

Welcome to Needles.ods (Release 025.Mk1 - 2018/03/27) The Carburetter Needle comparison and analysis spreadsheet

This spreadsheet is probably the most comprehensive tool available for analysing or assisting in the choice of SU and Zenith-Stromberg CD carburetter needles.

This is a LibreOffice (.ods) document which should also open in OpenOffice. Requests to convert this to a "different" format will be futile as the above software is both easy to obtain and is totally free of charge. The author uses LibreOffice v3.4 which is highly recommended for all older systems.

For Windows7 and earlier, LibreOffice v3.4 can be downloaded from this link:
[Lib0 3.4.5rc2 Win_x86 install_multi.exe](#)

For most other OS's, the latest (untested) version can be downloaded from:
<http://www.libreoffice.org/download>

General Information:

Before starting, there are some LibreOffice settings that need to be checked or amended in order to get the best out of this spreadsheet. Please see "How to optimise LibreOffice Calc" towards the end of this page. Because of variations in the software, some of these instructions may not be 100% correct.

Unlike other existing utilities of this type, Needles.ods will calculate the annular area in the jet, i.e. the *effective jet area*. What this means is that valid comparisons can be made between needles from different jet size ranges. For example: A needle for a 90 thou jet can be compared with one for a 100 thou jet, or a 125 thou jet. (One "thou" is one thousandth of an inch i.e. 0.001").

If a change is needed from one jet size to another in the same carburetter, this spreadsheet will assist in finding a needle with very similar fuelling.

Comparisons can even be made between SU needles and Stromberg ones! The author has investigated using SU needles in Stromberg carbs, and vice-versa. In some cases, this is entirely possible with only simple modifications being required. The mounting collar on most of the fixed SU needles is a nominal 0.125", whereas the collar on the fixed Strombergs is 0.135".

Throughout the spreadsheet, diameters are expressed in "tenths of a thou" as this standardises the way in which the values are quoted in the official needle charts. A diameter quoted as .099" will be listed as 990, and a diameter quoted as .0895" will be quoted as 895 . All areas are shown in square thou.

Each jet type has its own data tab which contains the needle chart. These are provided as being approximate only, as some have been manually keyed and as such are possibly subject to omissions and data input errors. The needles are listed conventionally in columns, with the needle name or profile ID being at the top.

The "Basic" tab can be used to make a quick comparison of up to 6 needles of any type. Simply select the tab names, eg "F100", and the needle names, eg "RC", in the cells at the top of the table. Details of the diameters will be provided and the chart will show the exposed jet area for each index point.

On the "Advanced" tab, there is the facility to compare two needles from any of the data tabs in much more detail. Details of the index diameters will be displayed along with the exposed jet area and a percentage comparison for each index point. Several fine-tuning modifications and features are also supported.

The name of the "test" needle and the "AVE" (average) needle are also valid needle names and so can be input in place of an official needle profile. The lines on the charts will serve as a good visual comparison between the needles.

Changing the "Working Range Index" value on any of the tabs will grey out the section of the needle which is never lifted out of the jet. This part of the needle can be ignored as it does not affect the fuel metering.

Charting effective areas is more realistic than comparing the diameters alone. Consider the two fixed 90 thou needles A5 and W3. The first index values are 890 and 880 respectively and a simple diameter percentage will tell us that W3 is 99% the diameter of A5 at this point. Although only 1% less in diameter, the needle W3 will allow nearly twice as much fuel from the jet in reality.

Data tabs have comprehensive search facilities. Either of the main needles from "Advanced" can be directly imported, as can a "Jet Converter" needle. There is also space for a user-defined "test" needle which can be of any sensible values. The mode is set in cell "D1" - Select from: "TEST", "NDL1", "NDL2" or "CONV". The spreadsheet will suggest up to 5 needles which are a statistical close match and the needles suggested can be fine tuned using the "Priority Index" and "Tolerance" features. A match will always be sought at the "Working Range" of the needle, but if a match is also required towards the idle end, selecting a lower "Priority Index" will achieve this. If too many or not enough needles are found, this can probably be rectified by changing the "Tolerance" value which is a +/- percentage value and uses annular areas as a comparator. The table will show each needle in the chart as a percentage of the "test" needle for both the "Priority Index" and the "Working Range", in rows 27 and 28 respectively.

The best match needle's column will be highlighted for easy identification. The suggested needles can then be displayed using tab "Basic" by changing the "Show Suggested" setting to "Yes" and selecting the correct needle type with the "... From Tab" setting. If the chart is too cluttered with all of the suggested needles showing, selected needles can be hidden using the "Show/Hide" pull down.

Consider this example: A dyno session has suggested that an engine needs the idle end of one needle, say "BC", and the full power end of say "KU". On the F100 tab in the "test" needle, the diameters for indices 1-6 can be keyed for "BC" then the diameters for indices 7-14 can be keyed for "KU".

The "test" needle will therefore contain:
 990,950,910,880,850,825 from "BC",
 then
 812,783,756,729,700,673,645 and 618 from "KU".

For this example, if the "Priority Index" is set half way down the effective part of the needle at index 6 and the "Tolerance" is set to (+/-)2.75%, the spreadsheet will suggest four needles. These are RK, ZA, SM and DF.

As detailed above, tab "Basic" can be used to review the results and it will be seen that the spreadsheet's first choice of "RK" is visually a very close match. The bias of match can be fine tuned by adjusting the "Priority Index" and "Tolerance" values.

Alternatively, a data tab can be used to find a swing type needle which is similar to a fixed type of the same size. On tab "Advanced", select an existing profile in either "Needle 1" or "Needle 2". On the appropriate data tab, select the mode in cell "D1", as "NDL1" or "NDL2" and the profile will be imported.

For example, using the diameters from F100/OA7 in the data tab for S100 will find the needle "BCD" which is a 100% match.

The "Adjust Jet" feature is available for "Needle 2" on the right hand side of the main table on tab "Advanced". This will show the effect of lowering or raising the jet for "Needle 2" relative to "Needle 1". Matching the idle index annular area of "Needle 2" to that of "Needle 1" will generate a more realistic comparison as the profiles will be aligned as they would become in actual use. Prior to changing needles, the feature could also be used to predict the amount of adjustment necessary in order to obtain the same fuel mixture at idle.

This feature is not available for needles which have gaps in the data, for example, it will not work with incomplete "test" needles. Please also note that not all adjustments will be physically or realistically possible.

Subject to the above, this will override the "Filed A/F" feature as both cannot be used at the same time.

Various thread TPI values have been used by the carb manufacturers on their mixture adjustment mechanisms. In order to accommodate these using a single format, the spreadsheet expects "Percentages of an index increment" as its adjustment criterion.

Positive values lower the jet making the profile richer, negative values raise the jet making the profile leaner.

For example, to wind the jet half an index down, enter 50% using the pull-down menu, or type "50".

For many SU carbs which have 26 TPI adjustment threads:

Each 5% of an index will be equal to a jet height change of exactly 6.25 thou or approximately one adjuster nut flat. (One adjuster nut flat is exactly equal to 6.41 thou lower/raised).

The spreadsheet will automatically calculate the revised diameters of an "Adjust Jet" needle in the "Result" column. This will facilitate locating a standard needle to replace an adjusted one.

On an appropriate data tab, set cell "D1" to "NDL2" and this will automatically import the revised values. Review the results on tab "Basic", as above.

Some tuners use the "filing a flat down the needle" method of making a richer needle out of one known to be too lean. The "Filed A/F" feature will show the results from this technique. "Filed A/F" also available for "Needle 2" on the "Advanced" tab but the "Adjust Jet" feature must be set to 0% for it to work.

Simply enter the amount filed off the needle at each index point into the appropriate cells. The values must be entered in tenths of a thou (0.0001"). The spreadsheet will calculate the area of the part that has been filed off and will adjust the area displayed for that index to reflect this.

In reality it will be almost impossible to measure the needle at exactly the correct index points and to arrive at the same values as the official needle tables. This is the reason why the reduction figure at each index is used by the spreadsheet as this should be close enough to provide a worthwhile calculation. Bear in mind that the initial couple of thou will produce a very small area increase as only the "tangent" point of the circle is being removed. Once an appreciable sized flat becomes apparent, the area removed will increase much faster for a given amount of height removed.

The spreadsheet could also be used to intelligently work out how much to file off a needle in order to achieve a certain percentage area increase. Inputting the same profile in both "Needle 1" and "Needle 2" will give a good idea as to what the before and after results will be.

The spreadsheet will automatically calculate the round equivalent of a "Filed A/F" needle in the "Result" column. This will facilitate locating a standard needle to replace a modified one.

On an appropriate data tab, set cell "D1" to "NDL2" and this will automatically import the revised values. Review the results on tab "Basic", as above.

Owners of vehicles equipped with some types of SU carb may have a choice of jet size available to them. The spreadsheet will allow advanced users to find a similar fuelling needle from different jet-size ranges.

The "Jet Converter" feature at the bottom left side of tab "Advanced" will re-calculate the equivalent sizes for either needle on the main table, even if "Needle 2" has been filed or had the jet position modified. If it is not possible to generate the required area with a smaller jet a '!' is displayed.

On an appropriate data tab, set cell "D1" to "CONV" and this will automatically import the revised values. Review the results on tab "Basic", as above.

The "Comments" tab contains a "Lookup" facility which can be used to find details of comments, needle names and needle part numbers. A comprehensive database of part numbers for both SU and Stromberg has been provided.

Between rows 21 and 900 inclusive, the "Comments" tab also allows users to save an individual comment for each needle. The general format for this is:

Column A – NeedleType/NeedleName

(eg "F90/AN" - A forward slash inbetween and no spaces)

Column B – The comment for the needle named in Column A.

Comments for the "test" needle for each needle type are input on the individual data tabs themselves. They are automatically copied to the "Comments" tab and no attempt should be made to edit their entries on the "Comments" tab.

When migrating from one version of Needles.ods to another, it is possible to import the comments tab from a previous version. Please see "How to import the Comments tab", further down this page.

Limitations:

Like most utilities, this one has its limitations, and being an editable spreadsheet is one of them. The spreadsheet is generally protected against typing in areas which should not be typed in. Areas where user input is allowed are shown with a pale yellow background. In most cases, invalid user input will be prevented but this is not guaranteed.

Useful information is provided when some cells are clicked but sometimes this will not display correctly. Clicking the same cell again should cure this. Sometimes the help may be intrusive, press the "ESC" key to clear it.

It is not possible to easily import either the test needles for each needle type, or their associated comments.

IMPORTANT WARNING:

"Copying and Pasting" should be avoided unless the user is able to select "Numbers Only" when pasting the clipboard contents into the spreadsheet. See under "Edit/Paste Special" or similar. Ignoring this advice will probably ruin the spreadsheet formatting and cause terminal damage. The only exception to this is when copying the "Comments" tab as detailed below.

How to optimise LibreOffice Calc:

(Only available on the spreadsheet version of this page)

[Click here](#) for Part 1 (Disable Autoinput)

[Click here](#) for Part 2 (Disable Spelling/Grammar Check etc)

[Click here](#) for Part 3 (Disable Cursor Movement)

How to import the Comments tab:

(Only available on the spreadsheet version of this page)

[Click here](#) for Part 1 (Preparation)

[Click here](#) for Part 2 (Copying)

[Click here](#) for Part 3 (Pasting)

[Click here](#) for Part 4 (Finish off)

Warning:

The software used to operate this spreadsheet is "Open Source" and free. It is maintained entirely by a community of volunteers and whilst every effort is made by the numerous programmers to issue a stable product, a small number of "bugs" may exist which can cause unexpected results, or even data loss.

USERS MUST ALWAYS KEEP AT LEAST ONE BACKUP COPY OF ALL IMPORTANT DOCUMENTS.

Disclaimer:

The author will not be held responsible for any unfortunate events which may occur as a result of using this facility. It should be used with caution as some of the needle data has been keyed manually and possibly contains errors, although every attempt has been made to keep these to a minimum. Cross-reference to an official needle chart is strongly recommended prior to making any modifications based on the results from this spreadsheet. The arithmetic and calculations in general should be correct, but again, this cannot be guaranteed.

This spreadsheet has been created primarily as a technical challenge for the author, but also as a useful tool for his personal use. The author hopes that it will also be of benefit to other engine tuners, subject to the above.
E & OE – Use it "as is" and at your own risk!

Updates may become available. Suggestions are welcome for discussion!
Please also feel free to report data corrections required in the needle charts.
[Contact: ian\(_UNDERSCORE_\)robert\(.DOT.\)hamilton\(@AT@\)hotmail\(.DOT.\)co\(.DOT.\)uk](mailto:ian(_UNDERSCORE_)robert(.DOT.)hamilton(@AT@)hotmail(.DOT.)co(.DOT.)uk)

Like to make a charity donation?

This comprehensive utility is offered to users totally free of charge and with no obligation whatsoever. (Subject to the disclaimer above).

What you see here is the result of hundreds of hours of work and updates are still being made by the author as and when appropriate.

If you have found this project useful and you feel that you would like to make a charitable donation in recognition of this, you are warmly invited to click the link below and donate some money to Macmillan Cancer Support:-

[To donate, please click here...](#)

Thank you for your generous support!

See also:

Ratios.ods

The A-Series Gearbox & Speedometer comparison and analysis spreadsheet

Acknowledgements:

Many thanks go to Mark Forster for hosting this work on his excellent website:
mk1-performance-conversions.co.uk

Finally, the author firmly believes that the classic car fraternity owes a huge debt of gratitude to Burlen Ltd. Despite carburettors becoming obsolete on new vehicles some 30 years ago, Burlen continues to provide the desperately needed parts and spares required to keep these cherished vehicles alive.

Needles.ods can also be downloaded from their website:

<https://burlen.co.uk/>

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BB4	F90	◀ Needle Type & Profile Name ▶		S100	BDL	Needle 2	Adjust Jet
Size	Annular Area		Working Range	Annular Area		Size	0%
900	6362	Needle 1	12	Needle 2	7854	1000	Result
tenths	square thou	1 of 2	Index	2 of 1	square thou	tenths	tenths
890	141	89.9%	1	111.2%	156	990	990
850	687	99.5%	2	100.5%	691	955	955
810	1209	105.2%	3	95.0%	1148	924	924
780	1583	99.5%	4	100.5%	1591	893	893
742	2038	103.0%	5	97.0%	1977	865	865
706	2447	102.3%	6	97.7%	2391	834	834
670	2836	99.4%	7	100.6%	2853	798	798
638	3165	100.5%	8	99.5%	3149	774	774
602	3515	99.9%	9	100.1%	3518	743	743
564	3863	99.2%	10	100.8%	3895	710	710
528	4172	98.8%	11	101.2%	4222	680	680
495	4437	97.8%	12	102.2%	4536	650	650
460	4700	97.2%	13	102.9%	4835	620	620
			14		5120	590	590
			15		5391	560	560
			16		5648	530	530

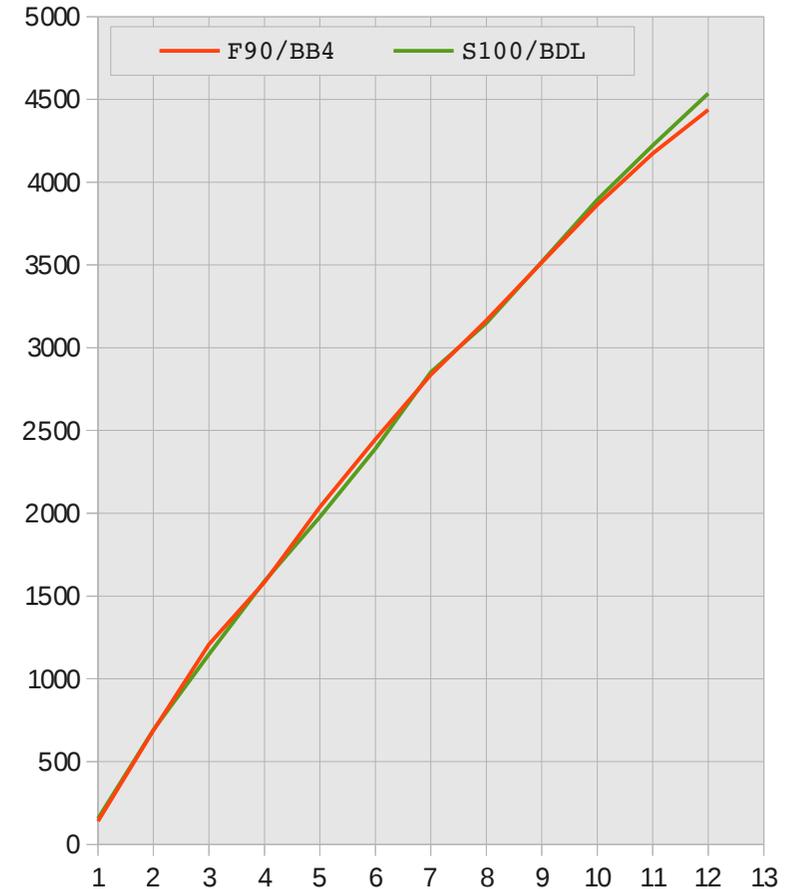
AUD1535	Comments	NZX8011 MG Metro (Early)
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Carb Size	Working Range
eg H2/HS6	Index
1	7
2	9
4/38	11
6/44	12
7	14
8	15/16

Needle 1	Size	New Size	
F90/BB4	900	1000	
1	141	890	991
2	687	850	955
3	1209	810	920
4	1583	780	894
5	2038	742	861
6	2447	706	830
7	2836	670	799
8	3165	638	773
9	3515	602	743
10	3863	564	713
11	4172	528	685
12	4437	495	660
13	4700	460	634
14			
15			
16			

Needles.ods
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SU Spring Code	Rate (ounces)	@ Length (inches) A/[B]	Part No. A/[B]
Light Blue	2.5	2.625	AUC 4587
Red	4.5	2.635/1.530	AUC 4387/AUD 4355
Yellow	8	2.750/1.530	AUC 1167/AUD 4398
Green	12	3.000/1.530	AUC 1170/JZX 1088
Brown	14	3.000	AUC 1168
White	18	3.562	AUC 1166
Red and Green	11.25	3.875	AUC 4826
Red and Yellow	24	4.812	AUC 4478
Red and White	40.5	3.875	AUC 4869
Light Blue and Black*	4.5	3.875	AUC 2107
Light Blue and Red*	18	3.875	AUC 4818

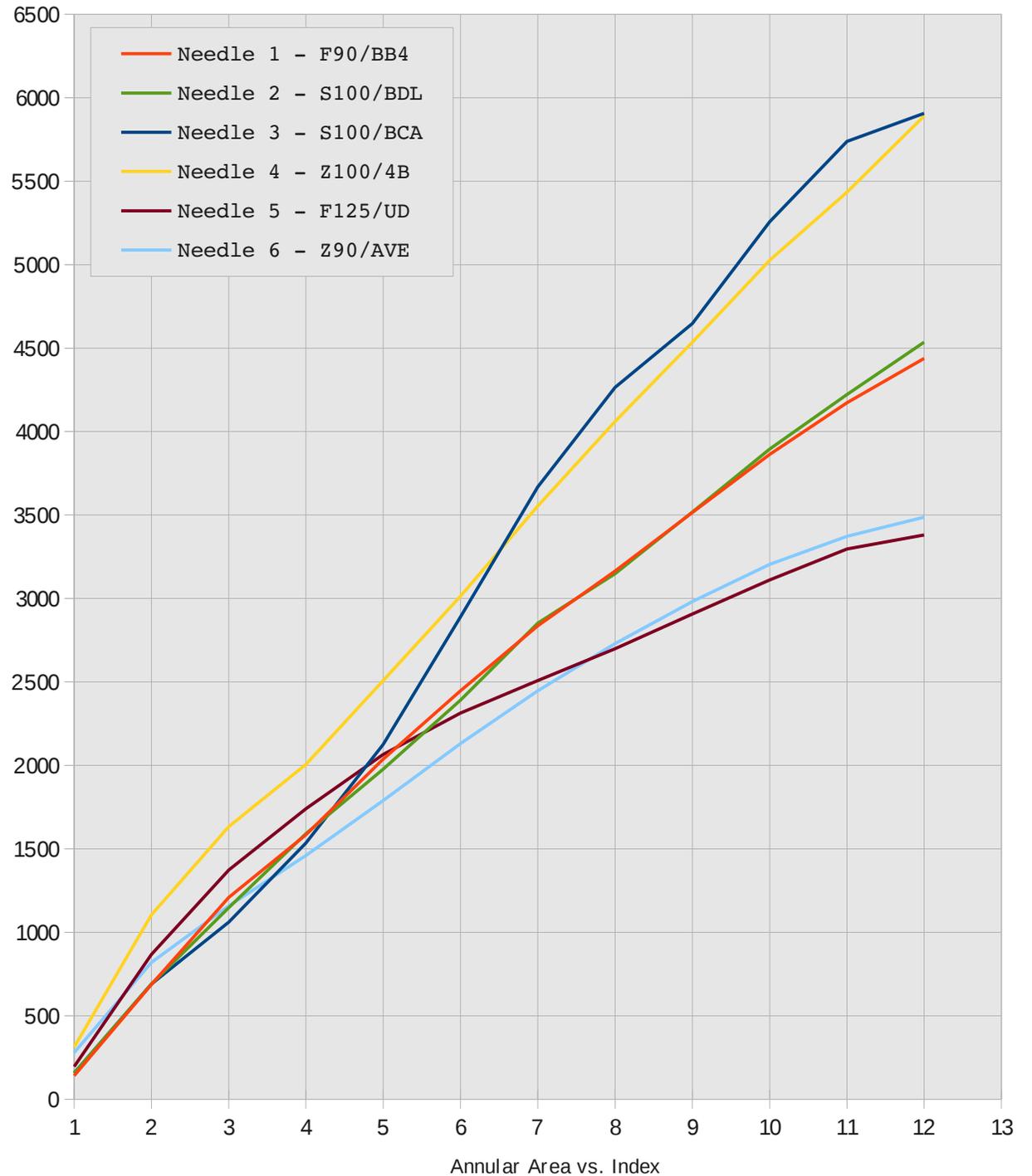


Annular Area vs. Index
Chart All [Visit Mk1](#) [Click-Me!](#)

Notes:	
Needle Counts	
SU	787
Stromberg	381
You can delete this content if you want to!	
To force the chart to Refresh: Press F9	
For Full Screen Mode: Press Ctrl+Shift+J	

Working Range	Needle 1	Needle 2	Needle 3	Needle 4	Needle 5	Needle 6
12	Show	Show	Show	Show	Show	Show
Select ▶	▼	▼	▼	▼	▼	▼
Index	F90	S100	S100	Z100	F125	Z90
	BB4	BDL	BCA	4B	UD	AVE
1	890	990	990	980	1240	880
2	850	955	955	927	1205	840
3	810	924	930	890	1178	814
4	780	893	897	863	1158	790
5	742	865	854	825	1140	763
6	706	834	795	785	1126	734
7	670	798	730	740	1115	706
8	638	774	676	695	1104	680
9	602	743	639	650	1092	656
10	564	710	575	600	1080	634
11	528	680	519	555	1069	617
12	495	650	498	500	1064	605
13	460	620	450	500	1058	602
14		590	400		1047	
15		560	400		1036	
16		530	400		1025	
17						
18						
19						
20						

Needles.025.Mk1 - Basic



Needles.ods

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Chart All	No
Show Suggested	No
... From Tab	F100

Comments

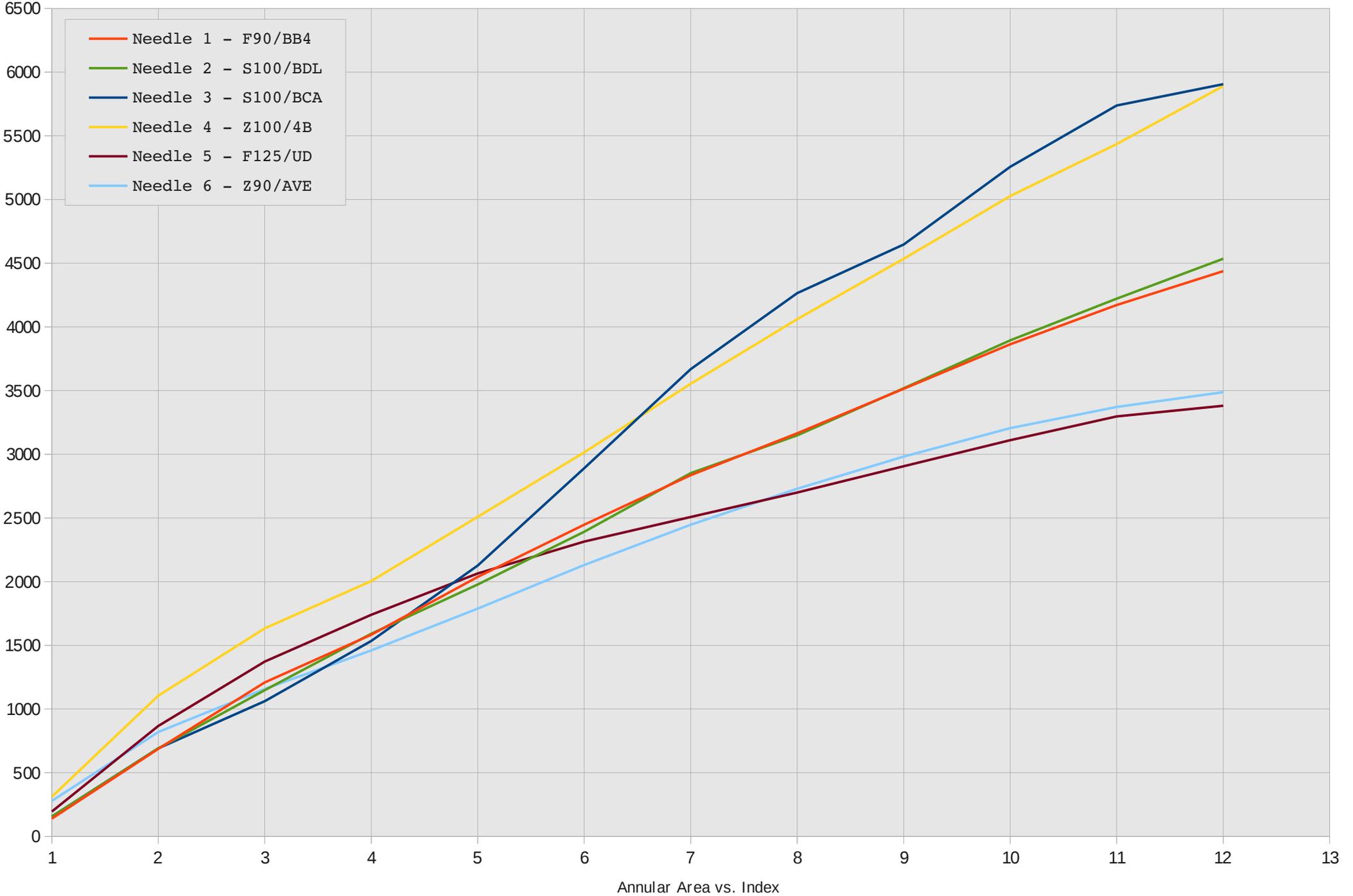
Displaying the needles selected in rows 4 and 5

Show Data From **Basic**

Chart All **No**

Working Range **12**

For Full Screen Mode: Press Ctrl+Shift+J



Annular Area vs. Index

Index	test	Use TEST	AVE	1	2	3	4	5	6	7	20	21	24	61	62	69	80	81	24A	24B
1	890	890	889	890	890	890	890	890	890	890	890	890	880	890	890	890	890	890	880	880
2	850	850	850	850	850	850	850	850	850	850	855	855	845	850	850	850	850	850	845	845
3	805	805	817	814	814	814	814	814	814	814	822	827	815	805	810	805	800	800	815	815
4	768	768	790	785	785	785	785	785	785	785	792	800	785	775	780	785	780	770	785	795
5	741	741	766	770	767	765	761	758	755	755	760	775	755	745	750	765	758	742	760	775
6	720	720	744	755	749	744	737	733	725	720	730	750	725	725	734	750	733	719	738	755
7	694	694	724	740	732	723	714	705	696	686	703	723	702	709	719	740	705	699	716	735
8	669	669	706	725	714	703	692	680	666	650	677	697	682	690	700	730	680	680	698	715
9	643	643	689	710	696	683	668	653	636	620	647	671	667	670	685	720	653	653	680	695
10	617	617	673	695	678	661	645	627	606	587	624	646	650	653	670	710	627	627	660	675
11	590	590	657	680	660	640	620	600	577	553	600	628	636	635	650	700	600	600	640	655
12	565	565	640	670	650	630	610	590	550	520	580	608	625	620	635	690	590	590	620	635
13	538	538	591	660	640	620	600	580	520	490	560	590	610	600	620		580	580	600	615
14																				
15																				
16																				
F90	Diameters	Comments																		
			2014	1885	1956	2014	2096	2142	2233	2290	2176	1944	2233	2233	2130	1944	2142	2302	2084	1885
Priority Index		6	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290	2290
Working Range		11	2972	2730	2941	3145	3343	3534	3747	3960	3534	3264	3185	3195	3043	2513	3534	3534	3145	2992
Tolerance +/- n%		2.50%	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628	3628
Tolerances at Priority Index			88%	82%	85%	88%	92%	94%	98%	100%	95%	85%	98%	98%	93%	85%	94%	100%	91%	82%
Tolerances at Working Range			82%	75%	81%	87%	92%	97%	103%	109%	97%	90%	88%	88%	84%	69%	97%	97%	87%	82%
Perfect Match Found		1.000																		
Possible Needles		3 of 279																		
TEST same as AY up to W/R			AVE	1	2	3	4	5	6	7	20	21	24	61	62	69	80	81	24A	24B
Suggest	AY	1.000	1																	
	S6	0.999	2	AUD1000	AUD1001	AUD1002	AUD1003	AUD1004	AUD1005	AUD1006	AUD1007	AUD1008	AUD1009	AUD1021	AUD1022	AUD1023	AUD1030	AUD1031	AUD1010	AUD1011
	EA	0.999	3																	
			4																	
			5																	
General Notes for F90 Needles																				
Fixed SU needles, primarily used in pre-HIF type carburettors up to and including 1½"																				

Index	test	Use TEST		AVE	53	55	58	A9	BC	C1	C1W	CV	DF	DG	DX	GK	K	KA	KB	KC	KD
1	990	990		993	1000	1000	1000	980	990	990	990	990	1000	1000	990	1000	1000	990	990	990	990
2	950	950		950	950	950	950	946	950	950	955	940	960	960	958	940	950	950	950	935	950
3	910	910		913	900	900	900	913	910	916	930	900	910	905	926	890	905	920	917	900	908
4	880	880		882	858	858	858	880	880	889	905	867	880	870	888	850	865	895	900	870	883
5	850	850		855	815	815	815	850	850	861	875	840	850	836	859	810	830	876	886	840	856
6	825	825		828	777	780	780	834	825	840	856	815	820	804	830	780	800	855	872	820	830
7	812	812		801	738	740	744	818	803	818	836	795	782	772	775	750	777	835	860	800	775
8	783	783		775	700	700	712	802	785	796	819	775	750	740	740	720	760	814	850	785	740
9	756	756		747	668	670	685	787	765	778	800	760	725	710	705	690	740	793	845	765	705
10	729	729		721	636	640	660	770	750	760	780	745	700	689	670	660	722	784	840	750	670
11	700	700		695	606	620	640	755	730	740	760	732	685	670	635	630	705	780	835	730	635
12	673	673		671	579	600	620	740	720	730	752	720	670	653	600	600	685	780	830	715	600
13	645	645		648	552	570	600	722	710	720	746	710	655	636	565	570	667	780	825	695	565
14	618	618		622	530	550	580	706	700	710	740	700	640	620	530	540	650	780		675	530
15				521																	
16				510																	
F100	Hybrid of F	Comments											•	•							
				2469	3112	3076	3076	2391	2508	2312	2099	2637	2573	2777	2443	3076	2827	2113	1882	2573	2443
Priority Index		6		2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508	2508
Working Range		12		4318	5221	5027	4835	3553	3782	3669	3413	3782	4328	4505	5027	5027	4169	3076	2443	3839	5027
Tolerance +/- n%		2.75%		4297	4297	4297	4297	4297	4297	4297	4297	4297	4297	4297	4297	4297	4297	4297	4297	4297	4297
Tolerances at Priority Index				98%	124%	123%	123%	95%	100%	92%	84%	105%	103%	111%	97%	123%	113%	84%	75%	103%	97%
Tolerances at Working Range				100%	122%	117%	113%	83%	88%	85%	79%	88%	101%	105%	117%	117%	97%	72%	57%	89%	117%
Best Correlation		0.999											0.991								
Possible Needles		4 of 124											4								
Using Needle "TEST"				AVE	53	55	58	A9	BC	C1	C1W	CV	DF	DG	DX	GK	K	KA	KB	KC	KD
Suggest	RK	0.999	1	Visit Mk1	AUD1016	AUD1017	AUD1018	AUD1061	AUD1063	AUD1099	AUD1117	AUD1112	AUD1124	AUD1125	AUD1525	AUD1215	AUD1244	AUD1470	AUD1477	AUD1500	AUD1501
	ZA	0.998	2																		
	SM	0.996	3																		
	DF	0.991	4																		
			5																		
General Notes for F100 Needles				Fixed SU needles, primarily used in pre-HIF 1¼" carburetters																	

Needles.ods

Release 025.Mk1

2018/03/27

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How to import the Comments tab: [Click here](#) for Part 1 (Preparation)[Click here](#) for Part 2 (Copying)[Click here](#) for Part 3 (Pasting)[Click here](#) for Part 4 (Finish off)

Lookup ▶	SU Needle Name	EB	AUD1149	F90/EB
Minor 803cc H1 Rich, 948cc H2 Lean, Mini 848cc HS2 Std, Auto 848cc HS4 Lean, Non-Auto 1098cc HS2 Lean, Coopers ex. 998cc Lean, MG1300 '69 2xHS2 Std				
Needle Name	Comment Hint: Create/Edit your own comments from row 21 down to row 900			
F90/TEST	Diameters same as F90/AY			
S90/TEST	Diameters same as F90/7			
F100/TEST	Hybrid of F100/BC and F100/KU			
S100/TEST	Diameters same as F100/OA7			
F125/TEST	Diameters same as the "average" needle for F125			
F187/TEST	Diameters same as F187/WC			
F250/TEST	Diameters same as the "average" needle for F250			
Z90/TEST	Diameters same as F90/7			
B90/TEST	Diameters same as F90/AAA			
Z100/TEST	Diameters same as F100/RC			
B100/TEST	Diameters same as B100/45P?			
F90/EX1	See F90/EX/1			
F90/81	Morris Six (MS) 2215cc 1948-1953. See also alternative AY.			
F90/AY	Morris Six alternative to 81			
F90/7	Popular "A-Series" performance needle for HS4			
F90/MOW	Minor 803cc H1 Lean			
F90/EB	Minor 803cc H1 Rich, 948cc H2 Lean, Mini 848cc HS2 Std, Auto 848cc HS4 Lean, Non-Auto 1098cc			
F90/BX1	Minor 948cc H2 Standard			
F90/S	Minor 948cc H2 Rich			
F90/MO	Minor 948cc H2 Lean			
F90/AN	Mini Auto 848cc HS4 Std, Non-Auto 1098cc HS2 Std, Mini-Cooper 'S' 970cc 2xHS2 Std (See also S9			
F90/H6	Mini Auto 848cc HS4 Rich, Non-Auto 1098cc HS2 Rich, Cooper 'S' 970cc 2xHS2 Rich, Cooper 'S' 10			
F90/AD	Almost identical to Needle H6 (Only Idx2 differs)			
F90/GZ	Mini-Cooper 997cc 2xHS2 Standard - Available as S90/AAC (CUD1002) and F90/GZ (AUD1473)			
F90/AH2	Minor 948cc H2 Rich, Mini-Cooper 997cc 2xHS2 Rich, Mini-Cooper 'S' 1275cc 2xHS2 Rich			
F90/3	Mini-Cooper 'S' 1071cc 2xHS2 Rich			
F90/GX	Mini Non-Auto 998cc HS2 Standard			
F90/M	Mini Non-Auto 998cc HS2 Rich, Cooper 998cc 2xHS2 Rich, MG1300 & 1300GT 1275cc 2xHS2 Rich,			
F90/AC	Mini Auto 998cc HS4 Standard			
F90/M1	Mini Auto 998cc HS4 Rich			
F90/HA	Mini Auto 998cc HS4 Lean			
F90/GG	Minor 803cc H1 Standard, Mini-Cooper 998cc 2xHS2 Lean, Austin 1300GT & MG1300 MKII 1275cc 2			
F90/GY	Mini-Cooper 998cc 2xHS2 Standard, MG1100 1098cc 2xHS2 Lean, MG1300 MKII & Austin 1300GT			
F90/DL	Auto 1098cc HS4 Standard			
F90/BQ	Auto 1098cc HS4 Rich, Auto & Non-Auto 1275cc HS4 Rich, MG1300 1967/69 with HS4 Rich			
F90/ED	Auto 1098cc HS4 Lean			
F90/D3	MG1100 1098cc 2xHS2 Standard			
F90/D6	MG1100 1098cc 2xHS2 Rich			
F90/DZ	Auto & Non-Auto 1275cc HS4 Standard, MG1300 1967/69 with single HS4 Standard			

2018/03/27

Release 025.Mk1

Dedicated to the author's father, David Hamilton (1942-2006).

Improved Advanced - Jet Converter tidied up. Some missing grid lines re-added.

Modified "Adjust Jet" to allow a nominal amount of hypothetical mixture leaning to be calculated for index 1 - This will enable users to visually estimate an idle mixture match between index 1 and 2, using the charts.

Modified the "Adjust Jet" pulldown menu to make it more robust. Under certain circumstances, the percent values were scrambled/out-of-order.

Improved Basic - Better handling of "Show/Hide" needle captions.

Increased column width on data tabs from 0.44" to 0.46" to avoid ### being displayed when zooming F187 and F250.

Added a "Donate button" targeted at a charitable organisation's website.

Added facility to display supplier/sponsor hyperlinks (Fixed/author defined).

2017/02/28

Release 024.Mk1

In certain areas, the spreadsheet now detects which operating system is being used - This enables Mac-specific help to be displayed as appropriate.

Part numbers added to the data tabs for easy reference. Part numbers are now also displayed on the "Advanced" tab.

F90 and S90, needle AAA index 7 contained a typo and has been corrected.

Thanks to mk1-forum.net member John Gervais for spotting this and advising me.

2016/02/19

Release 023.Mk1

F187, needle RM1, index 19 contained a typo and has been corrected.

Improved the data tabs to be able to directly import "Needle 1", "Needle 2", or a "Jet Converter" needle directly from the "Advanced" tab. The mode is set in cell "D1" and expects either the name of the "test" needle, or "NDL1", "NDL2" or "CONV" as appropriate.

As a result of this mod, the "Suggested Needles" correlation has been moved to start at index 2 instead of index 1 for logistical reasons - This will also be beneficial as realistically, no engine will ever actually run at index point 1.

Many thanks again to mk1-forum.net member John Gervais for prompting me to elevate the priority of this concept and finally get it included.

2016/02/05

Release 022.Mk1

Improved Advanced - Changed "Drop Jet" to "Adjust Jet" and modified it to now be able to both lower and raise the jet on Needle 2, relative to Needle 1.

Help improved in cell C22 on the data tabs, removing duplicated remark regarding the "Advanced" tab.

Copyright dates updated to 2016.

Debug: On "Comments", removed extra/spurious help from cells A5 and F5.

S90, needle AAB and a few others, index 1 contained an error and these have been corrected. Many thanks to mk1-forum.net member John Gervais for advising me of this and his assistance in testing and providing feedback for this version.

2015/10/16

Release 021.Mk1

Database of all known SU and Stromberg part numbers added. This is available on the "Comments" tab which now includes a comprehensive "Lookup" feature.

Some needles do not have a part number listed and there are some part numbers which do not have a set of needle dimensions available.

Were the latter "place-holders" for future needles? If any users are able to assist in filling the gaps, they are asked to contact the author.

Comments added for many standard/lean/rich needles used in 'A' Series engines.

"Comments" now has a freeze line, scrolling only the "user-defined" comments. "Notes:" area shrunk on "Advanced" to allow a table containing the list of SU springs to be included. Tab "Chart" added, a larger "full-sized" chart which can be set to show either the data from "Basic" or "Advanced". Limited support/data added for SU 3/16" (0.1875") needles and SU 1/4" (0.250") needles, see the new F187 and F250 tabs. "Filed A/F" and "Drop Jet" are not available for indices higher than index 16. Use "Basic" to view all indices. Layout and appearance optimised for viewing on 1280x768 resolution monitors and printing "Advanced", "Basic" and "Chart" on A4 (210mm x 297mm) sized paper.

NB: On the data tabs and "Comments" tab, if it is set at all, the default "Print Range" will be set as the first page only. This is only to allow the sample "ReadMeFirst" .pdf file to be created. To enlarge the print ranges: Highlight the total area required, then select "Format"→"Print Ranges"→"Define".

2014/08/20

Release 020.Mk1

Improved to allow "missing" index diameters in the "Test" needles. A minimum of three indices is required, Idx1, P/I and W/R. Drop Jet facility is disabled and reverts to "Filed A/F" if there is a needle with gaps in it specified in the "test" needle. Tolerance values on data tabs now show as a percentage. CloseMatch needles on data tabs now also ranked - All suggested are highlighted. Data for duplicated, possibly false needle removed (B100/B1R).

2013/11/25

Release 019.Mk1

Improved Advanced - Jet Converter can now be applied to either needle. Debug Basic - Fixed broken greying out of 1-16 index numbers. For a full .pdf sample, export pages "1-5,6,7,8,9,10,11-", and set "Initial View" Tab, Magnification - Zoom factor 75%.

2013/11/18

Release 018.Mk1

Debug - .PDF sample copy text not rendering nicely due to reduced height rows. Reset ReadMeFirst and Updates to 0.18" high but left all others as they were. The .PDF therefore looks a bit odd in places, but the proper .ODS file is OK. Improved Data Tabs - Percentages reciprocated so that each needle is shown as a percentage of the test needle. Needle name also duplicated at bottom of list.

2013/11/17

Release 017.Mk1

Debug - Advanced - Fixed caption for needle 2 not appearing on chart. Improved Advanced tab to add a "Drop Jet" feature to emulate lowering the jet. Improved Basic tab to include a "Show/Hide" setting for each needle. B100, needle B1AK, index 4 contained a typo and has been corrected.

2013/06/13

Release 016.Mk1

Print ranges added to allow sample .PDF's to be created. Tabs coloured. Font on ReadMeFirst and Updates changed to DejaVu Sans Mono. No other changes.

2013/01/10

Release 015.Mk1

F100, needle TN, index 3 contained a typo and has been corrected. Data tabs percentages are now area based for greater accuracy. They now also match the percentage values shown on Advanced.

2012/12/10

Release 014.Mk1

Improved Basic tab, taller chart and neater message boxes.

Width on Basic tab now a closer match to the Advanced tab.

Added pulldowns for needle name on Advanced and Basic.

Better help added to many caption cells.

Better error handling.

"Check for Updates" hyperlinks to the "Mk1 Home Page" on Basic and Advanced.

2012/12/07

Release 013.Mk1

Revised "Comments Tab" with simpler copy-and-paste instructions. Only the data section of the tab is now transferred. Better comment lookup added.

Added pull-down menus to most input fields. (Needle name pending...)

Changes on data tabs to accommodate pull-downs, plus other mods.

Changed height of data tab rows to fit better on the screen without scrolling.

Moved some of the context help to the captions instead of the input fields to make it less intrusive.

Fixed "ERR:502" on jet re-size calculator, replaced with "!" as a warning.

Swapped "Chart All" and "Show Suggested" options on tab Basic.

2012/11/27

Release 012.Mk1

ReadMeFirst reformatted as Courier 10 pitch and re-widened to 80 chars to enable easier cut-n-paste.

ReadMeFirst typos in jet size explanation corrected.

ReadMeFirst references to OpenOffice updated to LibreOffice

ReadMeFirst "Acknowledgements" added.

2012/10/05

Release 012

Filed "A/F function" modified to expect the amount filed off to be entered in Column H instead of the reduced diameter. This is still in tenths. Data tab F100, needle ZB, index 5 contained a typo and has been corrected.

The "diameter/area finder" on tab "Advanced" has been enhanced/replaced with a far better feature for working out an equivalent whole needle of "Needle 2" for different sized jets.

2012/04/22

Release 011

"Basic" tab added for quick comparison of up to 6 needles of any type.

The basic tab can also import and display the suggested needles from the data tabs.

Zenith-Stromberg needles split into bias/non-bias, as per the SU's fixed/swing.

Minor amendments to the chart on tab Advanced.

Amended "Comments" instructions to include "Ctrl+A" when migrating versions.

2012/02/08

Release 010

Needle chart data added for 90thou Zenith-Stromberg carbs

A few more Z100 needles added. Some typo's corrected.

Modified column F on Main as LibreOffice does not assume a blank field to be a zero value. A blank "Filed Off Area" in Column I was causing an error in column F. Added "IF(ISNUMBER())....")"

2011/06/15

Release 009

Minor mods to fix cell positioning for version information

Debug – Fixed "Working Range" input rejection on sheet "Main"

2011/05/25

Release 008

First general release version. More examples added. No other changes.

2011/04/26

Version 007

Support and needle chart data added for 100thou Zenith-Stromberg carbs.

2011/04/26

Version 006

Moved the needle comments to a separate tab to make it easier to migrate from one version to another. Refer to ReadMeFirst for details. Many undocumented minor improvements. Better "Input Help".

2011/04/13

Version 005

Added a decent example of a "Test" needle for a fixed 100 thou jet to the ReadMeFirst tab.

2011/04/10

Version 004

Fixed error handling for A/F that got broken when re-arranging the sheet.

2011/04/09

Version 003

Changed legend on chart so that the key on the left is the left needle and the key on the right is the right needle.

Moved some of the content around so that the spreadsheet displays better on a standard 1024x768 aspect screen. To do this, two of the Filed A/F columns have been hidden, but these were only workings and are of no real interest to the user.

Shortened the height of the graph to fit a standard screen whilst making the Show All switch visible.

Increased the height of the Comment boxes on sheet Main to allow longer comments to be displayed.