NEWS 169

August 2021

www.tttg.org.au **ISSN 2206-1606**

What is TTTG?

TTTG is the Traditional Tools Group; a not-for-profit group of like-minded enthusiasts interested in the history and preservation of traditional trade skills, techniques, and tools, including hand tools, machinery, and other old technologies. TTTG was established in 1992.

Our bi-monthly Members' meetings feature a guest speaker presenting diverse topics related to tools, trades, and technology.

Keeping traditional tool skills alive is a key objective of TTTG.
"Real Skills" workshops have been held every year since 2005.
These popular fee-based workshops, open to all, are designed to guide participants in developing their tool skills and practicing new techniques.

The Group sells old tools and machinery at affordable prices.
Three "members and friends" tool sales are held each year.
These tool sales are at the Old Eastwood Town Hall.

Every February TTTG runs Sydney's largest second-hand tools sale.
The Annual Tool sale is at The Brick Pit Sports Stadium in Thornleigh.

The TTTG digital magazine, "NEWS", is published four times a year.

Membership of the Traditional Tools Group is open to anyone with an interest in traditional tools, history, techniques, and skills.

TTTG Membership Rules

The MEMBERSHIP YEAR starts 1 July and ends on the following 30 June.

The MEMBERSHIP FEE is currently $50.

The MEMBERSHIP FEE is due to be paid on 1 July each year and must be paid on or before August 15.

A Member may choose to pay the Membership *Fee* one year in advance, but only from 1 January in the current Membership Year and only for one year. *Other advance payments will not be accepted.*

A Member who has NOT paid their Membership Fee by August 15 becomes an UN-FINANCIAL MEMBER.
From August 15 an UN-FINANCIAL MEMBER and will cease to receive the NEWS magazine. Access to the Members' area of the TTTG website will also cease.

A NEW MEMBER joining between July 1 and March 31 the following year is a full Member for the remainder of that Membership Year only.

A NEW MEMBER joining between April1and June 30 does not become a full Member until the following Membership Year and must pay the Membership *Fee applicable to that Membership Year.*

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Cover: image from *1950 Shop Master Tools*

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Next Meeting & *Sale of tools & Auction*
When Lock Down ends

For details of TTTG Meetings and Sales:

Website: www.tttg.org.au

Email johnbates@tttg.org.au

NEWS Magazine, Contacts & Fees 2020/21

NEWS Magazine is sent to all financial members during

FEBRUARY MAY AUGUST NOVEMBER

From 30 June 2020 NEWS Magazine is sent only by email.

2020/21 TTTG Fees

Membership	***$50***
Workshops	***$60***
Tool Sale Entry	**$10**
Meeting Entry	**$5**

TTTG Contacts

Editorial/Advertising Enquiries:

Bob Crosbie
bobcrosbie@tttg.org.au

Membership Enquiries:

John Bates -
secretary@tttg.org.au

Next Meeting?
When Lock Down ends?

Sale of surplus tools

Bargain Tool Sale and Auction

TTTG needs to make space!

Stanley Planes from $15 each

Parts from $5 Handles $10 each

TTTG Sharp Oil TTTG Citric Acid

Entry only $5

Volunteers Wanted

-To demonstrate skills.

-To "sell" TTTG.

-To write articles.

-To help with the website.

-To sort tools.

-To repair tools.

-To repair old machines.

TTTG needs members who can talk to an audience and can demonstrate "real skills".

Why not get more involved?

The COVID-19 Crisis and TTTG to date

The “10 max.” workshops and “35 max.” meetings have been successful.
The February Sydney Tool Sale was cancelled due to COVID restrictions.
The May Tool Sale was well attended.

In May the *2021 Sydney Wood Show was cancelled.*

“Real Skills” Workshops suspended during the Sydney Lock Down.

All TTTG Meetings suspended during the Sydney Lock Down.

“Real Skills” Workshops will resume when the borders are open.

TTTG Meetings will resume when the borders are open.

New workshops are being developed. Post COVID there will be more classes.

Keeping watching the TTTG website and reading the TTTG emails.

TTTG Workshop Space is limited so the classes are small.
Small class sizes and quality teaching insure “value for money”.

Next Tool Sale may be 5 December

The May Tool Sale was Great

The December Tool Sale may be better!

Table bookings for the December Tool sale are deferred.

Open if lockdown & restrictions end in time.

But

If you want more tools .....

When the Lock Downs end .....

TTTG sells!

Just a Sec from the TTTG Secretary

John Bates

NEWS 169 is our third magazine this year.

COVID continues to cast a shadow over TTTG activities and events.

Latest casualties are the “Real Skills” Workshops and TTTG Meetings.

2022 Sydney Tool Sale

Good news is we have a date for next year so put Sunday 20 February 2022 in your diary or paint it on the wall of your workshop.

Real Skills Workshops

Keep an eye on the TTTG website www.tttg.org.au as there will be some great ‘Real Skills’ workshops on offer.

Be sure to tell your friends and family too as our workshops are open to everyone and are keenly priced.

Members’ Meetings

No bi-monthly Members’ Meetings until the COVID lockdown and restrictions end.

Watch the TTTG Website for the details of the next meeting when COVID restrictions allow.

Tools for sale

The Woodfast Scroll Saw has been sold.

Members’ Tool Sales

We are working on holding another Members and Friends Tool Sale at Marsfield on 5 December 2021. COVID restrictions currently prevent this, but things will change. Keep an eye on the website and your inbox for updates.

I would like to hear from Members who are interested in selling at or attending the December Tool Sale so drop me an email at secretary@tttg.org.au and let me know.

Committee Vacancy

We still have a vacancy on the Committee if anyone feels inclined.

Just a Word from the *NEWS* Editor

Bob Crosbie

The Future for TTTG?

The future is in the hands of the members. TTTG needs members to step forward and become actively involved.

***COVID*-19 permitting the 2022 Annual Tool Sale will be on!**
Sunday 20 February 2022

How is TTTG going during COVID-19?

The good news:	Membership is growing!
The bad news:	No meetings of tool sales are allowed.

When we have them the sales of tools continue to be strong!

"Real Skills" Workshops suspended during the Sydney Lock Down.

All TTTG Meetings suspended during the Sydney Lock Down.

"Real Skills" Workshops will resume when the Lock Downs end.

TTTG Meetings will resume when the Lock Downs end.

Paying the Rent

The bank balance is heathy, but the suspension of meetings, sales and classes has reduced cash flow.

Rent Relief

TTTG has made the initial enquiry to Ryde Council regarding the possibility of rent relief due to COVID19.

Digital NEWS

The Committee's decision to "go digital NEWS" was the key factor in TTTG's remaining solvent despite COVID-19.

TTTG is emailing anyone interested in tools and machines

TTTG has a growing mailing list and is sending out regular updates.

Trad Tools has improved TTTG communication with members. Trad Tools is sent first week of each month by Mailchimp

TTTG Instagram is being developed.

COVID means slow progress, but work continues on the revitalised website.

Interested in becoming involved with the Website and Instagram?

All it takes is an email to become a member of the team.

Do you know?

Someone interested in assisting with the website.

Someone interested in redesigning the website.

We are looking for volunteers!

The NEWS Editor has updated his computer but the Editor is considering if producing NEWS is too much for one person.

If NEWS is to continue more members need to be involved.

The Editor is asking for your comments.

TTTG Instagram

Find TTTG on Instagram by searching for TTTG by name.
The account name is one word 'thetraditionaltoolsgroup'
https://www.instagram.com/thetraditionaltoolsgroup/

What do the numbers mean?

The majority of mass-produced old hand tools have a "maker & number".

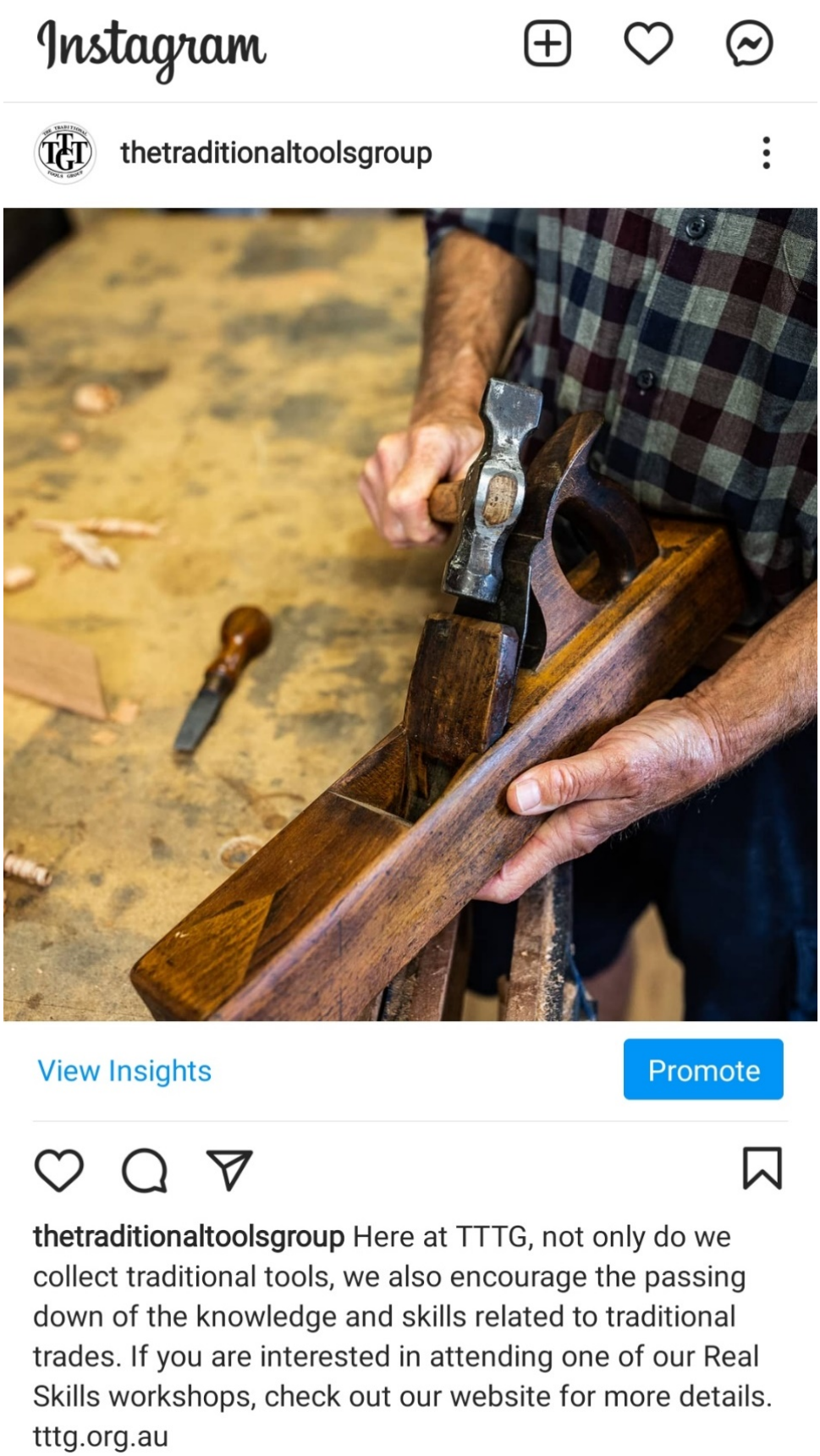
Stanley Tools cast or stamped a model number on each Stanley tool.

How can you make sense of these numbers?

For Stanley Tools go to Patrick Leach Stanley Blood and Gore

http://www.supertool.com/StanleyBG/stan0.htm

TTTG Instagram



TTTG Real Skills Workshops	***$60***
#**Enrol Online**	All enrolments are online
	No "pay on the day"
	No refunds
#**What to wear**	Enclosed shoes
	Sensible clean clothing
#***What not to wear***	Heavy Industrial clothing
	Nail bags
#***What to bring***	Lunch
#***Can I bring my tools?***	Yes, but "use TTTG tools"

The classes start at 9.30am after "sign on" from 9.15am.
Lunch is around 12.30pm and the class finishes by 3pm.

There are no chairs to minimise "trip hazards".

At the time of publication, it is not possible to schedule TTTG Classes.

Post the COVID 19 Sydney Lock Down TTTG classes will resume.

If there is the demand more frequent classes will be offered.

Sunday will remain the usual "workshop day".

However, with enough interest Saturday classes will be offered.

The cost will remain $60 for each class.

What you get at TTTG "Real Skills" Workshops

Ten participants, all actively engaged and leaving keen to learn more.

Compare this to some of the classes offered by a high-profile organisation.
Marketing on the back of the right to repair movement but offering what?

Tool Abuse 101 in contrast to TTTG offering ***Real Skills!***

Real Skills classes are not restricted to "the unplugged experience".
TTTG classes promote safe hand tool skills and machine tool skills.
TTTG promotes the use of the "best tool for the job; old tool or new tool.

Real Skills classes have the sub theme ***Don't throw money at it***.
All TTTG classes include suggestions on buying "old and new" tools.

Post COVID 19 “Real Skills” Workshops

* Hand Cut Dovetails

Making dovetails with traditional tools.

Sharpening dovetail saws and chisels Setting out dovetail joints
Dovetail pitch and templates
Fitting and gluing dovetail joints
Making dovetails with traditional tools
Using the cutting gauge. Using the coping saw
Fitting and gluing dovetail joints

No expensive jigs, no Japanese saws, and chisels.
How to sharpen traditional saws and chisels for cutting dovetails.
The essential tools for success? The Cutting Gauge and Coping Saw.

* Sharpening & Using Planes and Chisels

What is Sharp? How do chisels and plane blades cut?

Grinding and Honing Angles
Taking an edge tool from blunt to razor sharp
Traditional methods to achieve a razor-sharp edge
Using a Pedestal grinder Soft and sharp wheels
Using Oilstones and Diamond Plates

No expensive jigs

Eclipse Honing Guide India Oilstone or Diamond Plate Sharp Oil
What you really need you probably have!

* Using Routers and Trimmers

Routers, Trimmers and Router cutters
What routers can do
Home-made Router Jigs
Commercial Router Jigs
Working safely with Routers.

Buying new and old Routers. Buying Router cutters
The hazards of noise and dust. Router repairs.

Post COVID 19 “Real Skills” Workshops

* Grand Dad's Tools

The essential woodworking tools

The hand tools you really need
Planes, saws, squares and gauges, chisels
Measuring and marking out skills
How to use these essential tools
What are the best tools, old or new tools?

What you really need Grand Dad might have!

** Sharpening Hand Saws*

Rip saws, Cross cut saws, Panel saws, Dovetail saws, Tenon saws

The sharpening equipment you need Simple to make holding jigs
The correct files and where to get them Saw sets, the good and the bad
Jointing the teeth Mill saw file 50 cent File holder
Western saws cut any timber if they are sharpened correctly!

** Repairing and Using Moulding Planes.*

Old moulding planes aren’t rare and can be purchased for under $10
Moulding planes are quick to set up and to use
This workshop takes the mystery out of these planes
Sharpening and setting up moulding planes Types of moulding planes

** Repairing and Using Grooving and Rebating Planes*

Wooden Fillisters, Dados and Grooving planes Names and sizes explained
Metal Rebate and Grooving planes The ones to buy and use

** Making Router Jigs.*

The most useful router jigs are home made from scrap!
Jigs for rebates and housings Jigs for angles Jigs for “one offs”

** Make a spokeshave or scraper*

We supply an old spokeshave blade We supply a scraper blade
We supply the wood (American Beech) *Or* “bring your own”
The scraper will be a “Chairmakers’ Devil”
A sharp Devil makes shaving any hardwood a pleasure!

Learning skills online

There are numerous learning experiences to be found online. Some are good. But many offer poor instruction and demonstrate questionable techniques.

The vast bulk of the online “teach yourself” material is at best misleading. The NEWS Editor recommends the following Blogs.

All the blogs recommended are free. Go online and subscribe.

The three blogs recommended are starting points on the blogs journey. Each blog will lead to other blogs.

Paul Sellers Blog

The Paul Sellers’ blog is worth reading. For comments on “plane experts” go to Paul’s May and June blogs.

The presenter of the TTTG “Real Skills” workshops has similar opinions!

Refreshing to see Paul is also annoyed by the spectators who turn his planes on their side while he is demonstrating!

Paul also shares the NEWS editor’s opinion that real skills can be learned in a reasonable time span and practice is the real key to skill acquisition.

https://paulsellers.com/woodworking-blog/paul-sellers-blog/

Popular Woodworking

This magazine has been promoting traditional woodworking skills for decades. Back issues are available. Regular online feature articles.

popularwoodworking@popularwoodworking.com

Mortise & Tenon Magazine

"Setting Up Shop" series

This series examines the basic joinery tools traditionally used and how the tools were sharpened and set up.
There are no metal planes and expensive “instant skills” tools

info@mortiseandtenonmag.com via gmail.mcsv.net

TTTG promotes and teaches traditional skills

TTTG “Real Skills” workshops are successful

TTTG holds the largest annual tool sale in Australia

BUT

TTTG has no sponsorship and is ignored by Australian magazines

TTTG Replacement Spokeshave Blades

The TTTG Committee is investigating producing replacement blades for "veteran" metal spokeshaves.

The proposed range is;

Stanley Spokeshaves

51, 51R, 53, 54, 63, 64, 65,151, 151M, 151R,

Record Spokeshaves

A51, A51R, A65, 051, 051R, A64, A63, A151, A151R, 0151, 0151R,

Preston Spokeshaves

1390, 1391, 3174P

Specifications

The spokeshave blades will be made from Ground Flat Stock, Hardened and tempered to 62 Rockwell C. Size "as original blades".

This project has been put on hold due to the Covid Lock Down.

When the "Real Skills" Workshops resume.

**** Make a spokeshave or scraper***

TTTG supplies a spokeshave blade *or* a scraper blade
TTTG supplies the wood (American Beech)
Or "bring your own blade and wood"

The scraper will be a "Chairmakers' Devil"

TTTG Merchandise

When the Meetings, Classes and Tool Sales resume

Plane handles and knobs $10 each

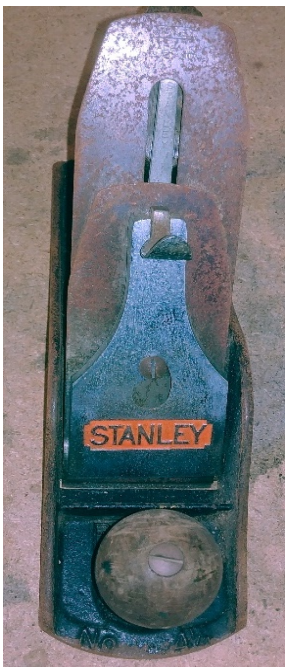
Citric Acid $5 a jar **Sharp Oil $6 a bottle**
Scraper Burnisher $20

The stock of old tools is getting bigger!

There will be many bargains post COVID

Including this Stanley 4 1/2 Plane

Virtually new and only $25!



New products being developed

Spokeshave blades

Cutting Gauge

E.A. Berg Chisel Handles

John Deeble

The following images taken from the 1965 Bahco Tools Catalogue provide full size images of the wooden handles fitted to a range of socket and tang style bevel edged chisels. These highly sought-after chisels are often found with damaged handles due to striking with a hammer. For those with a woodturning lathe it is a relatively simple process to turn a replacement handle. While the original handles were made from curly-grained birch, available timbers such as American beech is a suitable substitute. Ferrules for tang type chisels are easily made from suitable brass tube.

Older garden sprays are a suitable source of brass tubing for the bottom ferrules. The top ferrules were steel.

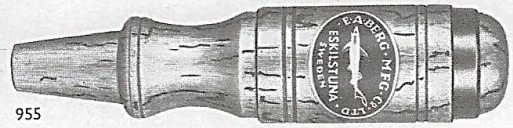
Wash the brass! The old insecticides are residual and near lethal!

BAHCO

CURLY-GRAINED BIRCHWOOD HANDLES

951, 955

951



955

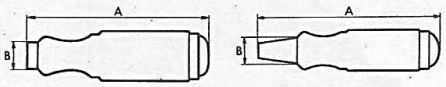
Curly-grained birch — an exceptionally strong and handsome wood — is first seasoned for two years before handles are turned from it. Correctly-shaped handles, finished in clear cellulose lacquer, are of generous size to give a comfortable grip.

951

Intended for tang chisels. Made in seven sizes. Fitted with a metal band at each end to provide additional strength and resistance to hammer blows.

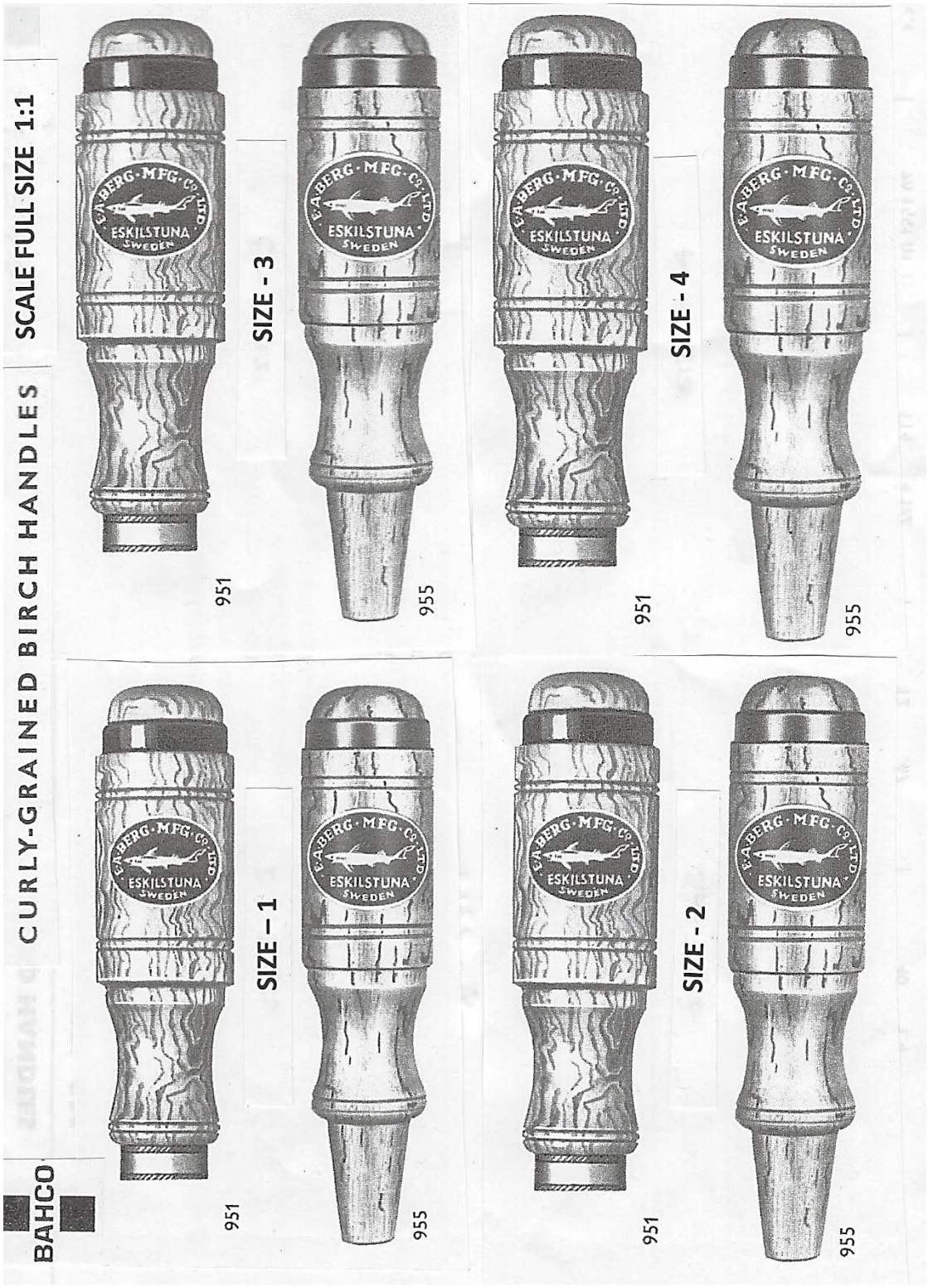
955 Export model

Intended for socket chisels. Made in four sizes. Tapered socket insert. Fitted with a metal band at head for extra strength.



CURLY-GRAINED BIRCH HANDLES

Type	Cat. No.	TECHNICAL DATA A mm	A in.	B mm	B in.	Weight grms	Weight ozs.
951-1	70 1551 01	114	4 1/2	12	.47	40	1.4
-2	70 1551 02	118	4 3/8	15	.59	50	1.8
-3	70 1551 03	120	4 3/4	17	.67	60	2.1
-4	70 1551 04	120	4 3/4	19	.75	70	2.5
-5	70 1551 05	126	5	22	.87	80	2.8
-6	70 1551 06	130	5 1/8	24	.94	100	3.5
-7	70 1551 07	139	5 1/2	28	1.10	120	4.2
955-1	70 1555 01	120	4 3/4	14	.55	40	1.4
-2	70 1555 02	125	4 7/8	16	.63	45	1.6
-3	70 1555 03	130	5 1/8	18	.71	60	2.1
-4	70 1555 04	135	5 1/4	20	.79	65	2.3



Note: This copy from the original catalogue has not been scaled to 1:1

If you want exact copies of the original Berg handles the best approach is to find old Berg handles and use them as patterns.

Berg chisels can be fitted with “user preference handles”.

Replacing Berg “red plastic” Chisel Handles

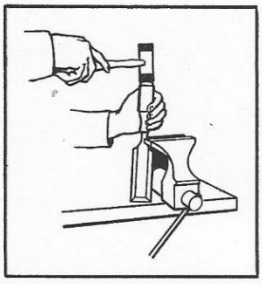
John Deeble

The following extract from the 1965 Bahco Tools Catalogue details how to remove and replace the red Cellulose Acetate Butyrate handles introduced around 1950.

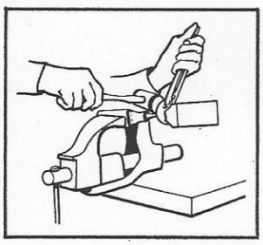
Unfortunately, replacements would today need to come from another chisel or from an old stock purchase

The alternative is to turn and fit “Berg Pattern” wooden handles.

Fitting — heat the plastic handle in hot water up to 70°C for about 10—15 minutes. Then knock it onto the chisel tang like an ordinary wooden handle.

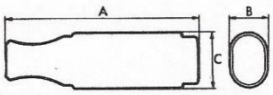


Removing — heat the handle in hot water up to 70°C for 10—15 minutes. Clamp the chisel blade in a vice and knock the handle off with a flat drift.



Bahco plastic handles are made of CAB (cellulose acetate butyrate), a resilient and impact-resistant substance which retains its excellent properties even at low temperatures. Handles are correctly proportioned and of oval configuration to ensure a comfortable grip and also prevent the chisel from rolling. Smart red finish stands out well, making chisels easier to find among wood shavings, sawdust, etc. on the workbench. Handles are available in four sizes having holes of different diameter for the chisel tang.

Handles are also supplied in cartons (9120) of 12 useful sizes: three No. 11, four No. 12, three No. 21 and two No. 22.



PLASTIC HANDLES

Type	Cat. No.	TECHNICAL DATA							
		A		B		C		Weight	
		mm	in.	mm	in.	mm	in.	grms	ozs.
956-11	70 1656 11	105	4 1/8	23	.90	29	1.15	50	1.8
-12	70 1656 12	105	4 1/8	23	.90	29	1.15	50	1.8
-21	70 1656 21	110	4 3/8	27	1.06	31	1.22	70	2.5
-22	70 1656 22	110	4 3/8	27	1.06	31	1.22	70	2.5
-31	70 1656 31	115	4 1/2	28	1.10	37	1.46	90	3.2
-32	70 1656 32	115	4 1/2	28	1.10	37	1.46	90	3.2
-41	70 1656 41	120	4 3/4	32	1.26	41	1.61	120	4.2

The tools Grand Dad could buy

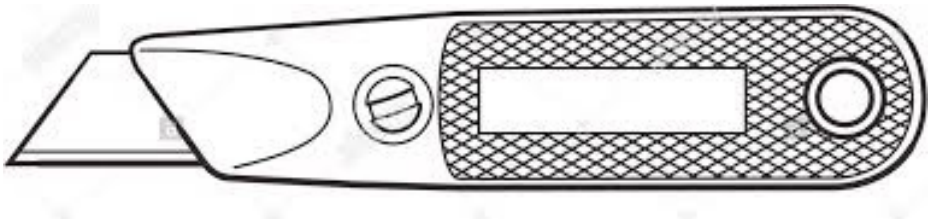
Eclipse manufactured a wide range of quality hand tools from the 1930's.

The 1920's advert left by James Neil & Co, the manufacturers of Eclipse Tools, indicates the company was into making products from "razor blades to hand tools". After World War 2 Eclipse developed a range of "modern design tools" using the best steel combined with modern materials.

Some of these tools are now classic tools, still copied and in production.

These tools include Eclipse 35 Honing Jig and Eclipse Hacksaw Frames.

Some of the post war Eclipse tools are no longer in production, for example the Eclipse Striking Knife.



When he was a boy the Stanley Knife was worth buying.
When he was a young man Retractable Stanley Knife was essential.

At these prices

Grand Dad would buy these

TTTG Citric Acid $5 a jar

TTTG Sharp Oil $6 a bottle

Stanley Type Plane Handles

#2-7 Stanley/Record type $10 ea

Scraper Burnishers $20 ea
Dovetail Templates $2 ea.

In development:

- Traditional Cutting Gauge
- Spokeshave Blades

Surplus Old Tools from 50 cents to $5

At all TTTG Meetings and Events

Using Sparks to Identify Metal

John Bates

There are seven tests commonly used to identify metals.
Those tests are as follows:

- surface appearance
- spark test
- chip test
- magnet test
- torch test
- chemical test
- hardness test

The identification tests which are probably the most affordable and readily available to our readers are the spark test, the chip test, and the magnet test. These three relatively simple tests are described and illustrated below.

At the end of this article a reproduction of the US metal identification colour codes for rod and bar stock is included. If you happen have a few painted 'rod ends' this may be a convenient means of identifying your bit of metal.

The spark test for ferrous metals

In 1909, Max Bermann, an engineer in Budapest, was the first to discover that sparks can be used to identify ferrous materials. He originally claimed to be able to distinguish different types of ferrous materials based on percent carbon and principal alloying elements. Moreover, he claimed to achieve an accuracy of 0.01% carbon content.

I think you can judge these claims for yourself.

Those who wish to do some further reading could refer to Gerhardt Tschorn who produced an exhaustive treatment of spark testing (see TSCHORN, Gerhart (1963) *Spark Atlas of Steels: Cast-Iron, Pig-Iron, Ferro-Alloys and Metals*, MacMillan, New York).

His book, along with *Spark Testing* by Gladwin probably represent the two most comprehensive texts on this subject (see GLADWIN, W.M. *Spark Testing*, United Steel Company, Sheffield).

The industrial use of spark testing has not been as common as it used to be.

Nevertheless, the metal spark test is useful for identifying the type of metal and in the case of steel, determining its relative carbon content.

The test is simple and can be conducted in any workshop with a grinder.

What Is the Spark Test?

The spark test simply uses the sparks given off when holding metal sample against a grinding wheel as a way of classifying iron and steel. By visually inspecting the spark colour, shape and length, a metalworker can with some accuracy identify the type of ferrous metal in the sample.

While the test is fast and extremely convenient, it cannot replace chemical metal analysis. It is a quick method for sorting metals where the spark characteristics are known such as when sorting mixed steels.

When metal is held lightly against a grinding wheel, the different kinds of steel and iron produce sparks that vary in colour, shape, and length.

The Technique

A bench grinder is typically used to create the sparks, but sometimes this is not convenient, so a portable grinder may be used. In either case, the grinding wheel must have adequate surface velocity. This should not be less than 25 m/sec (5,000 surface feet per minute) to get a good spark stream and preferably between 35 and 60 m/sec (6,900–11,800 surface feet per minute).

The wheel should be coarse and hard to very hard, therefore aluminium oxide or carborundum are often employed. Use a grinding wheel that has sufficient hardness to last for some time but is soft enough to maintain a free cutting edge. Keep the wheel clean to produce a true spark rather than a coarse spark.

How to Conduct a Spark Test

The test area should be in an area where there is no bright light shining directly into the observer's eyes. Moreover, the grinding wheel and surrounding area should be dark so that the sparks can be observed clearly.

Conducting spark tests in little light to make it easier to see the spark colour. It is recommended that you use standard metal samples when comparing sparks with test patterns.

Touch the test sample lightly to the grinding wheel to produce the sparks.

The important spark characteristics are colour, volume, nature of the spark, and length.

Also, when holding the metal piece, position it so that the stream of sparks moves across your line of vision. Hold the metal part still with enough pressure to create a spark stream that is horizontal. The spark stream should be at a right angle to your line of vision.

Note that the length is dependent on the amount of pressure applied to the grinding wheel, so this can be a poor comparison tool if the pressure is not the same for all the samples. Also, the grinding wheel must be dressed frequently to remove metallic build-up. Be careful not to have too much wheel pressure pressing against the metal since increased pressure raises the spark stream temperature. Increased pressure also makes it appear as if the metal has a higher percentage of carbon content.

All aspects of the spark stream (near the wheel, mid-stream, incandescent particles at the end of the stream, are noted as part of the identification process. It is something of a trial-and-error process.

With practice you will develop a feel for the amount of pressure to apply to get an accurate spark stream without changing the grinder wheel speed.

Studying The Spark

The spark resulting from the test should be directed downward and studied. Spark length, colour, activity, and shape relate to characteristics of the material being tested.

The spark stream has specific items which can be identified. When looking at the spark stream, observe 1/3 of the way from the tail end. Watch how the sparks cross your line of vision. Attempt to form an image of an individual spark. Once your do this, then look at the entire spark stream.

Carrier lines are straight lines of sparks that shoot off the abrasive wheel. They are usually continuous and sold. They may divide into three short forks or lines at the end of the carrier line. When examining a “carrier line” look at the spark length, stream, and colour.

Excessive pressure increases the temperature of the spark stream. This, in turn, increases the temperature of the burst and gives the appearance of a carbon content higher than it is.

The sparks given off, or the lack of sparks, aid in the identification of the metal. The length of the spark stream, the colour, and the form of the sparks are features you should look for.

Diagrams 1, 2 and 3 illustrate some of the terms used in referring to various basic spark forms produced in spark testing.

Be aware that steels having the same carbon content but differing alloying elements are difficult to identify because the alloying elements affect the carrier lines, the bursts, or the forms of characteristic bursts in the spark picture.

The effect of the alloying element may slow or accelerate the carbon spark or make the carrier line lighter or darker in colour. Molybdenum, for example, appears as a detached, orange-coloured spearhead on the end of the carrier line. Nickel appears to suppress the effect of the carbon burst; however, the nickel spark can be identified by tiny blocks of brilliant white light. Silicon suppresses the carbon burst even more than nickel. When silicon is present, the carrier line usually ends abruptly in a white flash of light.

Wrought iron sparks (Diagram 2 Figure A) flow out in straight lines. The tails of the sparks widen out near the end, like a leaf.

Mild steel sparks (Diagram 2 Figure B and Diagram 3 Figure A) are like wrought iron, except they will have tiny forks and their lengths will vary more. The sparks will be white in colour.

Medium-carbon steel (Diagram 2 Figure C) has more forking than mild steel and a wide variety of spark lengths, with more near the grinding wheel.

High-carbon steel (Diagram 1 Figure A, Diagram 2 Figure D and Diagram 3 Figure B) has a bushy spark pattern (much forking) that starts at the grinding wheel. The sparks are not as bright as the medium-carbon steel ones.

Manganese steel (Diagram 1 Figure B and Diagram 2 Figure F) has medium length sparks that fork twice before ending.

High-speed steel (Diagram 2 Figure E) has a faint red spark that sparks at the tip.

Stainless steel (Diagram 3 Figure E) shows sparks that vary across the series. For example, 300-series stainless steel has sparks which are not so dense as the carbon steel sparks, do not fork, and are orange to straw in colour. While 310-series stainless steel sparks are much shorter and thinner than the 300-series sparks. They are red to orange in colour and do not fork. Finally, 400-series stainless steel sparks are like 300-series stainless steel sparks, but slightly longer and have forks at the ends of the sparks.

Cast iron (Diagram 3 Figure C) has very short sparks that begin at the grinding wheel.

Nickel and cobalt high-temperature alloys have sparks are thin and very short, they are dark-red in colour, and do not fork.

Cemented carbide has sparks under 75mm, which are dark-red in colour and do not fork. Titanium is a non-ferrous metal, but it gives off a great deal of sparks. These sparks are easily distinguishable from ferrous metals, as they are a very brilliant, blinding, white colour.

The Types of Spark Streams

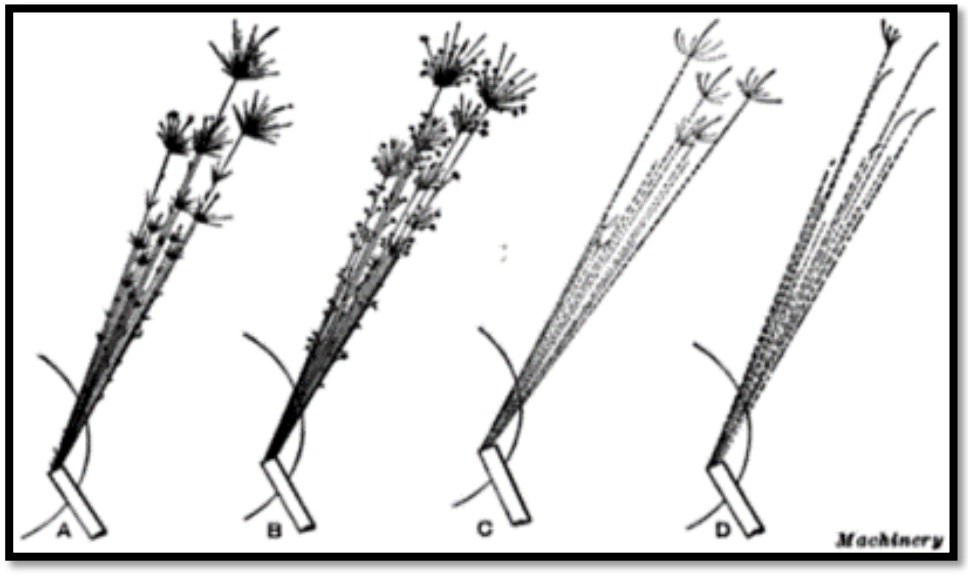
A sprig is a spark stream that divides into more lines at the end of the stream. They occur in different locations on the carrier line. These sprigs are called either fan bursts or stars. At times, a carrier line slightly enlarges for a short length, continues, and then enlarges for a short period.

When you see heavier portions at the end of the carrier line, they are called buds or spear points.

- If there is a presence of high sulphur levels, it results in thicker areas in the carrier lines. These thick areas are called spear points.
- Cast iron metal has very short streams.
- Most alloy steels and low-carbon steels have relatively long streams.
- Steels usually have white to yellow colour sparks.
- Cast irons are reddish to straw yellow.
- Sparks in long streaks that tend to burst into a sparkler effect are seen with 0.15% carbon steel.
- Carbon tool steel exhibits pronounced bursting.
- 1.00% carbon steel shows minute and brilliant sparklers or explosions because as the carbon content increases, the intensity of bursting increases.

Diagram 1

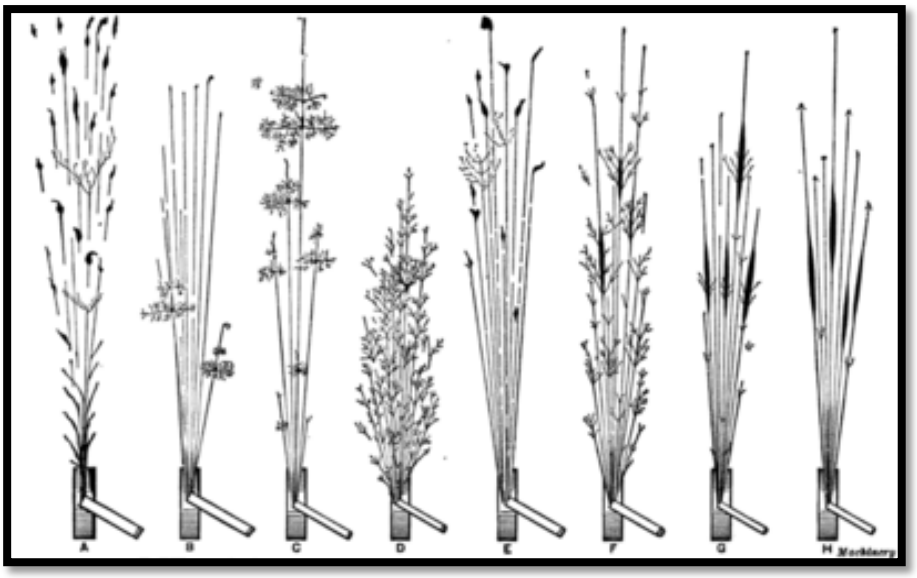
Figure:
(A) High-carbon Steel
(B) Manganese steel
(C) Tungsten steel
(D) Molybdenum steel



With practice identifying steel by observing the sparks becomes routine.
At first the process is confusing, but confidence comes with practice.
Having a piece of "known" steel to practice with helps to build confidence.

Diagram 2

Figure:
(A) Wrought iron
(B) Mild steel
(C) Steel with 0.5-0.85% carbon
(D) High-carbon tool steel
(E) High-speed steel
(F) Manganese steel
(G) Mushet steel
(H) Special magnet steel



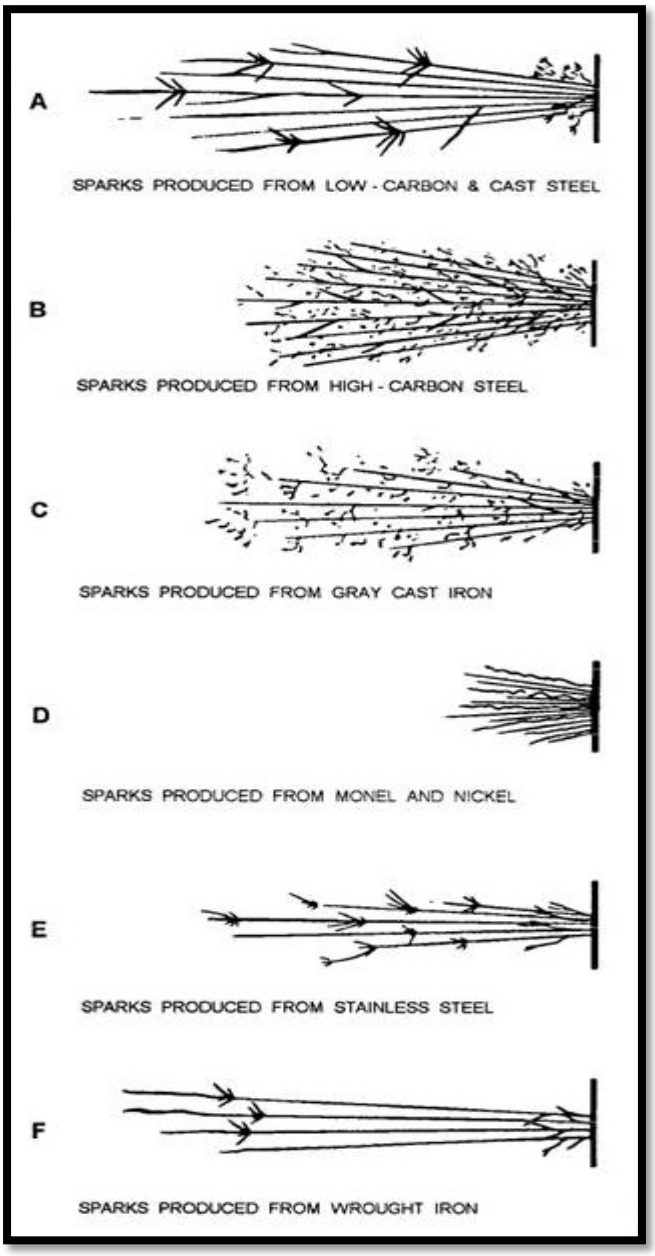


Diagram 3

Figure:
(A) Low Carbon and Cast Steel
(B) High Carbon steel
(C) Gray Cast Iron
(D) Monel and Nickel
(E) Stainless steel
(F) Wrought Iron

Diagram 3 at left shows more spark patterns formed by some common metals. Notice that in low carbon steel (Figure A), the spark stream is about 1.75 metres (70 inches) long and the volume is moderately large. In high-carbon steel (Figure B), the stream is shorter about 1.4 metres (55 inches) and the volume larger. The few sparklers that may occur at any place in low-carbon steel are forked, and in high-carbon steel, they are small and repeating. Both metals produce a spark stream white in colour.

Gray cast iron (Figure C) produces a stream of sparks

about 635mm (25 inches) in length. The sparklers are small and repeating, and their volume is rather small. Part of the stream near the wheel is red, and the outer portion is straw-coloured.

Monel and nickel (Figure D) form almost identical spark streams. The sparks are small in volume and orange in colour. The sparks form wavy streaks with no sparklers. Because of the similarity of the spark picture, Monel and nickel must be distinguished from each other by some other method.

Stainless steel (Figure E) produces a spark stream about 1.3 metres (50 inches) in length, moderate volume, and with few sparklers. The sparklers are forked. The stream next to the wheel is straw-coloured, and at the end, it is white.

The wrought-iron spark test (Figure F) produces a spark stream about 1.6 metres (65 inches) in length. The stream has a large volume with few sparklers. The sparks appear near the end of the stream and are forked. The stream next to the wheel is straw-coloured, and the outer end of the stream is a brighter red.

Some Advantages and Limitations of The Spark Test

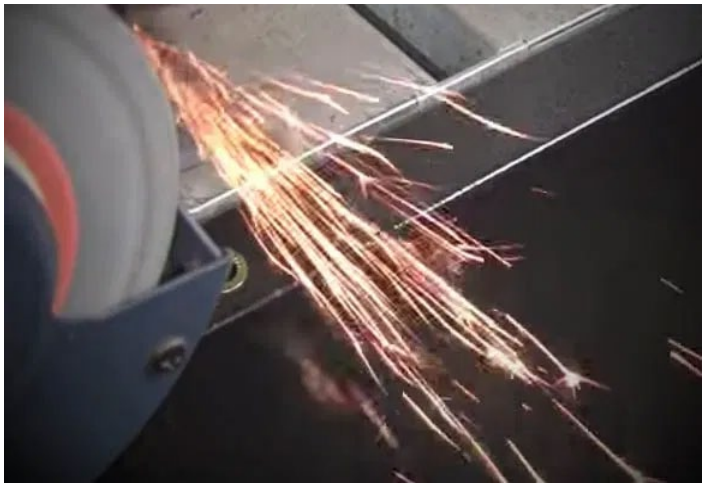
One major advantage of the spark test is that it can be used with all types and stages of metals, including finished parts, machined forgings, and bar stock in racks.

When using the spark test on steel, some steels have the same carbon content but differing alloying elements, such as the difference between unalloyed and low alloyed steel. Steel has different types of alloys that can affect the characteristics of the bursts in the spark picture, the bursts themselves and the carrier lines. Alloys can accelerate or slow the carbon spark or make carrier lines darker or lighter.

For example, the metal Molybdenum looks like an orange-coloured, detached spearhead at the end of the carrier line. When working with nickel, it can suppress the carbon burst effect. That said, the nickel spark can be identified by brilliant white light in tiny blocks. The carbon burst is contained by silicon even more than the nickel. Silicon causes the carrier line to end in a white flash of light abruptly.

Conducting a spark test is not helpful for identifying nonferrous metals such as nickel-base alloys, aluminium, and copper. These metals do not show significant spark stream. That said, the spark test method can be used to differentiate between nonferrous and ferrous metals.

Becoming Proficient in Spark Testing Ferrous Metals



One way to become proficient in spark testing ferrous metals is to gather an assortment of samples of known metals and test them. Make all the samples about the same size and shape so their identities are not revealed simply by the size or shape. Number each sample and prepare a list of names and corresponding numbers. Then, without looking at the number of the sample, spark test one sample at a time, calling out its name to someone assigned to check it against the names and numbers on the list. Repeating this process gives you some of the experience you need to become proficient in identifying individual samples.

The Chip Test

Another simple test used to identify an unknown piece of metal is the chip test. The chip test is made by removing a small amount of material from the test piece with a sharp, cold chisel. The material removed varies from small, broken fragments to a continuous strip.

The chip may have smooth, sharp edges; it maybe coarse grained or fine-grained; or it may have saw tooth like edges. The size of the chip is important in identifying the metal. The ease with which the chipping can be accomplished should also be considered.

The information given in Table 1 below can help you identify various metals using the chip test.

The Magnet Test

The use of a magnet is another method used to aid in the general identification of metals.

Remember that ferrous metals, being iron-based alloys, normally are magnetic, and nonferrous metals are nonmagnetic. This test is not 100% accurate because some stainless steels are nonmagnetic. In this instance, there is no substitute for experience.

Table 1: Metal Identification by Chip Test

METAL TESTED	CHIP TEST CHARACTERISTICS
WHITE CAST IRON	Chips are small, brittle fragments. Chipped surfaces not smooth.
GRAY CAST IRON	Chips are about 1/8 inch in length. Metal not easily chipped; therefore, chips break off and prevent smooth cut.
MALLEABLE IRON	Chips vary from 1/4 to 3/8 inch in length (larger than chips from cast iron). Metal is tough and hard to chip.
WROUGHT IRON	Chips have smooth edges. Metal is easily cut or chipped, and a chip can be made as a continuous strip.
LOW-CARBON AND CAST STEEL	Chips have smooth edges. Metal is easily cut or chipped, and a chip can be taken off as a continuous strip.
HIGH-CARBON STEEL	Chips show a fine-grain structure. Edges of chips are lighter in colour than chips of low-carbon steel. Metal is hard. but can be chipped in a continuous strip.
COPPER	Chips are smooth, with sawtooth edges where cut. Metal is easily cut as a continuous strip.
BRASS AND BRONZE	Chips are smooth, with saw tooth edges. These metals are easily cut, but chips are more brittle than chips of copper. Continuous strip is not easily cut.
ALUMINUM AND ALUMINUM ALLOYS	Chips are smooth, with saw tooth edges. A chip can be cut as continuous strip.
MONEL	Chips have smooth edges. Continuous strip can be cut Metal chips easily.
NICKEL	Chips have smooth edges. Continuous strip can be cut. Metal chips easily.
LEAD	Chips of any shape may be obtained because the metal is so soft that it can be cut with a knife.

Metal rod and bar colour coding

A colour code established by the Bureau of Standards of the United States Department of Commerce for making steel bars. Markings are applied by painting the ends of metal rods and bars.

- Solid colours: usually mean carbon steel
- Twin colours: designate alloy and free-cutting

Diagram 4 shows the US metal identification colour codes. Be aware that these colour codes may differ from those used in other countries including Australia.

Diagram 4 - US Metal identification colour codes

Aluminum

- 1100 (white)
- 2011 (brown)
- 2017 (yellow/green)
- 2024 (red)
- 3003 (green)
- 3105 (pink)
- 5005 (yellow/red)
- 5052 (purple)
- 5086 (red/orange)
- 6061 (blue)
- 6063 (yellow)
- 6101 Bus Bar (pink)
- 6262 (orange)
- 7075 (black)

Stainless

- 201L (pink)
- 303 (black)
- 304 (green)
- 304L (gold)
- 309 (brown)
- 310 (red)
- 316 (purple)
- 316L (purple/white)
- 409 (brown/blue)
- 410 (orange)
- 416 (blue)
- 17-4 (black/silver)
- 17-4 H 1150 (silver)
- 430 (white)
- Aquamet* 19 (green/white)
- Aquamet* 22 (blue/white)
- Aquamet* 17 (red/white)
- Alloy 20 (yellow/green)

Carbon Steel Bars

- A36 (brown)
- 1018 CD (green)
- 1018 HR (green)
- 1018 TP (red)
- 1018/20 (green/red)
- 1020 SBQ (green/brown)
- 1035 (blue)
- 1042/45 (yellow)
- 1042/1045 HR (yellow)
- 1045 TGP/DGP (yellow/red)
- 1050 (yellow/pink)
- 1137/1141 (brown/white)
- 1141 TGP/DGP (brown/red)
- 1144 CF (brown/black)
- 1144 HR (brown/black)
- 1117 (gold)
- 11L17 (gold/purple)
- 1215 Accuracy (red/white)
- 12L14 (purple)
- 1215 (orange)
- Fatigue-proof* (silver)
- M1044 (white)
- Stressproof* (pink)
- Stressproof* GP (blue/red)

Alloy Steel Bars

- ETD-150 (black/gold)
- ETD-150 CD (black/gold)
- ETD-150 G&P (black/gold)
- 4130 Norm Q&T (blue/black)
- 4140/4142 Q&T (black)
- 4140 annealed (black/yellow)
- 4150 RS, Q&T (purple/black)
- 4340 annealed (white/yellow)
- 4340 Q&T (white/orange)
- 8620 (orange/green)
- 86L20 (purple/green)
- E4340 HT (white/blue)

Carbon Tubing

- CD Buttweld ASTM A512 (pink)
- CD Buttweld (green)
- D.O.M. (gold)

Carbon & Alloy Plate

- A-36 (brown)
- A-514 AR plate (orange/black)
- A-514 Str.-quality (blue)
- A-514 Gr. B 321 (orange/white)
- A-514 Gr. B 340 (orange/blue)
- A-514 Gr. B 360 (orange/green)
- 1030 (purple)
- 1045 Carbon (yellow)
- Abrasion Resisting (pink)
- ASTM A516 (70) Norm PVQ (blue/red)
- ASTM A516 (70) PVQ (blue/pink)
- ASTM A572 (50) (white/green)
- A387 Grade 11 (black/green)
- A387 Grade 22 (black/silver)
- AR 400 (black/gold)
- AR 400F (orange)
- AR 225 (green)
- T-1 (green/yellow)
- T-1 Type A (ASTM A514 Gr. B) (green/pink)
- T-1 Type B (ASTM A514 Gr. F) (green/blue)

Brass & Copper

- Naval Brass Alloy 464 (green)
- Naval Brass Alloy 485 (orange)
- Phosphor Bronze Alloy 544 (blue)
- FC Brass Alloy 360 (red)

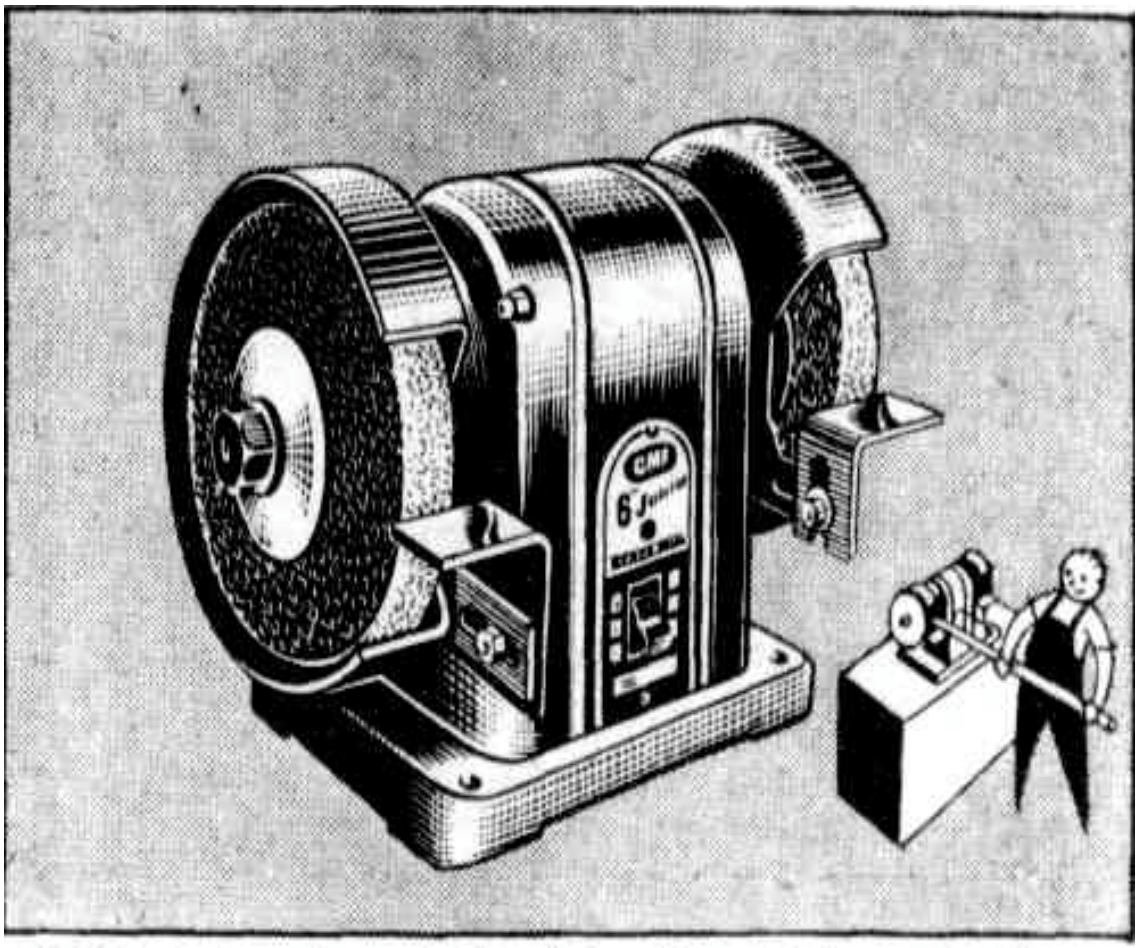
GMF Grinders

GMF produced high speed grinders from the 1940s until late last century.

These were quality machines and there are “lots of them out there”.

GMF 200mm Grinders are straight forward to recondition.

The electrics can be brought back to life by a competent electrician.



TTTG has a “surplus to requirements” 1970 vintage GMF 200mm Grinder.

This machine is in excellent condition with new wheel. ***Possibly for sale.***

JD's John Daniel

Wood Borers Ate Herman's Morse Key

Seems of late, there is never an idle moment up in the shed, for instance, a week or so back, Herman Willemsen, a Morse Telegraph key collector, appeared at the shed door with a bit of a relic in his hand, better described as a bit of a challenge, so here's a tale of one of those, not 'idle moments'.

Herman Willemsen is a retired Radio Officer on Dutch Merchant ships and retired OTC (now Telstra) Coast Radio Manager, and since retirement, has become a serious collector and researcher of Morse Telegraph keys.

Herman, now fully retired, writes articles for Australian Electronic magazines such as the OTN(Amateur radio magazine) and felt that this, now resurrected Morse key, was worthy of an article for the above magazines, the end result was a well-researched read that no doubt, would have been of interest to many communication enthusiastic historians and collectors out there… as a moment in my shed played a small part in bringing this rare PMG to light, I thought an abridged version of Herman Willemsen's article appropriate for the TTTG's NEWS.

Wood Borers ate My Morse Key

Herman Willemsen

At first glance

At first glance I steered well clear of this dilapidated Morse key. The top of the backstop contact adjustment screw was sliced off and a more than large bit of its wooden base was missing. However, when I turned the key upside down, I noticed the impressions **S123 6 C2044-40** stamped into the undamaged bottom part of the wooden base. Those characters indicated that this was a PMG-made brass/wooden key. I therefore decided to buy this wreck and try to have it restored to its former glory.

A bit of a challenge

From the sparse amount of data I received, I deduced that all hardware and spare parts used by the PMG were catalogued. It became clear that the characters S123 were a Stock number and in this case the warehouse ID number for a particular model of PMG-owned Morse code key or Sounder.

PMG stock numbers on bugs

It is also known that PMG operators with a medical certificate for Repetitive Strain Injury (RSI) were issued with bugs. I have owned a PMG-owned Vibroplex Lightning bug with the markings of P.M.G. 2639 and seen a Pendograph marked with a P.M.G. stock number. PMG also used Eddystone bugs. Those bugs were used by the PMG well before they adopted the Simplex Auto bug in 1923 as a standard sending aid for the Commonwealth of Australia.

John Daniel takes the challenge

When my friend John, a local craftsman, saw the key, his immediate impression was that the wood had been attacked by borers. He pointed out the borers' exit.

I am not certain about the number 6, but the C2044-40 characters were the maker's contract number, followed by the year of make: 1940.

There were wood borer holes in the sides of the wooden base and a large part of the wood was weak, tunnelled and brittle. Who had used this Morse key and why was it stored or left abandoned in a place where hungry wood borers had access?

To repair this severely damaged Morse key, John had to pull out all stops. His first task was to find a matching piece of wood to shape and replace the flaky, honeycombed part of the wooden base. John used Tasmanian Blackwood with matching grain and texture. The restoration was a time consuming, delicate job with much fitting, gluing, filling in holes and polishing. Compared to that onerous task, making a new brass backstop contact adjustment screw must have been for him, 'a walk in the park', but definitely not for me.

The Morse key came up very well and I can now add another rare brass/wooden PMG key to my small collection of Australian-made keys.

Some background information

1) Upon Federation in 1901, the PMG (the Postmaster General's Department) was created to run Australia's Post and Telecommunications Services. In 1975 the PMG was restructured as 2 individual identities, namely Australia Post and Telecom Australia. In 1995 Telecom Australia was renamed Telstra.
2) Ron McMullen's collection of keys, sounders and various other telegraph equipment can be seen on The Australian Telegraph Office website: The Australian Telegraph Office (wordpress.com). Ron is no doubt Australia's most prolific collector of Australian and overseas telegraph instruments.
3) See my story in OTN53 p59 "Restoration and preservation of 2 bug keys". The RSI, "Glass Arm" or Carpal Tunnel disease, is caused by compression of the median nerve when it passes through the wrist.

Assistance acknowledged

John Daniel, member of The Traditional Tools Group (Inc.) and the Kiama Woodcraft Group (Inc.); David Burger VK2CZ; Kees van der Spek VK1KVS; Lloyd Butler VK5BR; John Elliott VK5EMI and other members of the Adelaide Hills Amateur Radio Society (AHARS).

The Morse Key Challenge

John Daniel

The pictures tell most of the story, however, as with all restorations, much thought must be given to the history of the object and the integrity of the end result; in other words, preserve as much as one can, especially in the case of this project with its serial number still intact.

As can be seen, the wood borer damage was extreme however enough solid wood on the surfaces of one side of the base although the borers had had a good feed internally.

Where to start?

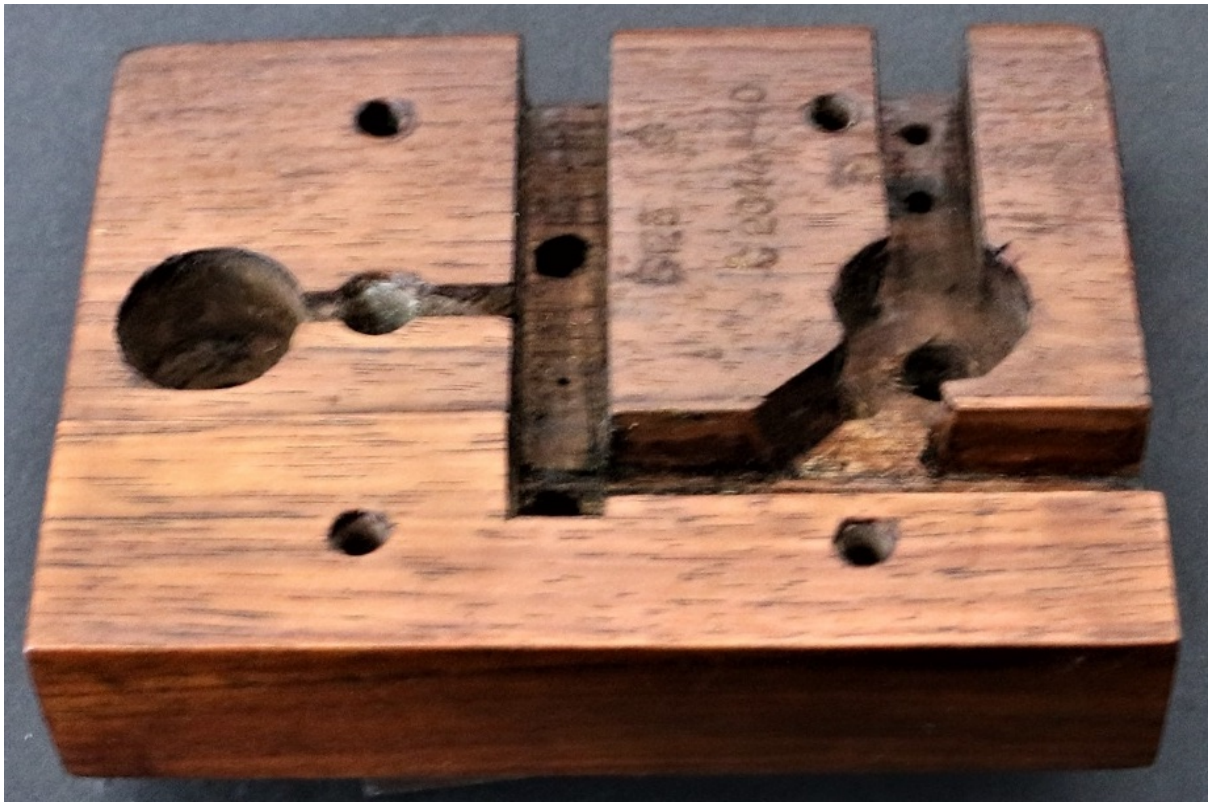
The top surface

Well, firstly the loose piece of numbered wood was removed and safely put to one side before removing the irreparable side which needed replacing; this allowed access to the borer damage which then had to be 'cleaned-out' with a narrow chisel and a bit of luck as the damage was very close to the top surface and the wood very brittle.

The cavity now needed to be filled with small layers of wood, not just to increase the gluing surface for the replacement side, but also to support the piece that completed the serial numbers on the bottom side of the base. Enough said, the tension now behind me, it was just a matter of adding a bit of detail to the underside of the replacement side before gluing in place.

Underside as found

Underside repaired



The replacement piece was then trimmed flush with the mating piece before a final sand, a touch up of stain here and there, surface borer holes stopped up and finally a couple of coats of shellac which was then waxed.

BELOW: Replacing internal wood

BELOW: Ready for shellac

After delivery, Herman sent a few photos of the now assembled and functioning PMG-made Morse code key No. S123 6 C2044-40.

Quite satisfying to have played a role in bringing back-to-life a PMG relic, that under different circumstances, would have been stripped down and used for spare parts; Herman's smile when he picked it up said it all.

All component parts back in place.

With serial number intact

Photos Herman Willemsen

Morse Key fully restored

VALE: ROLAND STEFEN

In August 2021 the TTTG Secretary received the sad news that Australian violin maker Roland Stefen had died. Many members will recall the detailed and fascinating presentation on violin making which Roland gave at the Old Eastwood Town Hall. His passion and love for his work was inspiring.

It was Roland's love of timber, combined with his ability to craft or build just about anything that led him to make his first instrument many years ago. He ultimately attained a broad knowledge in the making of violins and many other instruments.

The instruments which Roland made were of a high quality, hand-crafted, meticulously finished with oil varnish, and individually set-up. His violins were made in the Stradivarius or Guarneri style. Though his first love was violins, Roland also built some exceptional violas, cellos, and various other stringed instruments, researching all aspects of their construction and history.

His career started as a luthier making guitars but progressed to exclusively making bowed instruments. He made more than 125 bowed instruments which are played by professional musicians, music teachers and students. Clearly Roland’s legacy will endure.

Our deepest sympathy goes to his family and friends.

Two Stanley Block Planes

My favourite "to use" block plane is a Stanley #17.

Recently I have been giving a Stanley #18 block plane a "trial run" until I got around to fettling a Stanley #17 block plane.

A year or so back I dropped my #17 and one side cracked!

This casting is now in the TTTG Tool Collection. Luck was with me and I found a "rusty" replacement #17 with an original lever cap. The original lever cap is now on the plane in the TTTG Tool Collection. My replacement #17 has the later knuckle joint lever cap from a #18. It also has a HSS tipped blade marked "Stanley Made in England".

The #17 is one inch longer than the #18. One inch makes a big difference!

A year or so back I removed the rust from the #17 Block plane using Citric Acid and put the plane aside.

Having given the #18 a fair trial for over a year I got my act together and put the #17 back into active service.

My "fettled" #17 with "incorrect" Lever Cap and HSS tipped blade.

The wood was hard with interlocked grain. *Honed on a fine India Oilstone.*

Fettling my *"made up from parts"* #17 Block Plane

The sole was lightly pitted and not flat. A common problem with old planes.

Forty-five minutes work restored the #17 to working order.

A 14inch Bastard file is my preferred tool for flattening plane soles.

After the sole was filed flat the sole was lapped with Aluminium oxide cloth backed abrasive. The abrasive was glued to an offcut of 12mm CD Ply. This "emery stick" was lubricated with a mixture of White Spirit and Lamp Oil.

Once the "oxidised skin" is removed the filing becomes easy.
Cast Iron files rapidly unless there are "hard chill spots" in the casting.

Filing cast iron is dirty work!

The vice, the bench top and your hands are soon covered with black carbon. The black carbon gets up your nose. For a few days you smell and expel carbon from your nose. Cast iron has a distinctive acrid smell.

Keep it simple

Ideally, I would flatten an old plane sole on a Shaper, Surface Grinder or Universal Mill. But the time taken to "hand flatten" roughly equals what you would pay a machine shop to do the job.

You do not need large diamond plates or expensive equipment. Old large 14" Bastard Files are "for the asking". Old files sharpen "as new" in citric acid.

Buy a File Card and learn how to use files. Make some emery boards.

Sharpening the blade

I grind all my plane blades and chisels on a high-speed veteran Australian made GMF 200mm diameter grinder. The machine is fitted with 46 grit soft Aluminium Oxide Wheels. My current supplier is Timbecon (order online).

I dress the wheels with a Carborundum dressing stick. In my opinion better than expensive diamond dressing sticks or plates. Also, a lot cheaper!

My GMF grinder has the original Tool Rests. No expensive jigs.

Attend a TTTG "Real Skills" Sharpening class. After explaining the basic skills, I will introduce you to both high-speed and low-speed grinders.
You will get to try out the expensive jigs on the low-speed grinder.

I always let the "students" see me grinding with the high-speed grinder.
When the time is right, I ask "Anyone want to learn to grind freehand?"

Those who take up the challenge and practice never look back.
The next challenge is then to find a mid-twentieth century GMF grinder!

Honing on a Fine India Oilstone using Sharp Oil produces razor sharpness.

Stanley 18 block plane 1888 – 1950 6" long with a 1 5/8" cutter

Stanley 17 block plane 1888 – 1942 7" long with a 1 5/8" cutter

Heat Treatment of steel:

What is so special about Berg "shark or fish brand" E A Berg chisels?

John Deeble

Recently a member of the TTTG Committee asked why are older E A Berg chisels so superior, especially holding their cutting edge.

As one would expect many articles are available on E A Berg and other Swedish tool brands.

Galootopia - How Berg Chisels Were Made – galootopia contains a wealth of information on Berg and other tool brands especially Swedish tools.

Manufacture of the famous "Shark" or "Fish" brand chisels commenced in 1890 in Eskilstuna, Sweden. Chisels were described as being manufactured from the best Swedish steel. It is uncertain if this was a plain carbon steel (around 1.0% carbon) or contained specific alloying elements.

Experimentation with alloy steels had commenced in the 1880's with the first High Speed steel appearing in the 1890's. No doubt different alloy steels have been used over the years and from the mid 1950's steels for chisel production were provided by Sandvik.

Handle materials have varied over the years from Curly Grained Birch to clear Yellow Cellulose Acetate (Shark-O-Lite) and later dark red Cellulose Acetate Butyrate (CAB) introduced around 1950.

Berg chisels like other brands are formed to shape by the drop forging process. The forged blanks are then ground to final shape and dimensions.

Accurately ground chisels were then hardened and tempered. Hardening was undertaken by heating to the appropriate temperature (around 800 Degrees Celsius) and then quenching into an appropriately heated molten lead bath, soaking for a period of time followed by cooling to room temperature.

This quenching process is known to-day as Marquenching or Martempering. A further tempering stage required reheating to the correct temperature followed by quenching in a cold salt water bath. This process may explain the superior hardness, toughness, thin sectional shape and ease of sharpening of Berg chisels.

Hardening and tempering were only carried out to the lower two thirds of the blade. The differences in grain structure being clearly visible when older chisels are de-rusted in citric acid.

The various process, especially the tool steel selection and heat treatment, all combine to produce a superior tool with refined grain structure, hardness and toughness, that results in so many of these chisels still being highly sought after and used today.

Heat Treatment of steels

Heat treatment involves heating and cooling a metal or alloy in the solid state to produce a desired set of properties. The process is carried out to change the grain size, modify the structure of the material and to relive stresses introduced by previous processes.

Heat treatment of steel requires a specific carbon content or carbon equivalent for alloy steels. A carbon content of 0.35 to 1.86% is required to harden steel. This may be the carbon content of the full section of material or in specialised cases, a thin layer on the surface of the item (e.g., case hardening)

To harden steels, they must be heated into the Austenitic range, held for a period of time to homogenise the structure (thicker sections require longer soak times) then cooled at a rate to produce a martensitic structure. This is referred to as the critical cooling rate for a particular alloy. It should be noted that all transformations occur in the solid state.

Temperature ranges required can be seen by studying the Iron- Iron Carbide (Carbon) Phase Diagram (Figure 1). Figure 2 shows the temperature zones for specific steels with a carbon content up to 1.6% carbon as an overlay onto part of the Phase Diagram.

The martensitic structure formed by hardening is hard and brittle and unsuitable for most applications. A further heating and cooling process known as tempering is used modify the structure to remove brittleness and generally some hardness to produce steels suited to specific applications.

Time Temperature Transformation curves for 1050 High Carbon steel containing 0.5% Carbon is shown below. The fast-cooling rate illustrates cooling from 900 degrees Celsius (Austenitic phase) with transformation to a fully Martenistic structure. Slower cooling rates would show a cooling curve passing through the transformation curves to the right, resulting in different final structures, for example Ferrite and Pearlite or Bainite and would exhibit vastly different mechanical properties.

Heat treatment types

Heat treatment is generally divided into eight types as follows:

1. Annealing – used to soften steel, refine the grain size and remove internal stresses to obtain the desired ductility, malleability and toughness. The material is heated to its Critical Temperature range (Austenitic Phase), held for a defined time then slowly cooled, often inside a furnace.
2. Normalising – generally used to remove stresses after cold working. The material is heated to its Critical Temperature range, held for a short period and then cooled in air (air quenching).

3. Hardening – used to increase the hardness and toughness of the steel. The material is heated to its Critical Temperature range, held for a defined period and then cooled by quench in water, oil, brine or molten salts
4. Tempering – used to modify undesirable properties introduced by hardening. The process is undertaken within a range of temperatures (below 723 degrees Celsius) to produce the final desired properties. Results include reduced brittleness, improved ductility, strength and toughness, increased wear resistance and improved mechanical properties. The material is heated to a temperature below its Lower Critical Temperature, held for a defined time then cooled, often in air.
5. Nitriding – this is a process of case or surface hardening to increase resistance to wear and fatigue. Finished components made from medium carbon alloy steels (0.3 -0.45% carbon) are heated in a furnace in an airtight container. Nitrogen gas released from ammonia reacts with the surface of the steel to form iron nitrate. The depth of surface penetration depends on the length of time the component is held at the nitriding temperature.
6. Cyaniding – in this process steel is heated in the presence of sodium cyanide, depositing carbon and nitrogen atoms on the surface of the steel. This process is generally undertaken in a molten Cyanide bath held at 950 Degrees Celsius for around 20 minutes followed by quenching into water or oil. Hardite was one commercial product previously available for this process.
7. Carburising – involves heating steel in the presence of a carbon environment resulting in carbon atoms being deposited on the surface of the metal producing a hard outer layer.
8. Case Hardening - this process aims to retain a soft and tough metal core with a hard external surface. The finished components are heated in a carbon rich atmosphere (Charcoal or other carbon rich material) to carburise the surface of the steel. This results in a hard and wear resistant outer surface.

Martempering

Martempering or Marquenching is a specialised heat treatment process where the quenching process into a salt, oil or lead bath from the Austenitic phase is interrupted and held at a temperature just above the range at which Martensite begins to form (200 to 250 degrees Celsius) The steel is then held in the bath until the temperature is uniform throughout the cross section. It is then removed and cooled to room temperature. Tempering is carried out as a separate process. Because cooling is delayed until the temperature is uniform throughout the piece, the process prevents cracking and distortion. The process is suited to high alloy steels, those with complicated structures and items with varied thicknesses such as Berg chisels which are hardened after being ground to shape.

Effect of heat on steels

Metals are comprised of a symmetrical structure of atoms. Heating metal will displace atoms from their position and the displaced atoms form a new structure. These phase transformations alter the hardness, strength and ductility of the metal.

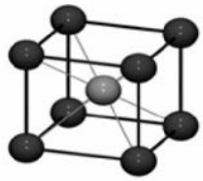


Figure 1 - Arrangement of atoms in a body-centered-cubic lattice

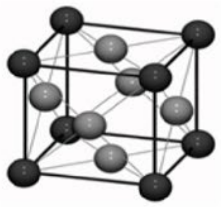


Figure 2 - Arrangement of atoms in a face-centered-cubic lattice

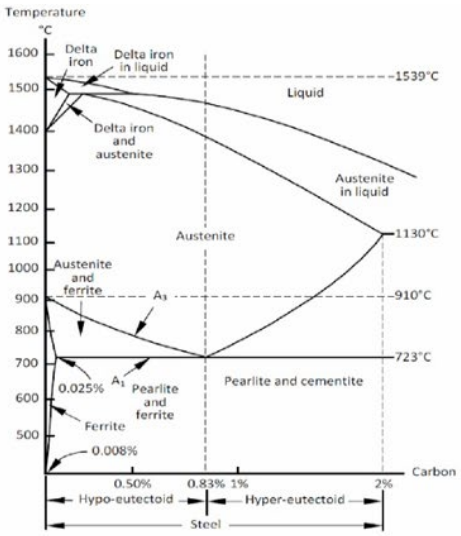


Figure 3 - Stable iron-carbon phase diagram for steel

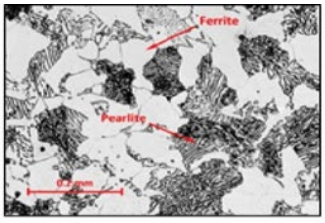


Figure 4 - Example of ferritic-pearlitic microstructure [1]

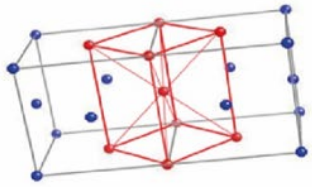
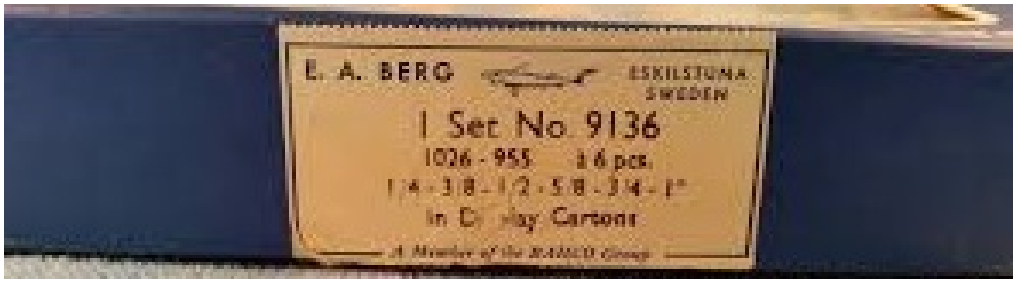


Figure 5 - Body-centered-tetragonal lattice (formation of martensite within the austenite structure)

In the body-centered cubic space lattice, a crystal that has an iron atom in each corner and one in the center of the cube – ferrite. This being the normal structure of annealed carbon steel at room temperature. A single cube contains 9 iron atoms. It is also magnetic in nature.

The second crystal structure is a face-centered cubic space lattice - austenitic iron. It is the normal structure above the "transformation temperature" or the A3 line (910 Degrees C). It is non-magnetic at this temperature and in this structure. A single cube contains 14 atoms. The non-magnetic property can be useful in knowing when you have heated the steel to a sufficient temperature. Very useful when using a blowtorch or similar heat source.

When the face-centered cubic, austenitic iron (heated above A3 line) is quenched the resulting martensitic structure is distorted into a body centred tetragonal lattice which is hard and brittle



Metallurgy of steels

For most steels, carbon is the most important alloy. Increasing carbon content increases hardness and strength and increases hardenability but carbon also increases brittleness and weldability due to its tendency to form Martensite. Steels can contain up to 2% carbon content but most steels contain less than 0.35% carbon. Steel containing between 0.35 to 1.86% carbon can be hardened using a heat-quench – temper process.

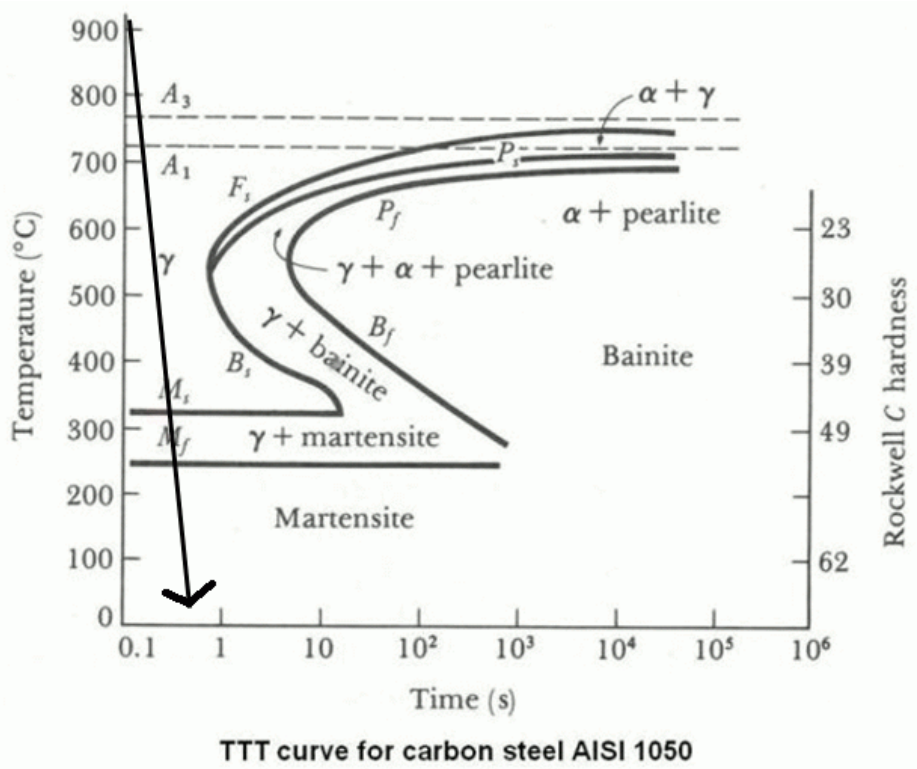
Plain Carbon Steels are generally iron with less than 1% carbon plus small amounts of manganese, phosphorus, sulphur and silicon. Plain carbon steels are generally divided into four groups:

1. Low – often called mild steels, containing less than 0.30% carbon. They are easily welded and generally more ductile than other steels
2. Medium – containing 0.30 to 0.45 % carbon. Increased carbon gives increased hardness and tensile strength but decreased ductility and machinability
3. High – containing 0.45 to 0.75 % carbon resulting in greatly decreased weldability and difficulty controlling mechanical properties, especially after welding.
4. Very High – containing up to 1.50% carbon and are used for hard steel products such as cutting tools following appropriate heat treatment.

Low Alloy Steels usually contain below 0.25% carbon but may be below 0.15% carbon. Typical alloys include nickel, chromium, molybdenum, manganese and silicon which add strength and impart specific properties to individual alloy combinations. Individual alloys exhibit increased corrosion resistance and suitability for specific heat treatment processes. Each alloying addition provides a specific carbon equivalent. (i.e., effectively increasing the carbon content)

High Alloy Steels generally refers to stainless steels which contain at least 12% chromium and high nickel content. Stainless steels are divided into 3 types:

1. Martensitic – these have the lowest amount of chromium but offer high hardenability making them suitable for cutlery.
2. Ferritic – containing between 12 to 27% chromium and are magnetic. They exhibit good ductility, resistance to corrosion and stress corrosion. Typical uses are exhaust systems and hot water tanks.
3. Austenitic – Austenitic stainless steels contain at least 10.5% chromium and 8 to 12 % nickel as well as nitrogen and carbon and exhibit corrosion resistance, formability and strength and are non-magnetic. While chromium provides corrosion resistance, nitrogen is a stiffening agent. Alloying elements allow Austenite to remain stable at room temperature.



TTT curve for carbon steel AISI 1050

Typical uses include domestic, industrial, marine, transport and architectural products. 316 (Marine Grade) and 304 (commonly available fasteners) are typical alloys of this type. Alloys of this type exhibit excellent weldability and do not harden in the heat affected zone. Austenitic alloys cannot be hardened by heat treatment.

Cast Irons another high carbon metal, formed when the carbon content is 2.1% or more (generally up to 3.7% carbon). There are four basic types of cast iron:

1) Grey Cast Iron – which is relatively soft, easily machined and welded. The presence of carbon as graphite flakes causes poor tensile strength. Typical uses include engine cylinder blocks and machine tool structures.
2) White Cast Iron which is hard and brittle and cannot be welded. It exhibits high compressive strength and when annealed it becomes malleable cast iron. It often forms on the outside surface of Grey Iron castings due to rapid cooling.
3) Malleable Cast Iron – which is annealed white iron. It has good strength, is ductile and can be welded and machined
4) Ductile Cast Iron – often called nodular or spheroidal cast iron as the carbon is in small spheres not flakes thus creating a ductile and malleable material which can be welded. Examples include pipe fittings and clamps.

References:

1. The Engineers Post blog https://www.theengineerspost.com
2. The Metallurgy's Blog for Beginners https://www.metallurgyfordummies.com/

Figure 1- Iron – Carbon Phase diagram for Steels (up to 2% Carbon) and Cast Irons (2.1 to 3.7% Carbon)

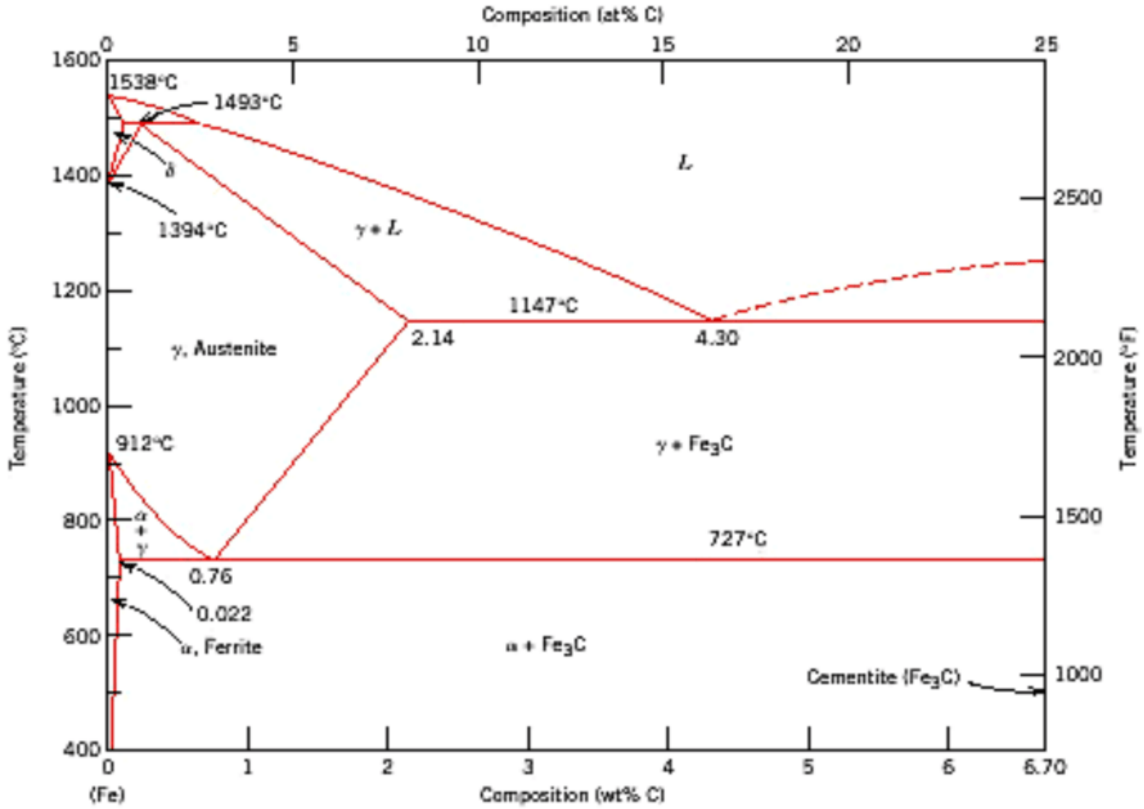
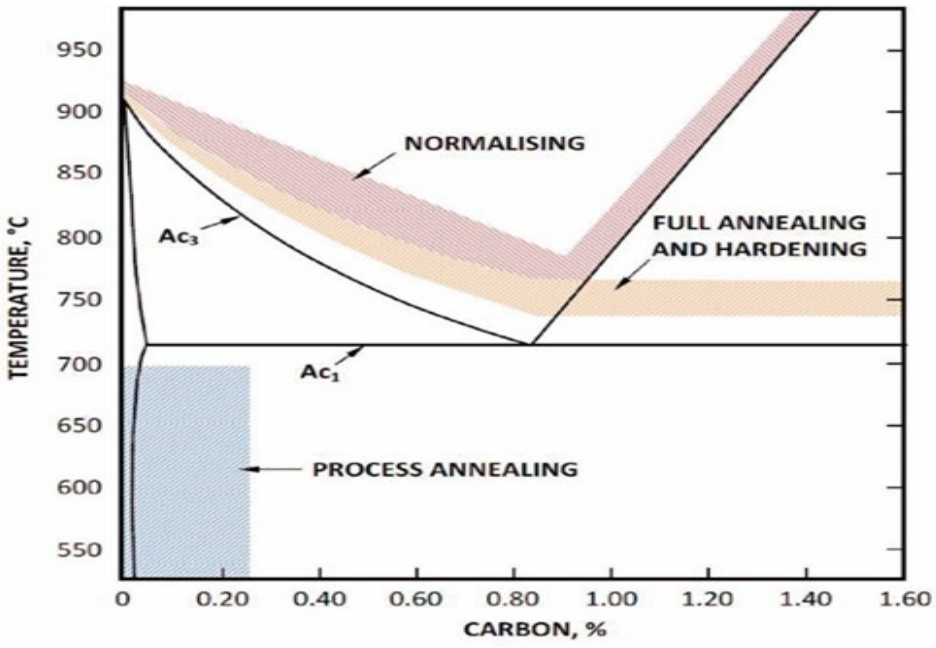


Figure 2 – Showing the temperature ranges required for specific carbon content and process



TTTG Sharp Oil

Mike Williams

There are several approaches to keeping your woodworking tools such as plane blades and chisels sharp. All have their adherents and method zealots; some methods are expensive and require specialist grinders such as slow speed water grinders or Japanese water stones of various grades. Some methods are very inexpensive and require only a flat surface and several grades of emery paper purchasable by the sheet at your local hardware store.

The more traditional and middle of the road, as far as expense is concerned, is the so-called oilstone and this is the method which is championed by TTTG and has been featured for several years in their popular workshops.

What type of stone should you buy? And here again there are a number of choices and qualities matched by their price.

Some years ago, TTTG in collaboration with the UK's Tool and Trades History Society published a comprehensive review of sharpening stones, both natural and man-made and copy of this publication can be found on TTTG's website. The long and short of the study was that the artificial stone, commercially marketed by Norton as "India" was found to be by far the best finishing stone with its combination of adequate hardness and fineness, putting an excellent edge on carbon steel in minimum time.

Combination (double sided) stones with coarse on one side and fine red India on the other are readily available. *What lubricant should be used?*

There is little doubt that the original lubricant marketed by Norton was excellent but is no longer available.

Neat's foot oil works well for a short while and then clogs the stone to such an extent that the stone is no longer useable.

Light mineral oil also works well but eventually it allows the surface of the stone to clog with powdered metal and spent stone dust so that the speed of grinding slows almost to a halt.

Kerosene works well but is a bit too light to lift finer grounds from the stone surface and some clogging ensues; it also tends to flow off the stone and all over the bench.

White Spirit seems to have a higher surface tension than kerosene and tends to stay on the stone surface better, although its gradual clogging performance seems to be not much better than the latter. It also contains higher paraffins and organic cyclic compounds which are strongly suspected to be carcinogenic so perhaps better to be avoided if possible.

White Spirit and Lamp Oil, 50/50 Mix. The rival to Sharp Oil!

TTTG "SHARP OIL" ARRIVES

TTTG member Matt Pryor rose to the challenge and after a series of experiments formulated a sharpening lubricant that overcame all the above difficulties.

TTTG bottles the mix and sells it under the name Sharp Oil. Sharp Oil is sold at all TTTG events for only $6 a bottle ($10 for 2 bottles).

Not only does Sharp Oil lubricate the stone while sharpening, it also: -

a) Stays on the stone
b) Does not slow the speed of sharpening
c) Completely raises the spent metal and stone from the surface and prevents clogging
d) Contains no known carcinogens *and* (almost unbelievably)
e) When a previously clogged stone is soaked in TTTG Sharp Oil it *completely* cleans the stone and restores the stone to its original condition! Sharp Oil even restores India sharpening stones to their original colour. To maintain this cleaning property, make sure that you wipe the surface of the stone with a clean cloth after using, to remove the spent fluid.

The only possible complaint that I have is that the bottle top is a little hard to replace and this is important as it prevents the more volatile components from escaping between uses.

You can tell that I have been converted to TTTG Sharp Oil and always have a bottle of it beside my sharpening stones. It does the job better than anything else that I have tried and is very affordable!

A note on bottle caps from the TTTG Secretary:

I agree with Mike, the caps can be rather difficult to replace for the first few uses. Indeed, when we first got the bottles and tops, I complained to the maker that the caps did not fit onto the tapered spout as they should. Well, the supplier sent someone out to see me and demonstrated how to fit the cap onto the top when new.

This is basically how it goes. First, take the top off the bottle. Second, trim off a short section of the tapered spout to meet your needs in terms of hole size and angle – not too much. Third, place the cap loosely on the spout, upend the assembled top and tip and press down onto a firm surface with the palm of your hand on the threaded end; the top should snap into place. Repeat this until the fit eases; perhaps 4 to 6 cycles.

If that seems too difficult put the cap and top assembly into a vice and force the two parts together. That is what I did. After a few iterations of this 'force fitting' the cap and top should become much easier to assemble.

Sharp Oil is also the best lubricant to use on Diamond Plates.

Grobet Checkering Files

John Bates

Ok I am no stranger to files and filing, for years I have used files of differing types and currently I have dozens of files on hand, if I count the files in my riffler sets. However, until recently there was not a single checkering file in the bunch. But now I have a Grobet checkering file.

Question is what do I do with a Grobet checkering file? Time for a bit of research.

The company history

Situated near Lausanne, Switzerland, in a valley of the Jura Mountains, Usines Métallurgiques de Vallorbe has close ties to the history of the Vallorbe district. Three hundred years BC, blacksmiths were already mining the iron ore available in the region.

The first factories were built along the waterfront by the end of the 13th century. Along the river Orbe, monks set up an iron mine, which brought the mining industry to Vallorbe.

By the end of the 15th century, industries based on forging and casting processes were thriving in Vallorbe.

Other metalwork sectors developed including metallurgy, blacksmithing and nail manufacturing. These activities in turn led to the emergence of locksmithing, arms manufacturing and, finally, watchmaking.

In the early 19th century, following the nail manufacturing industry boom of the 18th century, it was the production of files, first for the watchmaking industry and then for other sectors, that really took off. Cutting files provided farmers in the region with an additional source of work during the winter. Files were closely linked to the growth of watchmaking as they are a key tool in the production and repair of watches. The heirs to Vallorbe's expertise in metal-working, watchmakers were adept at forging and tempering tools – a skill which would ensure the precision and reputation of the Swiss watch.

Then in 1836 F L Grobet of Vallorbe invented a machine for cutting files. This marked the beginning of industrialisation of the file production process. Sixty six years later, Vallorbe's three largest file factories, Borloz & Noguet-Borloz, Antoine Glardon & Cie and Grobet SA merged to create Usines Métallurgiques de Vallorbe. Today Grobet files are just one of the many fine products and brands associated with this Swiss company.

The Checkering File

Grobet checkering files are parallel in width and gently tapered in thickness. Overcut is parallel to file edges and upcut is 90° to overcut. These files are useful for putting serrations on knife edges and to obtain a checkered design on a gun hand grip.

Double cut top and bottom. Both edges are safe. Available in 6 and in 8-inch sizes with cuts ranging from 0000 (12 lines per inch) to 4 (75 lines per inch).

Unlike standard double cut files, checkering files have teeth that are in line with each other instead of staggered.

Because of the arrangement of teeth, checkering files (sometimes referred to as texturing or Florentine files) create grooves or serrations in the material being filed. They are often used to create decorative edges on bezels, broad textured surfaces, and for fast material removal.

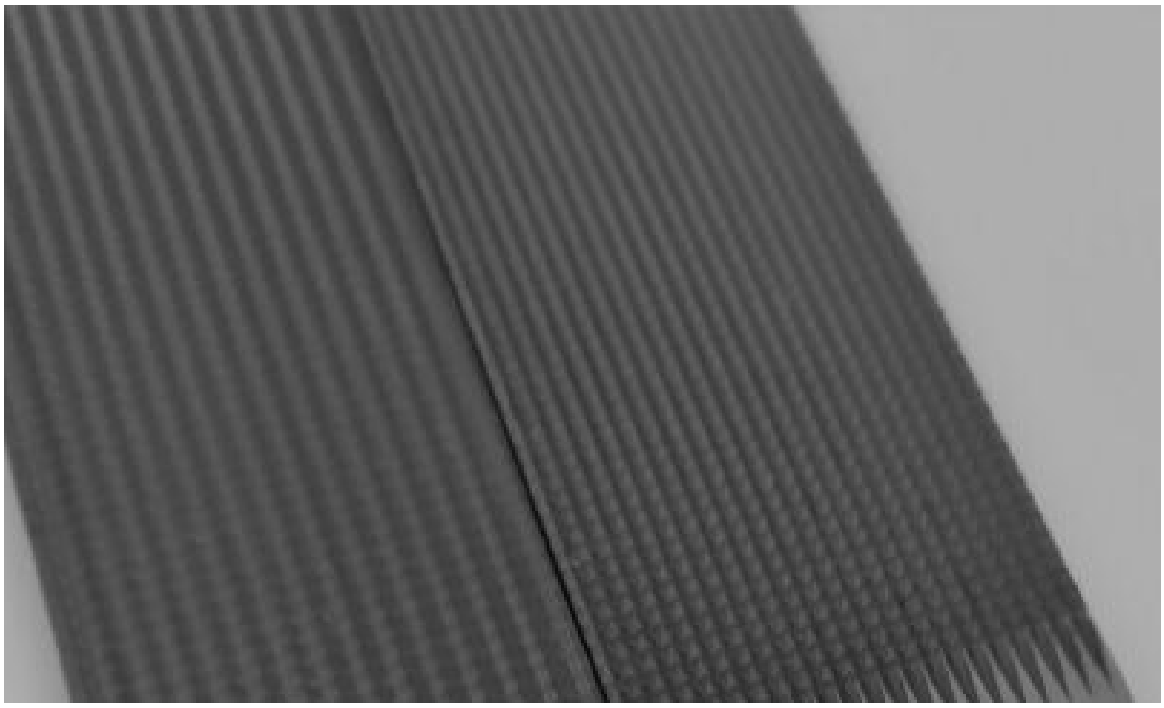
Checkering files are generally used on metal. Checkering tools for wood are entirely different and are available from gunsmithing suppliers such as Brownells.

Checkering explained

Checkering are rows of parallel grooves that cross at a given angle to form little diamond shapes.

In the English literature, checkering is often spelled 'chequering'.

The function of checkering is to give the shooter more grip on the stock and as decoration. Checkering is not necessary on most stocks, so the decorative aspect is probably the most important.

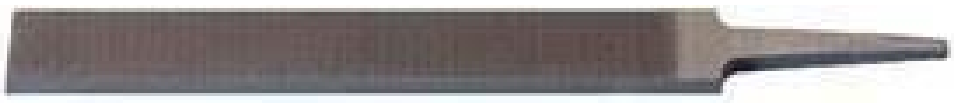


The checkering files are also used to make “jimping” or notches in the spine of a knife blade. It provides a better grip by giving the users thumb (or sometimes an index finger) something to bite into as it slips over the blade while working the knife.

A checkering file is used anywhere an improved gripping surface is needed. Finer cuts give a nice matting effect to reduce glare and light distortion.

The checkering can be cut in several ways. Most common techniques are pointed, flattop and semi flattop checkering.

Another variety is skip line or French checkering. In this technique lines are simply skipped at regular interval creating a tartan like effect hence it is also called Scottish checkering.



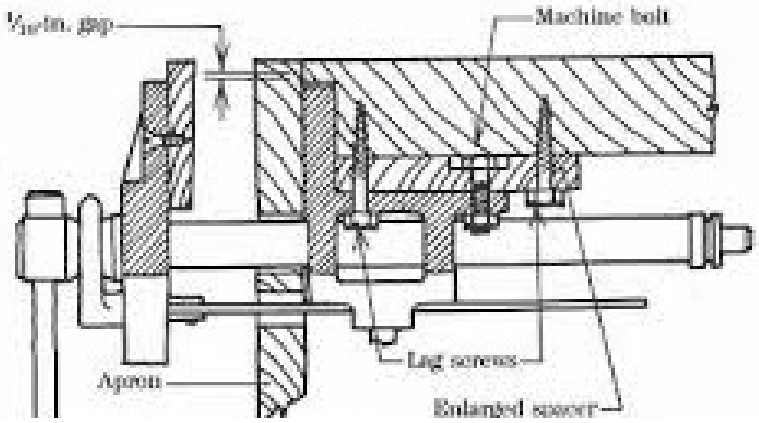
The Quick Action Vice

TTTG was asked *"How hard is it to find parts for a Record Quick Action Vice?*

All Record and Irwin Quick Action vices, both metal and wood working vices, have the same mechanism. There is a range of vices but the crucial parts, screw, springs, half nuts, rods are standard.

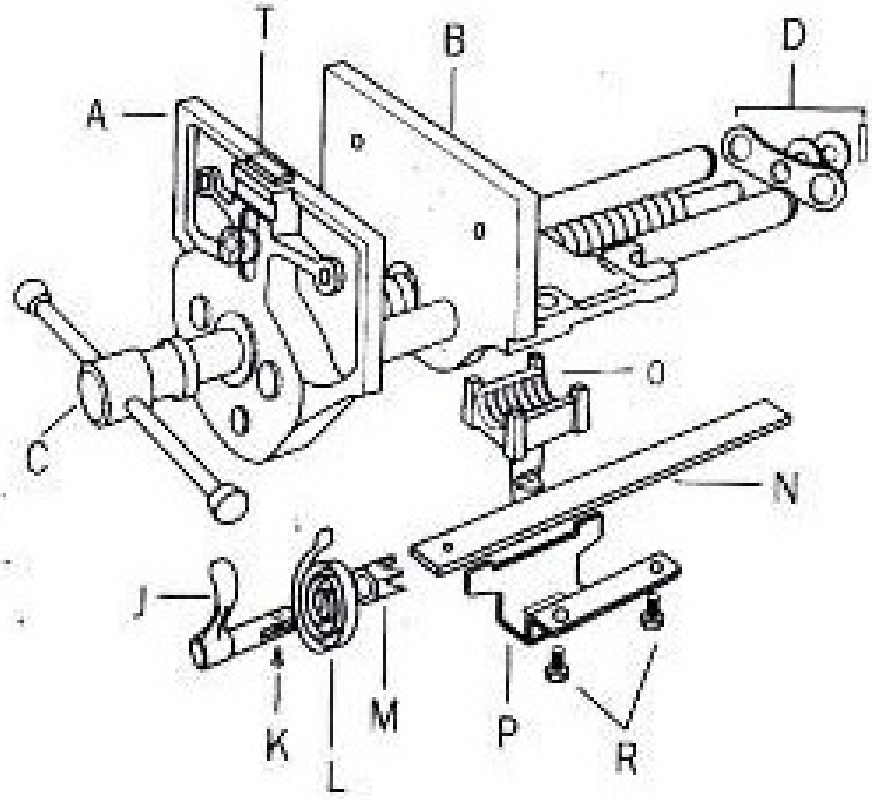
There are suppliers of spare parts in the United Kingdom but the parts are expensive. Some parts such as the springs can be replaced with "standard" springs. There are several local spring suppliers and makers. Other parts can easily be made by a competent metal worker.

Broken cast iron components should be welded by a competent welder. Brazing suggests a poor repair. Avoid old tools that have been brazed.



Cross Section of an Irwin Quick Action Woodworking Vice

Online drawing from an Irwin advertisement 1970s?



David Brown Micrometer-Adjustable Floating Reamers

John Bates

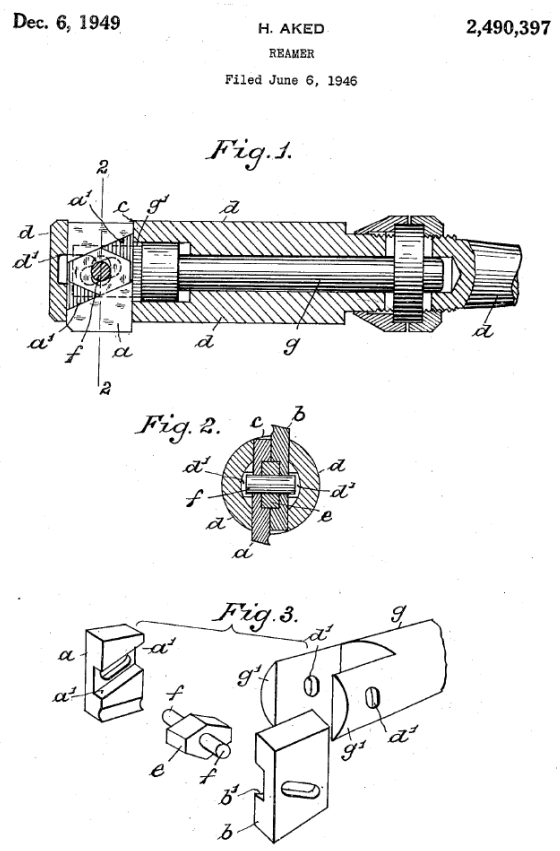
David Brown & Sons (Huddersfield) Ltd, engineers, gear and pattern makers of Swan Lane, Lockwood, Huddersfield was founded in 1860 by David Brown as a pattern-making concern specializing in gearwheel patterns for cast gears.

By 1873 Brown had focused his business on gear systems with machine-cut teeth, in which the firm was to become one of the global pioneers. The company began to manufacture machine cut gears in 1898.

David Brown retired and died in 1903 – so much for a long and restful retirement. His three sons Ernest, Frank and Percy succeeded him and building on his vision for the company, they began to produce self-contained worm gear units complete with bearings and shafts. In 1934 the company established links with Richardson Gears (Pty) Ltd of Footscray, Victoria, Australia.

The Footscray venture is an interesting aside which could be worthy of further research and investigation.

British and US patents for the David Brown floating reamer first appeared around 1927. Various design changes and improvements were added, and these were included in subsequent patents during the 1940s.


Dec. 6, 1949 H. AKED 2,490,397

REAMER

Filed June 6, 1946

Fig. 1.

Fig. 2.

Fig. 3.

The drawing right which forms part of US Patent No.2,490,397 of 1949, clearly shows the general design and arrangement of the reamer mechanism and these features remain fundamentally unchanged today.

The design simplicity of the David Brown floating reamer is emphasised by the fact that no keys or special tools are required. The only skill called for is in the use of the micrometer for setting the blades to the required diameter before use.

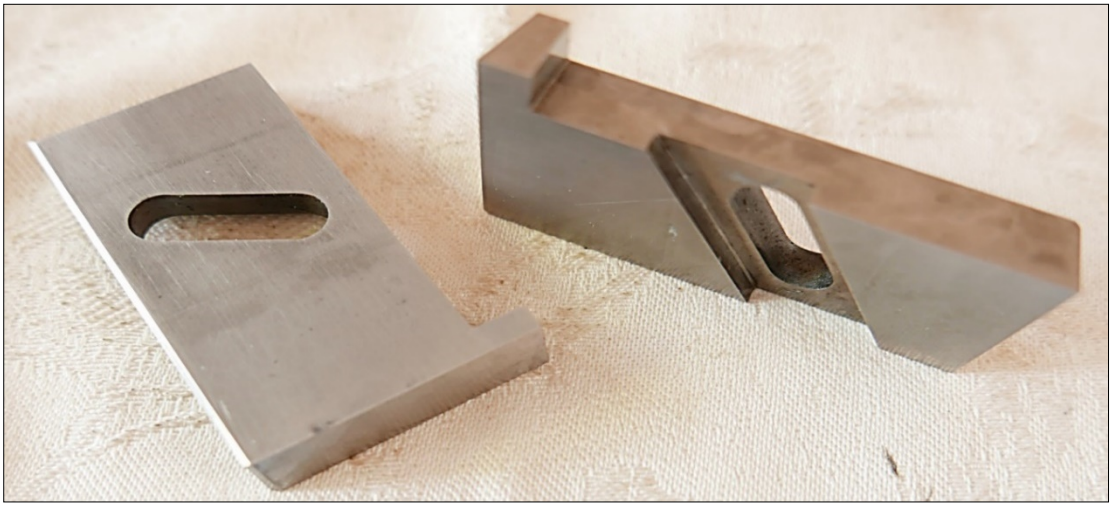
These reamers were designed for high quality production work requiring bores finished to fine limits of

concentricity, parallelism, and surface finish. The amount of float is predetermined in the design. Furthermore, David Brown floating reamers can be used to ream through, blind or stepped bores.

The blades are available in either solid HSS or tipped with tungsten carbide inserts. The picture below shows a matched pair of HSS reamer blades used for reaming blind or stepped bores. Blade sharpening is easily carried out on a tool and cutter or surface grinder.

These reamers are still prized by machinists and tool makers and are widely considered to be as the finest floating reamer available.

In 1945 the David Brown Tool Company was established by David Brown and Sons and manufactured these micrometer adjustable floating reamers as well as gear-cutting tools, gear measuring instruments, spur, spline, helical, and special gear shaving cutters, jigs, and fixtures.

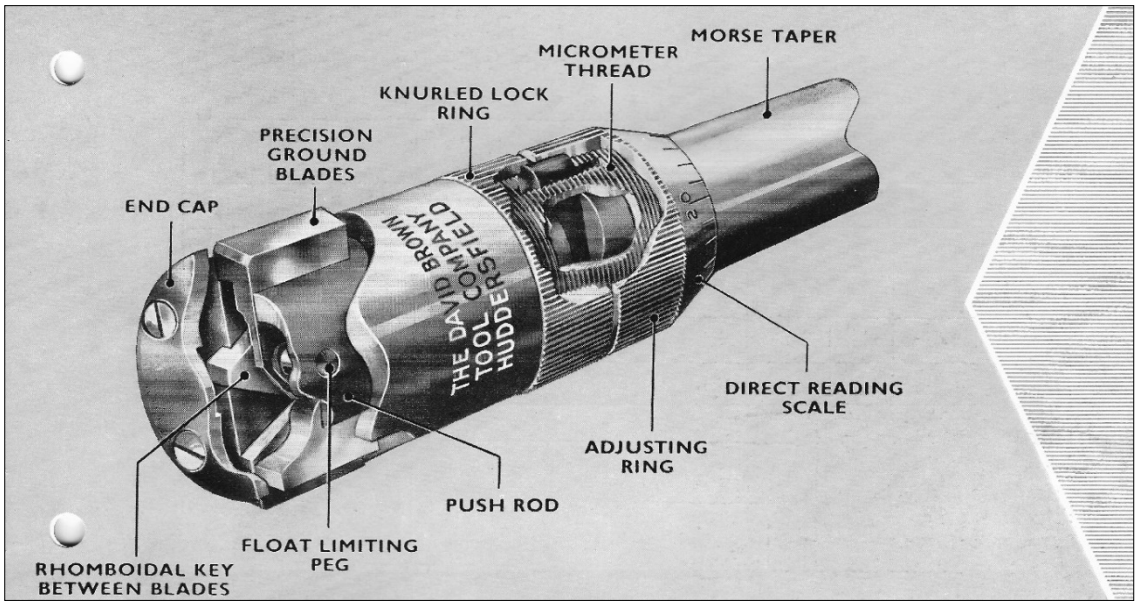


ABOVE: pair of David Brown HSS reamer blades for stepped or blind bores

The principal features of the modern David Brown adjustable floating reamers are:

*Direct reading micrometer adjustment
*Used for through or blind holes
*Wide size range: ½ inch to 8 inches
*No special tools required for setting
*Fully floating blades, solid High Speed Steel or Tungsten Carbide tipped
*Float is positive and constant
*Instant setting to finished size on machine
*Blades quickly and easily removed for sharpening or replacement
*Machine tool misalignment automatically minimised
*Long reliable operational life
*Standard integral Morse taper shanks
*Effective either stationary or rotating
*No gears or spring mechanisms used

Of course, quality and precision never come cheaply and the present-day price of these reamers new is in the order of AU$500 to AU$700 each. Second-hand reamers in useable condition as well as replacement blades can be obtained at a more reasonable cost so keep an eye out when you finally get to a tool sale or market.



Above: sectioned drawing showing the component parts of the David Brown floating reamer

Do you have any old adverts or leaflets?

John Bates is researching Australian engineering hand and machine tools.

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Extract from *Commercial Motor*, 10th March 1944, page 25

In the ordinary way a reamer finish cannot be relied upon to produce a bore that is completely free from chatter marks, although a casual inspection might be deceiving in this respect. Reaming troubles, however, would appear to have been satisfactorily solved by a new floating-type tool, recently introduced by David Brown and Sons (Huddersfield) Ltd, Huddersfield, England.

The main essentials of this tool are that it has two blades or cutters, diametrically opposed to each other, and being so mounted that they are permitted to float. Micrometer adjustment, between the minimum and maximum effective extension of the cutters, is provided.

The tool is designed with standard morse taper shank and can be used on vertical and horizontal borers and turret, capstan and centre lathes and drilling machines. The advantages of the floating feature scarcely need pointing out, and we understand that the finish obtained with one of these reamers is of a high order.

It is to be understood that no reamer is to be used for the removal of metal like a boring tool. In practice, with this tool, the hole to be reamed should first be bored to within 0.005 to 0.007 inch (0.003 to 0.005 inch for the smaller SO type) of the finished diameter, and the reamer cutters adjusted accordingly.

Source: http://archive.commercialmotor.com/page/10th-march-1944/25

Mortise & Tenon Magazine

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- Essays on historical craft practice and tools
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- Reviews of relevant books.

Where to Get It

Carbatec
113 Station Rd, Auburn NSW 2144
Woodworking machinery and supply store
Carbatec gives TTTG members a 15% discount. You must be "on the system" so tell Carbatec you are a financial TTTG member.

Hare & Forbes Machinery House
1/2 Windsor Rd, Northmead NSW 2152
Machinery and engineering tools

Lee Bros. Engineering Supplies
6 Dunlop St, North Parramatta NSW 2151
The "nut house" is the place where you are likely to match a screw thread.
Great stock and helpful staff.

Davro Assembly Products
2/66 Clapham Road. Sefton NSW 2162
www.davroproducts.com.au
Solid rivets

Timbecon
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Disston Advert below is from Vintage Tools ***Steve Carter***

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The print quality of the original advertisement is poor, and the claim exaggerated but nearly a century after the advert appeared Plumb USA tools are still in demand by both tool users and tool collectors.

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