

MAIDSTONE

MODEL ENGINEERING

SOCIETY

President:

JOS. N. LIVERSAGE
C. Eng., M. I. Mech. E.

NEWSLETTER '77

WINTER EDITION

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Our thanks to the many Societies from whom we have received newsletters. They are greatly appreciated.

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Copy for the Spring edition must be in by :-

MARCH 5th. LATEST.

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Don't forget your 20p. for the Personal Insurance Scheme which is payable with your subscription - Ed.

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Hon. Chairman :-	
A.H.W. Payne, 38, Oxford Road, Maidstone, Kent.	Maidstone 57545
Hon. Secretary :-	
R. Milliken, 14, Hurstwood, Chatham, Kent.	Medway 67978
Hon. Treasurer :-	
P.A. Roots, 97, Tonbridge Road, Maidstone, Kent.	Maidstone 58599
Hon. Press Officer :-	
G.R. Linkins, 8, Woodlands Road, Willesborough, Ashford,	Kent. Ashford 20809

FROM THE PRESIDENT.

First of all let me say that I was NOT the Author of the short item over my name on page 10 of the Autumn edition issue of the Newsletter. This was taken verbatim from a copy of the Big Wheel News which I receive every month from the Steam Locomotive Society of Victoria (Australia), being an extract from the President's (Mr. Gordon Schulz) usual notes. I did let the Editor of our Newsletter have the copy and suggested that this particular paragraph would be worth repeating which it well deserved, but unfortunately I omitted to mention that the Authorship should be acknowledged. My oversight entirely.

The Secretary has again mentioned me in his notes, he shouldn't cite me as an example as in these days I have difficulty in overcoming my inertia. I think that it was Mark Twain who said "I nowadays sit and think but sometimes I just sit". This applies to me.

Without intending to start a mutual admiration society I don't think that Ray has done too badly in completing one third of that great Tractor in a year, and it doesn't seem that long ago since there was great consternation at No. 14, Hurstwood over some purchased drawings. What he must not overlook also is that he has to travel to and from London everyday (what an awful business) in order to provide the where-withall to keep Margaret and Linda in the style to which they are accustomed. I haven't such a chore.

I was particularly interested in Mr. Alexander's description and experience with the small engine. From the details given if I understand them correctly this engine is a straightforward petrol or paraffin with TUBE ignition. It is certainly not a 'Hot Bulb' engine as these worked on an entirely different principle. What is termed the hot bulb is a cylindrical container with a ceramic lining and kept hot with a burner underneath. From this there is a connection to the rear of the combustion chamber and on compression the explosive mixture is forced through to the heated tube and so ignited. The short pipe between the tube and the cylinder end was usually provided with an ordinary plug cock which could be closed and so to stop the engine.

Regarding the two fuels mentioned, the pet'l'm really means petrol and the benz benzol, this latter being for starting only. Benzol is a coal tar product and in the days before and after the First war was easily obtainable. I well remember when my wife and I bought our first car, an 8 H.P. Rover, with a flat twin air cooled engine, collected from the main Rover Agents in Bradford.

The Manager recommended me to buy two gallons of petrol and one gallon of benzol, the former at -/9 per gallon and the latter at 2/4 $\frac{1}{2}$. Figures that I shall never forget.

Mr A's engine would appear to be quite old, possibly around the turn of the turn of the Century, as only a few years later the automatic inlet valve was superceded by the governed inlet valve controlled either by the 'hit and miss' or 'throttled' principle, thus saving fuel which with the older engines was wasted on the non working stroke. The fact that the engine will run on paraffin is interesting since it was usual with this fuel to provide some form of heating to the carburettor by the provision of a 'hot-spot' or 'muffle'.

As a young draughtsman I worked for quite a time on the design

and development of Hot Bulb engines, under the eye of the Inventor of the Two Stroke Cycle, Dugald Clerk, who was at the time a Director of the Firm, and one of the stalwarts of the development of the internal combustion engine in all its forms.

The H.B. engine is of the compression ignition type and always has solid injection with of course no carburettor. The fuel was in some cases a very thick oil which needed heating to make it flow, very much like that now used for marine engines and boilers. The pumps were made by Bosch, became rare and could not be produced here until the National Physical Laboratory took up the lapping experiments and the Carborundum Company developed a special range of lapping compounds in which the grains were not angular but spherical.

Our engines had a conical combustion chamber, since heat concentrates at the point of a cone, and after the first heating with a blowlamp underneath would work normally as a compression ignition engine. This type was the forerunner of the modern, so called, Diesel which nowadays powers both road and rail transport. These actually are not true Diesels as they had air injection and always an integral compressor to provide the high pressure air blast.

As for a model of a tube ignition gas engine, these were advertised in the Model Engineer quite regularly by firms providing the necessary castings. Sparking plugs for spark ignition were not available, if memory serves me right, until about the late twenties or early thirties so tube ignition it had to be. Heating the tube was by a small gas jet taken from the engine supply, but a small blowlamp for a petrol engine would not, I think, present any difficulties considering the type of heating used in the flash steam power boats.

If Mr. Alexander, who I do not know by name, will have a chat with me at Mote Park sometime I should be pleased, as it is over thirty years ago that I had dealings with one of these engines, which was driving a sewage pump here in Herne Bay, but had developed a cracked flywheel boss.

Joe Liversage

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CHAIRMAN'S REPORT FOR 1977.

The season opened on a very sad note with the loss of Mr. S.T. Longley, one of the Society's founder members. New members will not relate this name with the running of trains at Mote Park, but Sid, as we knew him, ran both $3\frac{1}{2}$ " & $2\frac{1}{2}$ " locos. Until recent years Sid was always to be found at the park on Sunday mornings. He helped many of the members with the construction of their models, both in the building and in allowing the use of his workshop. The seat we now have at the park (Sid's Seat) is a reminder that we owe a lot to Sid.

As the season progressed we found that the relaying we did during last winter was very successful and it is hoped to relay the bottom curve of the track this winter.

There has been quite an amount of hard work put in at our track during the season and we have, at times, been hard pressed for engines, but I am pleased to say that we have managed to keep most of the public happy.

(Cont. Over).

We have had a number of new locos finished during the season and some have made a good showing of their paces, I also hear that there are a number of new locos being built which I'm sure will soon find their way onto our track.

It was very pleasing that our Hon. Secretary was able to go on the trip to Japan after the trouble he had with his back, and I am sure that everybody is pleased to see him back complete with engines (the latter were held up at the docks by a dispute).

Although it is wrong to look back over the years, but I do, and I remember that we reformed the Society in 1946, I was then part of the committee and have been your chairman since 1965. In that time there have been many Ups and Downs in the Society.
The Ups:- We built a portable track, then in 1948-50 the original Mote Park track was built. That was lengthened in 1962-63 and has now been nearly totally relayed. A guard rail to stop the tipping of trucks has been added and we can also be proud of our excellent steaming-bays and our big new and nearly - new outbuildings, i.e. the clubhouse and trolley shed, engine shed and utility shed.
The Downs:- The loss of older members and stolen track. There was also the damage caused to the track by the falling of the elm tree and by a car running into it.

So on the whole I think that the Society has stood up to progress very well and as it stands today it is in good shape.

The future? For a start we badly need younger members, for although we have already got many good members in the Society we need more new younger members to help run the Society, for whilst it is very healthy to visit other Societies, one cannot give their best by belonging to too many other Societies.

Most model engineers already need a 25 hour day to get things done.

I look forward to seeing you all at the A.G.M.
A.H.W. Payne (Jack)

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SECRETARY'S NOTES

It is with some sadness that I write a few notes for the last Newsletter of 1977 as it is also my last notes as Hon. Secretary of Maidstone Model Engineering Society. When I took on the job from Ron Heathcote the Society was on the verge of what could almost be called a five year plan of building and re-building which is ending this winter with the re-laying of the remainder of the track. In addition over this period we have introduced new rolling stock and trolley standards and bared ourselves to the Inland Revenue so that all our financial affairs are on a legal footing which in spite of opposition at the time I am sure everyone agrees has turned out for the best.

Having only been in the Society for seven years I can't remember what it was like not to be continually writing letters and minutes or hearing Margaret tapping away at the typewriter so it was with mixed feelings that I asked the Chairman to accept my resignation with effect from the forthcoming Annual General Meeting. No doubt my successor and the new Committee will do their best to continue the progress of the Society now entering its 49th year and keep the close ties with our friends in associated clubs who visit us throughout the season and who in turn entertain us hospitably on our visits to them. Such reciprocal visits are in my view an integral part of the hobby and add immeasurably to the interest derived from Model Engineering.

In furtherance of this aspect the Southern Federation which exists principally for the purpose of closer liason between societies now embraces nearly seventy clubs and if re-elected for 1978 I, together with Ron Heathcote will be able to represent M.M.E.S.' views on the Federation Committee, and help to keep Maidstone in touch with what is going on elsewhere.

Finally may I take this opportunity to thank Mr. & Mrs. Walter Skuse for their generous gift to the Society and to wish Wally good luck with his magnificent engine at the forthcoming Model Engineer Exhibition. Also thank you to the Tonbridge Society for entertaining Margaret and I at their Jubilee Dinner last month and thank you to all those who have helped me in my efforts as Secretary not the least Margaret who did most of the work.

Ray Milliken
Hon. Secretary.

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SOLDERING, BRAZING AND BRONZE WELDING

This particular aspect of our hobby is the one on which very little factual data is available to us in a form easily understood. How often have you seen an article in "M.E." which says "put tubes in with B6 and the backhead with C4" ? Off you go, money in hot sticky hand, to get some and are met with a pitying look by the dealer because he does not have that brand and as you don't know precisely what you want you cannot pick an alternative. I hope these few notes, gathering together data from many sources, will shed a little more light on the subject.

A few technical details are necessary first to ensure that we have the same understanding of the various terms used. We often speak of silver solder being used for brazing. This seems to be a contradiction but it has occurred because of the sloppy use of words in the past. By general agreement the highest temperature at which soldering is said to occur is 450 C. Any joining materials which melt at or below this temperature are therefore solders and a variety of types are covered in British Standard B.S. 219.

Materials used to join items in the brazing process are known technically as "Filler metals for Brazing" and a considerable number of types are covered in B.S. 1845. They span a range of melting temperatures from 600 C. to 850 C. approximately. At around 900 C. we get into the range of bronze welding.

The joining materials for all three processes are alloys of a number of metals. When sectioned and polished, etched and viewed under a microscope, the crystals of the individual constituents can be seen in the general matrix. When heat is applied all of the components of the alloy do not melt at the same temperature. The temperature at which the first of them melts is called the solidus and that at which all of them have just become molten is called liquidus. This is why in trade literature a product is said to have a melting range of say 605 C. to 650 C. It doesn't mean that they are not sure where it melts, but that it has a solidus of 605 C. and a liquidus of 650 C. From this it follows that it is possible for a filler material to start flowing without being fully molten.

This will explain why it is possible to have a joint which externally looks perfect but is faulty because the work was not hot enough to fully melt the filler material and ensure full joint penetration.

Solders.

The solders with which most of us are familiar are alloys of lead and tin. These are widely used for constructing tender bodies and side tanks for example. However if they are used inside the firebox of a boiler to seal the stays, in the manner described many times by IBSC, it stops the use thereafter of silver bearing filler metals in the same area. This has been quite a problem in the past but the solution is quite simple - if you must use solder in the firebox use one which contains no lead (except as a trace impurity). A suitable type is given in B.S. 219 as grade 965. Johnson, Matthey's Plumbsol seems to conform to this specification and the flux for this is Bakers No. 3 Soldering Fluid. However it has only half the strength of 60/40 Tin-Lead solder so care should be taken on the application. During the visit to Chingford over the Jubilee weekend Fred (yes THE Fred) was discussing such matters with a chap who turned out to work for Johnson-Matthey. He had put the tubes in a boiler with their L.M. 15 alloy which is a mixture silver, cadmium and zinc. This was two seasons ago and as it has 3 times the strength of tin-lead solder would seem to be a very useful lead-free solder but of course with a higher melting point than tinmans solder.

Brazing Filler Metals.

British Standard B.S. 1845 covers a remarkable range of filler materials. The types which interest us are those containing a relatively high percentage of silver alloyed with copper and zinc (and often cadmium as well) and those containing a much lower proportion of silver and alloyed with copper and phosphorus. Data on both groups is given in the accompanying table but a few words of explanation (and warning) might not be out of place.

It has been found in industry that prolonged heating of filler materials containing cadmium cause that element to become volatile and give off fumes which in a confined space are harmful to people. As many model engineers work in very confined spaces good ventilation is an essential when brazing. Although fluxes are not deadly poisonous the hands should be thoroughly washed after using flux and especially before handling food.

The copper-silver-phosphorus filler materials have an interesting characteristic. You can braze copper to copper satisfactorily without using any flux but the work must of course be clean. However Fred has, recently drawn my attention to comments in Johnson-Matthey's application data on two alloys of this type which they make. They advise that such products should not be used where they could be in contact with sulphurised gases at elevated temperatures otherwise they could suffer from selective oxidation of the phosphorus and consequently deterioration of the joint. I would think that this is just the situation which exists inside the firebox of our loco's so I would think twice (or at the present price of copper, three times) before using filler metals of this type inside a firebox. If copper based alloys are involved in a brazing operation (e.g. boiler bushes), then flux must be used i.e. it is only self fluxing with pure copper to pure copper.

Bronze Welding.

This is only possible if you oxy/propane or oxy/acetylene equipment. The welding rod which most of us know is Sifbronze No.1 and
(Cont. Over).

it is an alloy of copper and zinc. This complies with B.S. 1453 Grade G2. The majority of problems which I've seen in industry were due either to the joint faces being dirty or through insufficient heat. Just recently a joint inspected looked perfect, with a beautiful rippled finish on the weld. However when it was cut out it was found to have almost no adhesion to the parent metal and would certainly have failed in service. It should be remembered that there is no capillary action and the strength of the joint is in the fillet produced and its adhesion to the parent metal.

In conclusion the three essential elements for success in all three processes are :-

- (1) The work must be clean and free from grease.
- (2) The joint must be properly fluxed (where necessary) including through the capillary gap on brazing applications.
- (3) The job must be hot enough.

A word in passing - be careful if using oxy/acetylene on a copper boiler. It is very easy to melt a hole through the metal and it can happen in seconds. I've seen a tubeplate where it happened and it was not a pretty sight. If you have a choice oxy/propane is hot enough for our purposes on copper but more controllable and safer regarding heating intensity.

Barry Lawson.

Footnote.

A table to accompany this article will be found at the back of the Newsletter - Ed.

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NOSTALGIA 2

Looking out a little further from my doorstep I can see in time-distance, a picture of the sands at Ramsgate absolutely packed with trippers and holiday makers, whose choice of seaside resort was largely governed by the position of the railway station relative to the sea and accommodation; Ramsgate Harbour station, built on the very edge of the sands was (for the public) ideal. For the railway it meant a terminal station sited between the sands and the towering cliffs and reached by a tunnel driven through the cliffs for about $1\frac{1}{2}$ miles with a ruling gradient of 1 in 75.

The station had two island platforms partly covered by the building's over-all roof and were served by the most complex system of sidings points and cross-overs that was possible to obtain on such an extremely constricted area. Whether a turntable existed when built is uncertain, but one old inhabitant of Ramsgate told me he was pretty certain there was one in his day, although I cannot trace it in an old photograph I have, taken from above the tunnel portal around 1924, but it does show two trains in the up platforms, one double headed and the other single headed, plus one engine on a siding, all engines facing in the up direction, that is towards the tunnel. This could indicate a turntable or that all trains came down through the tunnel tender first.

History does record a fatal accident in the summer of 1891 resulting from a down train of empty stock hauled by an engine running tender first, and although the engine was dual fitted (Vacuum and Westinghouse) the train failed to respond to the driver's brake valve, and careered down the tunnel, through the station wall and into the roadway, killing a man who was walking by; fortunately the driver and fireman managed to jump clear.

Cause of the brake failure was that the engine had been coupled to carriages without the brake hoses being coupled; Reason.. the engine had been built without brake pipes on its front end.

To travellers of a timid nature the first time journey out of Ramsgate Harbour station must have been almost a nightmare, for they were no sooner started than they were plunged in the darkness, relieved only by the glimmer of light shed by the invariably broken gas mantle of the roof light; this discomfort was nothing compared to that caused by the thunderous noise of the double headed train, its two engines blasting their way up the tunnel gradient, entombed in smoke and steam, a mixture which always found a way into the carriage before the summit was reached.

Considering the potential hazards that were inherent in the working of a line of this character, it is unfortunate that this one fatal accident, the result of someone's stupidity, should mar an otherwise accident free railway service of 63 years standing. There is little doubt that, to handle the busy summer traffic within this congested site, called for the best of planning and co-ordination. Credit must also be given to the footplate crews whose skill and experience enabled these packed trains to be got away from standing at the bottom of the incline, with no run to help; they were tough to.

The line and its station were closed on 2nd. July 1926 when the Southern Railway made several alterations to their system around this area. The tunnel was used for air raid shelters during World War II and for a while after it became a scenic railway as an entertainment (No steam). Its portal has now been bricked up. The station with its over-all roof has, with some modifications, a false ceiling in one case, been turned into a fun palace. It's worth a look round next time you're in Ramsgate even if you have no nostalgic urge.

E.G.Rix.

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EDITORIAL

As has already been mentioned further work towards the re-laying of the track will be carried out before Easter. This will start after the Committee meeting on Sunday 15th. January (weather permitting). Further on in these pages you can find information about the A.G.M. and two evening meetings. Good attendances on all these occasions would be appreciated.

Also towards the end of the issue you will find three forms referring to the subscriptions, newsletter delivery and nominations. On the first in addition to the normal 21.50 there is an optional extra

of 20p for the Southern Federation personal accident insurance. If this is not remitted to the Treasurer by the A.G.M. it may not be possible to include your name on the list of insured persons. I would also like to draw your attention to the nominations form. Please try and get some names and send them in, because we shall need at least four new people this year.

This past year we have been quite lucky as far as contributions to the newsletter have gone, with a good supply of interesting articles. Unfortunately we have only one item so far for the next edition and more are needed to give the new Editor a flying start. For inclusion in the next issue copy should be submitted no later than the first week in March.

I think it only remains for me to thank you for your support during the past year and to appeal to all members of the Society to GET INVOLVED with the activities that are going on. So, for now, it is goodbye from me, goodbye from him, and the compliments of the season to all (whichever season this reaches you in).

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WINTER PROGRAMME

Friday 20th. January, 7.30 p.m. - Bits and Pieces / Problem evening at Mote Park.

This event is one of our 'Hardy Annuals', but this year we hope to give anyone with a problem the chance to make it known and get a helpful suggestion or two. So come along and bring part or all of your latest model or piece of equipment.

Saturday 18th. March, 7.30 p.m. - Film evening at Mote Park.

The programme for this evening has not been fixed as yet, but it will definitely include a film from the Tal-y-lyn Railway and possibly one about the R.H.D.R.. With some other films that are available to us an enjoyable evening is in prospect.

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HOT FROM THE M.E. EXHIBITION

Congratulations to Mr. Skuse for winning the LBSC trophy for the second time and Mr. Graham Kimber for his silver medal.

It was also noticed that Mr. Fred LaRoche was sporting an immaculately clean white coat !! What does this mean ?? Perhaps he is going into the dairy business !!

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MAIDSTONE MODEL ENGINEERING SOCIETY

Notice is hereby given that the Annual General Meeting of the Society will be held at the Fountain Inn, Tonbridge Road, Maidstone, on Friday 17th. February 1978, commencing at 7.30 p.m. to consider the undernoted Agenda.

Raymond Milliken
Hon. Secretary

AGENDA

1. To read the Notice convening the meeting.
2. To confirm the Minutes of the Annual General Meeting held on the 18th. February 1977.
3. To consider matters arising from these Minutes.
4. To approve the Hon. Treasurer's Report and Accounts for the year ended 31st. December 1977.
5. To approve the Chairman's Report of the Society for the year ended 31st. December 1977.
6. To elect the Officers of the Society for the ensuing year, namely:
President --- Vice Presidents --- Chairman --- Vice Chairman
Hon. Secretary --- Hon. Treasurer --- Hon. Press Officer
Hon. Assistant Secretary
7. To elect the Council of the Society for the ensuing year.
8. To elect Honorary Members of the Society for the ensuing year.
9. To consider any other relevant business of which SEVEN DAYS ADVANCE NOTICE has been given in writing to the Hon. Secretary at:

14, Hurstwood, Chatam, Kent.

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SUBSCRIPTIONS

Your subscription for 1978 is payable as from the 1st. of January. It is suggested that payment be made as early as possible, by entering YOUR FULL DETAILS in the space provided. Failure to do so by 1st. APRIL 1978 will automatically terminate your Membership. Honorary and Life Members are of course excluded.

PLEASE USE BLOCK CAPITALS

NAME _____ TEL. No. _____

ADDRESS _____

SUBSCRIPTION £1.50 ENCLOSED

(Kindly consider the Spring issue of the Newsletter as being your receipt)

CUT - - - - -

NEWSLETTER

In the interests of economy we are again asking as many people as possible to collect their newsletter from the clubhouse. It would be gratefully appreciated if members who cannot collect their newsletter, and of course those who can, would kindly fill in their name and address (yes again) and the information below that.

PLEASE USE BLOCK CAPITALS

NAME _____ ADDRESS _____

I will/will not be able to collect my newsletter from the clubhouse during 1978.

N.B. Please return to either Hon. Treasurer or Hon. Press Officer.

CUT - - - - -

NOMINATIONS

Prior consent to serve, if elected, must be obtained from any person nominated. All nominations must be received by the Hon. Secretary by February 5th. 1978.

PRESIDENT	_____	COUNCIL	_____
		MEMBERS	_____
CHAIRMAN	_____		_____
VICE CHAIRMAN	_____		_____
HON. SECRETARY	_____		_____
HON. TREASURER	_____		_____
HON. PRESS OFFICER	_____		_____

Nominations are also required for the new post of Hon. Assistant-Secretary _____

SIGNATURE _____

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes the need for transparency and accountability in financial reporting.

2. The second part of the document outlines the various methods and techniques used to collect and analyze data. It includes a detailed description of the experimental procedures and the tools used for data collection.

3. The third part of the document presents the results of the study, including a comparison of the different methods and techniques used. It discusses the strengths and weaknesses of each method and provides a summary of the findings.

4. The fourth part of the document discusses the implications of the study and provides recommendations for future research. It highlights the need for further investigation into the effectiveness of the different methods and techniques used.

5. The fifth part of the document provides a conclusion and a summary of the key findings. It reiterates the importance of maintaining accurate records and the need for transparency and accountability in financial reporting.

6. The sixth part of the document provides a list of references and a bibliography. It includes a list of all the sources used in the study and provides a detailed description of each source.

7. The seventh part of the document provides a list of appendices and a bibliography. It includes a list of all the appendices used in the study and provides a detailed description of each appendix.

8. The eighth part of the document provides a list of figures and a bibliography. It includes a list of all the figures used in the study and provides a detailed description of each figure.

9. The ninth part of the document provides a list of tables and a bibliography. It includes a list of all the tables used in the study and provides a detailed description of each table.

10. The tenth part of the document provides a list of references and a bibliography. It includes a list of all the sources used in the study and provides a detailed description of each source.

SOFT SOLDERS

ALLOY	BS 219 REF	%					°C		MANUF ^R
		TIN	LEAD	SILVER	CADMIUM	ZINC	SOLIDUS	LIQUIDUS	
-	A/AP	63	37	-	-	-	183	185	-
PLUMBSOL	96 S	96.4	-	3.6	-	-	221	225	JM
LM15	-	-	-	*	*	*	280	320	JM

* NOT KNOWN

BRAZING FILLER METALS (HIGH SILVER).

ALLOY	BS 1845 REF	%				°C		MANUF ^R
		SILVER	COPPER	ZINC	CADMIUM	SOLIDUS	LIQUIDUS	
EASYFLO	AG1	50	15	16	19	620	640	JM
SIF SILVER SOLDER N° 38								SIF
EASYFLO N° 2	AG2	42	17	16	25	610	620	JM
SILVERBRAZE 42								BOC
ARGO-FLO	-	38	*	*	*	605	651	JM †
SILVERBRAZE 34	AG11	34	25	20	21	610	670	BOC
SILVERBRAZE 30	AG12	30	28	21	21	600	685	BOC
SILVERFLO 24	-	24	*	*	-	740	780	JM Δ
SILVERFLO 16	-	16	*	*	-	790	830	JM □

* NOT KNOWN † FILLET FORMING Δ FORMERLY C4 □ FORMERLY B6

BRAZING FILLER METALS (COPPER/PHOSPHORUS).

ALLOY	BS 1845 REF	%			°C		MANUF ^R
		COPPER	PHOSPHORUS	SILVER	SOLIDUS	LIQUIDUS	
SIL-FOS	CP1	80	5	15	645	700	JM
SILBRALLOY	CP2	91	7	2	645	740	JM
SIFCUPRON 17-2AG							SIF
SILVERBRAZE 2							BOC
SIFCUPRON 17	CP3	92	8	-	705	800	SIF
SILVERBRAZE 5	CP4	89	6	5	640	740	BOC

JM - JOHNSON, MATTHEY SIF - SIFBRONZE BOC - BRITISH OXYGEN Co.
 Tin - Sn; Lead - Pb; Silver - Ag; Cadmium - Cd; Zinc - Zn;
 Copper - Cu; Phosphorus - P.

