders may not contain enough flux to adequately clean the tips. In this case, larger diameter solder or liquid fluxes may be needed for cleaning. Periodically remove the tip from your tool and clean with a suitable cleaner for the flux being used. The frequency of cleaning will depend on the frequency and type of usage.
4. Filing tips will remove the protective plating and reduce tip life.
5. Do not remove excess solder from a heated tip before turning off the iron. The excess solder will prevent oxidation of the wettable surface when the tip is reheated.
6. Anti-seize compounds should be avoided (except when using threaded tips) since they may affect the function of the iron. If seizing occurs, try removing the tip while the tool is heated. If this fails, it may be necessary to return the tool to your agent for service. Removing the tip from the tool on a regular basis will also help in preventing the tip from seizing.
7. We recommend using distilled water when wetting the cleaning sponge. The mineral content in most tap water may contaminate your soldering tips.
8. Storing tips after production use:
   -- Clean hot tip thoroughly with damp sponge.
   -- Apply coating of solder to tip.
   -- Turn unit off to allow tip to cool.
   -- Put tip away in proper storage or in iron holder

How to "Renew" Your Tip

Emery cloth may be carefully used to wipe away oxidation when the tip is hot. The tip should then be immediately retinned to prevent further oxidation. In extreme cases of tip oxidation or "tip burnout" they may be cleaned using a soft steel brush along with an active flux. Once again, retinning the tip immediately is important.

Soldering Iron Temperature Settings

In order to raise the temperature of solder above it's melting point, soldering tip temperatures are usually set between 700 degrees F and 800 degrees F. Why such a high temperature when the most commonly used solders have a melting point under 400 degrees F? Using a higher temperature stores heat in the tip which speeds up the melting process. The operator can then complete the solder connection without applying too much pressure on the joint. This practice also allows a proper formation of an intermetallic layer of the parts and solder. This is critical for reliable electrical and mechanical solder joints.

How Precise is the Indicated Tip Temperature?

Very fine long soldering tips have less heat conductivity than large short tips and therefore will run slightly cooler. Electronic control soldering stations have a tip temperature control accuracy of at least plus or minus 10 degrees F (6 degrees C) which is the current Mil Spec. Tips for electronic soldering tools are carefully designed to give accurate temperatures measured at the center of the solder wetted area. The specifications of the individual soldering stations are assured only if the correct tips are used. The sensor hole in these tips is very critical to their proper operation.

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The Operator's Effect on The Process

The operator has a definite effect on the manual soldering process. The operator controls the factors during soldering that determine how much of the soldering iron's heat finally goes to the connection.

Besides the soldering iron configuration and the shape of the iron's tip, the operator also affects the flow of heat from the tip to the connection. The operator can vary the iron's position and the time on the connection, and pressure of the tool against the pad and lead of the connection.

When the tip of the iron contacts the solder connection, the tip temperature decreases as thermal energy transfers from the tip to the connection. The ability of the soldering iron to maintain a consistent soldering temperature from connection to connection depends on the iron's overall ability to transfer heat as well as the operator's ability to repeat proper technique.

The Reliable Solder Connection

Two connection elements must properly function for a solder joint to be reliable. The solder within the connection must mechanically bond the component to the PCB. The connection must also provide electrical continuity between the device and board. The proper intermetallic layer assures both.

Mechanical

In surface mount and nonclinched through-hole technology, the solder provides the mechanical strength within the connection. Important factors for mechanical strength include the wetting action of the solder with the component and board materials, physical shape and composition of the connection, and the materials' temperature within the connection during the process. The connection temperature should not be too high, causing embrittlement, or too low, resulting in poor wetting action.

Electrical

If a solder connection is mechanically intact, it is considered to be electrically continuous. Electrical continuity is easily measured and quantified.

Recognizing the Reliable Solder Connection

Two easily measured indicators in the soldering process that can determine the reliability of the solder connection are the soldering iron's tip temperature and the solder's wetting characteristics. The tip's temperature during the soldering process is an indicator of the amount of heat being transferred from the tip to the connection. The optimum rate of heat transfer occurs if the soldering iron tip temperature remains constant during the soldering process.

Another indicator for determining reliability is the solder's wetting action with the lead and board materials. As operators transfer heat to the connection, this wetting characteristic can be seen visually. If the molten solder quickly wicks up the sides of the component on contact, the wetting characteristic is considered good. If the operator sees the solder is flowing or spreading quickly through or along the surface of the printed circuit assembly, the wetting is also characterized as good.

Right Amount of Solder

a) Minimum amount of solder
b) Optimal
c) Excessive solder

Solderability

a) Bad solderability of terminal wire
b) Bad soldering of PCB
c) Bad soldering of terminal wire and PCB

Key Points to Remember

1. Always keep the tip coated with a thin layer of solder.
2. Use fluxes that are as mild as possible but still provide a strong solder joint.
3. Keep temperature as low as possible while maintaining enough temperature to quickly solder a joint (2 to 3 seconds maximum for electronic soldering).

4. Match the tips size to the work.
5. Use a tip with the shortest reach possible for maximum efficiency.

Summary

Operator training and experience will, over time, provide the consistency needed for excellent hand soldering results. Part of the training includes a proper understanding of solder characteristics, how a soldering iron works, how to maintain tips, correct techniques, recognizing good solder joints, and potential problems.