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# Circular Chaser Diehead Seminar

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# Circular Chaser Diehead Seminar

## Seminar Outline

### Diehead Maintenance & Chaser Grinding

This seminar is directed towards machine operators, Maintenance, Set-up people, Tool Grinders and Process Engineers.

- Diehead preventive maintenance; covers which parts wear in an opening diehead and how it effect the quality of your piece parts.
- Set-up and Adjustments; covers the correct way to preset tooling, mounting chasers into the diehead and setting correct pitch diameters.
- Grinding and resharpening procedures; how to achieve correct and repeatable grinds for straight and taper threads. Procedures on how to qualify your micrometer.

The seminar takes about one hour and an overhead and sketch board helps with the presentation.

Presented by: Robert S. Perkins

Open the door to communication & continuously training



## RSVP Tooling, Inc. Information Sheet

**Commitment:** Service all customers with the highest quality external threading tools and guarantee their quality, be competitively priced and there when you need them.

**Quotation:** One to two day maximum from request date.

**Stock:** We presently carry a wide range of replacement thread rolls for the radial, tangential, and axial heads. We have and will continue to carry a large circular chaser system inventory to support our customer's demands and we carry the projected ground Supermetric insert chasers.

**Facility:** RSVP Tooling is located in the Joliet Illinois located south of Chicago's O'Hare airport.

RSVP Tooling has trained engineers that will assist you if technical problems regarding your thread rolling or chasing arise.

Please call, fax or e-mail us if you require one of our full in depth catalogs.



# Circular Chaser Diehead Seminar

## Diehead Maintenance

### Check List

**Chaser Springs:** Visually inspect that they function without chip interference or being bent.

**Pins in Block:** Examine that they are not broken or bent.

**Cams on Diehead Cup:** Check for excessive wear on edge of cams.

**Guide Pins:** Pin in adjusting plate should not move, if so replace.

**Adjusting Plate:** If guide pin had to be replaced, check plate if not warped.

**Floating Bushing:** This bushing is in the body, which the guide pin runs through, make sure there is enough bushing showing through the body hole.

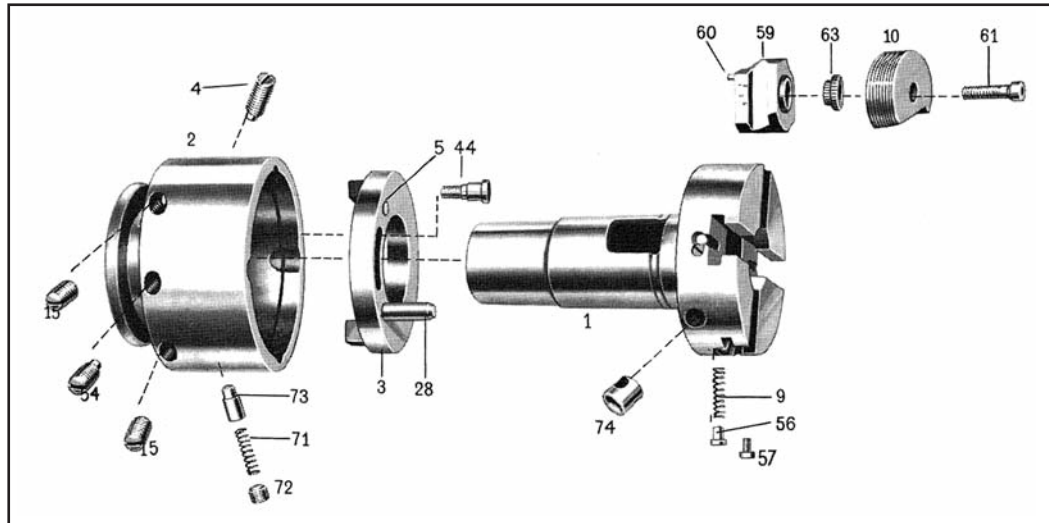
**Plunger:** Remove and inspect control point at tip edge.

**Spring Plunger:** If plunger is being replaced make sure spring still has compression.



# Circular Chaser Diehead Seminar

## RSVP DR 9/16 Diehead Component Part Breakdown



Part #	Unit Description	5/16" Reqd.	3/8" No.	9/16' No.	13/16" No.	1" No.	1-1/16" No.	1-5/8" No.	No.
DR-1A	Body Assembly	1	2960	2957	2992	2911	2909	2916	2919
DR-2A	Cup Assembly	1	2961	2958	2951	2912	2910	2917	2920
DR-3A	Adjusting Plate Assy	1	2962	2959	2952	2913	2907	2918	2921
DR-4	Retaining Screw	10	3024	3023	3028	3087	3074	3028	
DR-5	Stop Pin in DR-3A	1	3021	3025	3025	3029	3029	3029	3209
DR-9	Chaser Spring	4	3218	3226	3233	3239	3244	3239	3244
DR-9HD	Chaser SpringIHD	4	3195	3233	3227	3250	3240	3250	3240
DR-15	Adj Screw in DR-2A	2	3156	3026	3022	3030	3027	3030	3031
DR-28	Guide Pin in DR-3A	1	3174	3171	3164	3099	3100	3099	3157
DR-54	Chsr Locking Screw	1	3020	3043	3042	3044	3163	3074	3044
DR-56	Spg Plunger for DR-9	4	3073	3080	3080	3080	3046	3080	3046
DR-57	Spg Plunger Screw	4	3045	3045	3045	3045	3045	3045	3045
DR-60	Pin in Block	4	3071	3247	3247	3247	3247	3247	3255
DR-61	Chaser Screw		****	****	****	****	****	****	****
DR-63	Serrated Brushing		****	****	****	****	****	****	****
DR-71	Spring for DR-73	2	3143	3197	3220	3228	3228	3228	3246
DR-72	Ret Screw for DR-73	2	3147	3263	3152	3201	3201	3201	3201
DR-73	Die cup RetPlunger	2	3159	3161	3161	3153	3153	3153	3153
DR-74	Float Bushing Assy	1	2953	2953	2953	2908	2908	2908	2922

\*\*\*\* SEE PAGE 20 & 21

Our Cups, Bodies and Adjusting plates come complete as an Assembly

To order stainless steel springs add an "S" at the end of the piece part number.

We carry screws with a nylon plug to prevent screws from moving, add "N" after part number.

We offer different style screw heads upon request, hex, allen, etc.



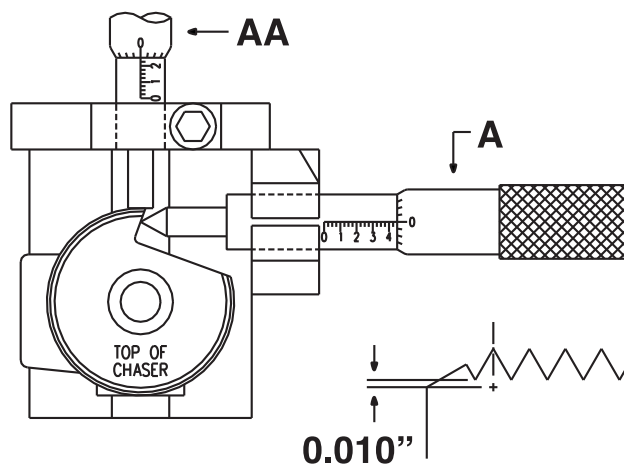
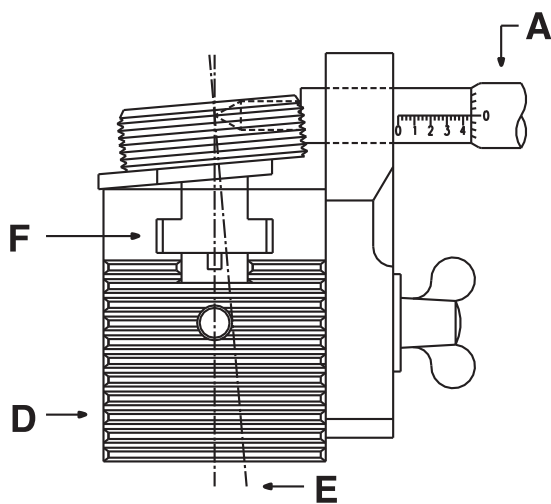
# Circular Chaser Diehead Seminar

## Using The Micrometer Setting Gauge

The gauge is designed so the chaser block (with chaser mounted on it) is fitted in the gauge slots.

Adjust micrometer holding brackets on the side and end of the gauge to a height which permits that flat spindle of barrel AA to contact the chaser thread grooves about two or three threads from the top of the chaser, and the point of the spindle of barrel A to touch the chaser face approximately in line with the crest of the first full thread.

Set micrometer barrel AA to read single thread depth plus  $.010''$ . Thus, when chaser is located against the flat spindle of barrel AA, the spindle point of micrometer barrel A contacts the chaser face at a point  $.010''$  below the root diameter of the thread. This distance below the root diameter may be increased if the operator desires, depending on thread pitch or nature of grind. (See chart "AA" reading for actual settings)

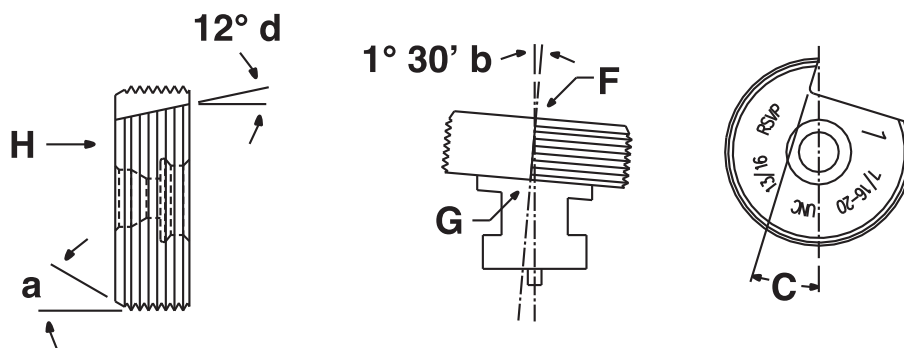


\*NOTE: These readings, as well as the suggested face and hook angles, are intended to serve only as a guide from which the operator can determine the angles and readings which work best on his individual jobs.

## How To Grind Circular Chasers

Circular chasers must be sharpened by a single grinding operation with the chaser and its holding block mounted in a grinding

fixture adapter. By grinding the face of the chaser in the fixture the three angles B, C, and D are ground simultaneously.



## Taper Thread Chasers

Regrinding and setting taper thread chasers and blocks for dieheads varies only in respect of the fixture base setting which controls the face angle.

Whereas the standard setting of 6 degrees produces a face angle of 1 degree 30 minutes on chaser, the base setting for taper thread chasers must be found by experiment.

These particular chasers when ground and set will have no face angle, but will be square with the base of the chaser block.

To achieve this, alter base setting from 6 degrees to 5 degrees. Grind two chasers to normal 22 degrees hook angle. Stand these on a flat surface and bring the two ground face angles in contact with each other. These two faces should touch from top to bottom in their length.

When correct base reading has thus been obtained, the chasers and blocks will then be ground and set in the normal manner, except that it is necessary to lower the bracket carrying micrometer A to the same level as micrometer AA. This will enable micrometer A to contact the chaser face at the depth of the thread plus 0.010".

Finally, we find it advisable to grind the chasers to a slightly higher micrometer reading than normal.

Where hook angles other than 22 degrees are required, the base readings, as shown above would vary and have to be found by experiment.



## Setting Chaser Ahead For Grinding

Remove chasers and blocks from the dieheads and check the face reading on Micrometer Setting Gauge. Put the gauge in a vice, back off barrel A and remove chaser screw with a wrench.

Lift the chaser off the double serrated bushing, holding the bushing in the block by pushing wrench through the chaser screw hole. Carefully move the bushing one serration ahead in the block and replace the chaser on the bushing so the cutting edge of the chaser is near its former position on the block. This results in advancing the cutting edge of the chaser approximately .008" for each serration the bushing is moved ahead in the block.

What has actually been done to obtain this fine setting is to move the smaller end of the bushing ahead in the block, and the chaser back on the larger end of the bushing. For example, 1/4"-28 T.P.I. Chasers for a 3/8" Style DR diehead use a bushing with 19 serration on the small

end (which goes in the block) and 20 serration on the large end (on which the chaser fits). Movement of one of the 19 serration is about .165", and one of the 20 serration is about .157". Thus, moving the bushing ahead .165" and the chaser back .157" leaves the chaser advanced .008" over its original position.

Check the chaser setting with micrometer barrel A to see that the chaser has been advanced enough to secure a good, clean grind. If more than a .008" grind is required moving chaser and bushing each two serration with advance the cutting edge .016", and so on. Replace the chaser screw and as you tighten it, pull the chaser back against the bushing serration with "C" spanner wrench. This prevents movement of the chaser on its bushing under cutting pressure after it is replaced in the head.

**\*Keep chasers and block free from dirt and swarf.**

## Setting The Grinding Fixture

When all chasers of the set have been moved ahead and locked on their blocks for grinding, put the chaser and block into the proper size adapter, which has been clamped by the screw in the center slot of the Chaser Grinding Fixture.

All adapters are designed to hold a chaser at a twelve degree angle for grinding the chip clearance angle.

Correct setting of the chaser for grinding the hook angle is obtained by turning the grinding fixture head to the desired angle reading on degree scale of fixture head bracket and tightening clamp screw.

The face angle setting is made by turning the fixture on its base and tightening base lock screw. To grind the correct face angle of 1 degree 30' on the Chaser and Block assembly. If the hook angle is increased by 5 degrees the base reading should be advanced by 1 degree.



## Grinding The Chaser

Bring the chaser against the grinding wheel. Keep the table moving back and forth and do not feed the chaser against the grinding wheel too fast. Take light fast cuts for a good grind without burning the chaser face.

**IMPORTANT:** Do not grind too close to serrated hole - grind only deep enough for sufficient chip clearance.

If a large amount is to be ground off the chaser face, rough grind first by moving the chaser in approximate position under the grinding wheel and raise the table. This is less likely to burn the chaser. Then finish grind with the inward movement of table.

Grind off the proper amount on each chaser according to the dials on the

grinding machine and then check each chaser on its block with the micrometer gauge to see that the correct readings for threading is obtained on barrel A of the gauge.

As further check on the amount of face angle on the chaser, put chasers and blocks together with holding blocks on a flat surface so the slots are parallel:

**For Straight Threads** bottom part of chaser cutting edges should touch, but there should be about 1/18" to 1/32" clearance at top of cutting edges.

**For Taper Pipe Threads** there should be no clearance a top since a straight face angle is required cutting edges should touch at both top and bottom.

## Useful Hints On Chaser Care & Threading

### TO AVOID CHASER CHIPPING AND BREAKAGE:

**DON'T** “hit the shoulder”

**DON'T** start tool on the work too hard.

**DON'T** use poor cutting oil.

**DON'T** use diehead with weak chaser springs, or clogged with chips - keep the tools clean and the chasers sharp.

**DON'T** let threading spindle and work spindle get out of alignment.

Threading machinery that is kept in alignment means more and better threads from the chasers.

### AND IN GENERAL:

**DON'T** run chasers too long between grinds. Grinding more often increases chaser life and results in better threads.

**DON'T** use chasers with different throat angles in the same set.

**DON'T** use chasers with shorter throat angles than necessary.

**DON'T** burn the chasers. Take light fast cuts, using correct grinding wheel.

## Problem Solving

### THIS WILL HELP CORRECT:

**Eccentric Threads** - where pitch diameter is not concentric with O.D. of the work, or one side of threaded part will show a flat and other side will show stock removed by root of chaser; usually due to improper alignment of threading tool work. Trouble can be partially corrected by increasing the face angle on the chasers, and beveling the piece so all chasers start cutting at the same time.

**Out of Round or Wavy Threads** - which may cut perfect pitch diameter and smooth threads from first thread to last, but will not fit “Go” gauges; if laid on straight plane, rest of thread would not follow a straight line; correct this by having the chaser grind more over center, a higher micrometer gauge reading on barrel A (for example, if chasers were ground to a .515” micrometer reading, regrind to .520”).

**Rough Threads** - to which may be due to too much surface speed, too poor or not enough cutting coolant (flow of cutting oil should be volume, not pressure), chaser chamfer or lead may be too short when longer lead is permitted, or hook angle may not be sufficient or ground deep enough for chip clearance. In most cases this condition is corrected by grinding more off face of chaser (have lower micrometer gauge reading).

**Shaved Threads** - which are very often caused by a turret which is too heavy, or a threading spindle which is binding and not moving freely with the diehead cutting. Be sure turret or spindle “follows” the die without excessive drag, particularly in cutting finer pitches. Shaved threads may also result from chasers which are ground too far behind center, permitting threads beyond the chamfer or first full thread to cut - this usually causes threading behind on lead and shows a taper. Check the lead, increase the face angle and grind chasers more over center (higher micrometer gauge reading).

Continued On Next Page



## Problem Solving

### THIS WILL HELP CORRECT:

**Shave or Taper on First Thread** - which is usually due to alignment; or, if on Brass, Cast Iron, Malleable Iron or Aluminum, increase the surface speed.

**Threading ahead on Lead** - grind more off chaser face (lower micrometer gauge reading).

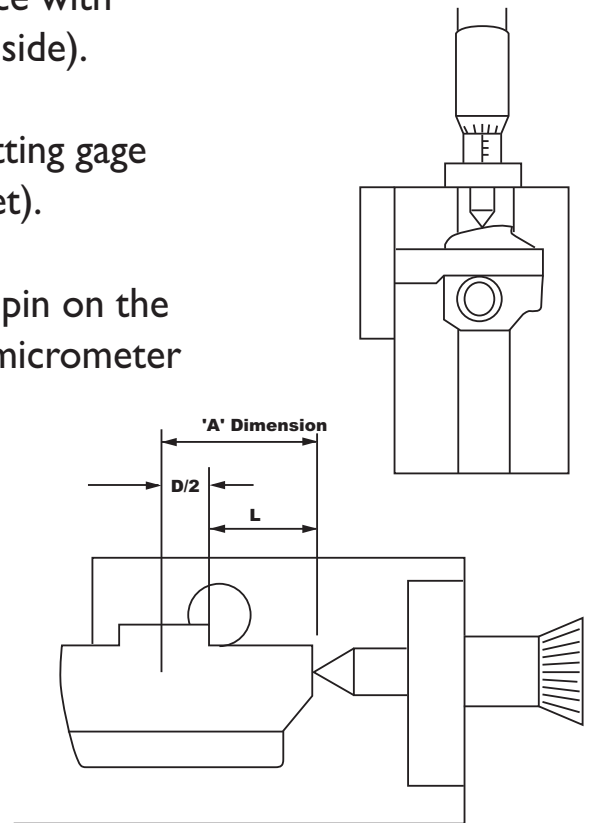
**Threading behind on Lead** - grind more over center (higher micrometer gauge reading).

**Chasers which do not Retract Freely** from work when diehead trips; increase face angle and grind more over center (higher micrometer gauge reading). Also check setting gauge. Use the “C” spanner effectively.

# Circular Chaser Diehead Seminar

## Guide to Checking Block Wear Using Your Micrometer

1. Remove “AA” micrometer bracket from the setting gage.
2. Remove “AA” barrel from bracket and replace with a stop pin (dowel rod with a flat milled on 1 side).
3. Move “A” micrometer bracket to back of setting gage (normal location of “AA” micrometer bracket).
4. Place bracket which now is holding the stop pin on the side of setting gage (normal location of “A” micrometer bracket).
5. Place block (without chaser and serrated bushing) backwards in setting gage.
6. Run block in until button on stop of block rests against flat on stop pin.
7. Position and advance a micrometer so that it makes contact at the block cam wear area.



This will allow you to check the difference in the block cam wear.

This dimension is not to exceed .0025 within a set of blocks. If the wear on the block is greater than .0025 you will experience difficulty finding and holding proper pitch diameter, and you will experience premature opening of the cup.

## Micrometer Barrel Certification

Handle and protect the Micrometer Gauge as carefully as you would any other high precision instrument. It is very important that micrometer barrels AA and A are set in the correct position in their brackets to give a correct reading in checking the chasers. Check the barrels regularly as follows:

Check diameter of micrometer A spindle by micrometer and note reading.

Loosen wing nut B (refer Fig. 11) and lower bracket C until the barrel of micrometer A rests in slot D of the gauge. Retighten wing nut B.

Loosen clamping screw in bracket C. Set micrometer A to the "set Mic" reading marked on the gauge at F. Position micrometer with the spindle lightly contacting opposite side of gauge block slot at face E. Retighten clamping screw and re-check micrometer reading. If micrometer A is correctly positioned the micrometer reading will be the same as the "set Mic" reading.

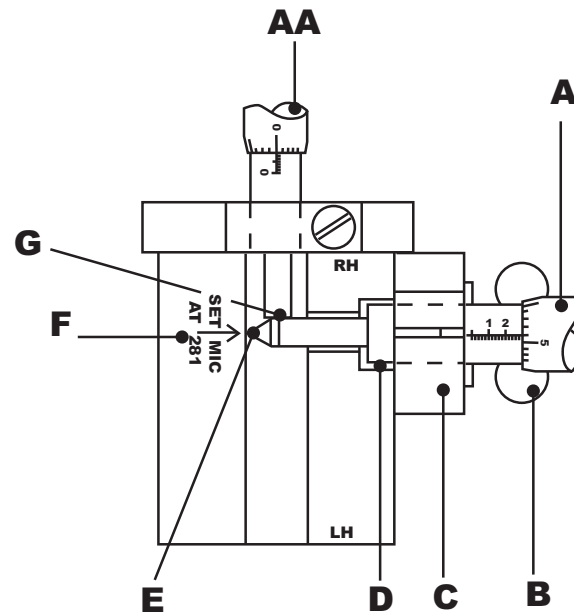


FIG. 11. Checking micrometer barrels for correct position.

Should the reading differ, loosen the clamping screw in Bracket C and adjust the micrometer in its bracket until the correct position is obtained. Re-lock the clamping screw and re-check the micrometer reading.

When the correct position is secured unlock wing nut B and raise bracket C until micrometer A spindle is in line with micrometer AA spindle. Re-lock wing nut B.

Operate micrometer AA until the spindle lightly contacts the side of micrometer A at point G.

The reading on micrometer AA should be equivalent to half the spindle diameter of micrometer A.

Example: Micrometer A spindle diameter .268"  
Micrometer AA reading .134"


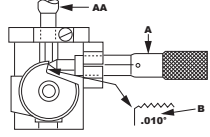


# Circular Chaser Diehead Seminar

Circular Chaser Seminar

## Suggested Grinds 4 Per Set Circular Chasers For Straight Threads

This chart is a guide for setting circular chaser cutting tool highs. Grinds for different materials may vary according to analysis, condition of machine, speeds and cutting coolant being used.

Material			Namco Style MGA micrometer guage barrel AA is set to read single thread depth plus .010". This positions chaser in gauge so barrel A contacts chaser .010" below root of first full thread as at B. Face grind readings are then made on barrel A. 								
	Fixture Base Setting (Deg.)	Face Angle "b" on Chaser	Hook Angle "c" on Chaser	Face Grind Readings on Micrometer A: :NOTE: Readings shown for circular chasers and cutters for various head sizes Styles DR-DRD-DS-DBS - not thread diameters.							
				1/4 to 5/16	3/8	9/16	13/16	1 to 1-1/6	1-5/8	2-3/8	
Aluminum	84	2	20	.095 to .100	.500 to .505	.510 to .515	.513 to .518	.515 to .523	.518 to .528	.525 to .533	
Bronze (Al 10%)	84-1/2	1-1/2	20	.095 to .100	.500 to .505	.510 to .515	.513 to .518	.515 to .523	.518 to .525	.525 to .533	
Brass Free Cut	89-1/2	1-1/2	5 Rev.	.100 to .105	.510 to .515	.513 to .518	.515 to .523	.518 to .528	.525 to .530	.518 to .535	
Copper	84	2	20	.095 to .100	.500 to .505	.510 to .515	.513 to .518	.515 to .523	.518 to .525	.525 to .533	
Steels non Heat Treated	84-1/2	1-1/2	20	.098 to .100	.495 to .500	.502 to .510	.508 to .513	.510 to .518	.518 to .525	.525 to .533	
Steels Heat Treated	85	2	15	.098 to .100	.495 to .500	.502 to .510	.508 to .515	.510 to .518	.518 to .528	.525 to .533	
Steels Stainless	83-1/2	1-1/2	25	.095 to .100	.495 to .500	.502 to .510	.508 to .513	.510 to .518	.515 to .523	.523 to .530	
Iron Cast	87	2	5	.100 to .105	.500 to .505	.510 to .515	.513 to .518	.515 to .523	.518 to .525	.523 to .528	
Iron Malleable	87-1/2	1-1/2	5	.100 to .105	.500 to .505	.510 to .515	.513 to .518	.515 to .523	.518 to .525	.523 to .528	

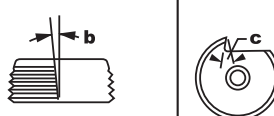

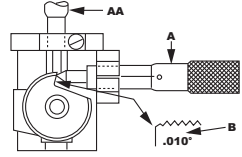
RSVP Tooling, Inc.



# Circular Chaser Diehead Seminar

## Suggested Grinds 5 Per Set Circular Chasers For Straight Threads

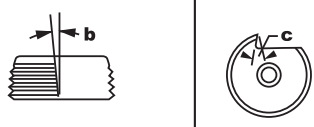
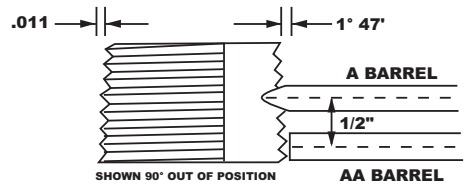
This chart is a guide for approximate Circular Chaser grinds for different materials and may vary according to analysis, condition of machine, speeds and cutting coolant used.

Material				<p>Namco Style MGA micrometer guage barrel AA is set to read single thread depth plus .010". This positions chaser in gauge so barrel A contacts chaser .010" below root of first full thread as at B. Face grind readings are then made on barrel A.</p> 		
	Fixture Base Setting (Deg.)	Face Angle "b" on Chaser (Deg.)	Hook Angle "c" on Chaser (Deg.)	<p>Face Grind Readings on Micrometer A: :NOTE: Readings shown for circular chasers for various head sizes Styles DRF and DSF - NOT THREAD DIAMETERS.</p>		
				DRF & DSF 1"	DRF & DSF 1-5/8"	DRF & DSF 2-3/8"
Aluminum	84	2	20	.513 to .518	.515 to .523	.518 to .525
Bronze (Al 10%)	84-1/2	1-1/2	20	.513 to .518	.515 to .523	.518 to .525
Brass Free Cut	89-1/2	1-1/2	5 Rev.	.515 to .523	.518 to .528	.525 to .530
Copper	84	2	20	.513 to .518	.515 to .523	.518 to .525
Steels non Heat Treated	84-1.2	1-1/2	20	.510 to .515	.512 to .520	.518 to .525
Steels Heat Treated	85	2	15	.512 to .520	.518 to .528	.520 to .530
Steels Stainless	83-1/2	1-1/2	25	.508 to .513	.510 to .518	.515 to .523
Iron Cast	87	2	5	.513 to .520	.515 to .523	.518 to .525
Iron Malleable	87-1/2	1-1/2	5	.513 to .520	.515 to .523	.518 to .525

# Circular Chaser Diehead Seminar

## Suggested Grinds For Taper Threads

This chart is a guide for setting circular chaser cutting tool highs. Grinds for different material may vary according to analysis, condition of machine, speeds and cutting coolant being used. As taper pipe chasers are made with 1-47' taper on them it is necessary to compensate for this taper. When taper chasers are ground and set will have no face angle, and will be square with the base of the chasers block.

Material										
	Fixture Base Setting (Deg.)	Face Angle "b" on Chaser	Hook Angle "c" on Chaser	1/4 to 5/16	3/8	9/16	13/16	1 to 1-1/6	1-5/8	2-3/8
Aluminum	86	0	20	.09118 to .103	.503 to .508	.510 to .515	.513 to .518	.518 to .523	.520 to .525	.528 to .533
Bronze (Al 10%)	86	0	20	.098 to .103	.503 to .508	.510 to .515	.513 to .518	.518 to .523	.520 to .525	.528 to .533
Copper	86	0	20	.098 to .103	.503 to .508	.510 to .515	.513 to .518	.518 to .523	.520 to .525	.528 to .533
Brass Freecut	89	0	5 Rev.	.100 to .105	.510 to .515	.513 to .518	.515 to .520	.520 to .528	.525 to .530	.528 to .533
Steels non Heat Treated	86	0	20	.098 to .105	.500 to .505	.502 to .512	.508 to .518	.513 to .523	.518 to .525	.520 to .530
Steels Heat Treated	81	0	15	.100 to .105	.500 to .508	.505 to .513	.510 to .518	.515 to .523	.518 to .525	.525 to .535
Steels Stainless	85	0	25	.100 to .105	.495 to .500	.502 to .510	.510 to .518	.513 to .520	.518 to .525	.520 to .530
Iron Cast	89	0	5	.100 to .105	.505 to .513	.510 to .518	.513 to .523	.515 to .525	.520 to .528	.525 to .533
Iron Malleable	89	0	5	.100 to .105	.505 to .513	.510 to .518	.513 to .523	.515 to .525	.520 to .525	.525 to .533

# Circular Chaser Diehead Seminar

## Chart For Micrometer “AA” Readings Actual Readings For Setting On Micrometer

Number of Threads Per Inch	Whitworth Form AA	Unified Form AA	Acme Form AA	B.S. Cy Form AA	N.P.T Form AA	N.P.T.F. Form AA	I.S.O.		B.A.	
							Pitch	AA	B.A. Number	AA
4	.170	.163	.145	.143	-	-	6.0	.155	-	-
4 1/2	.152	.146	.131	.128	-	-	5.5	.143	-	-
5	.138	.133	.120	.117	-	-	5.0	.131	-	-
5 1/2	.126	.122	.111	.107	-	-	4.5	.119	-	-
6	.117	.112	.103	.098	-	-	4.0	.107	-	-
7	.102	.098	.091	.086	-	-	3.5	.095	-	-
8	.090	.087	.083	.077	.110	.106	3.0	.082	-	-
9	.081	.078	.076	.069	-	-	2.5	.070	-	-
10	.074	.071	.070	.063	-	-	2.0	.058	-	-
11	.068	.066	.066	.058	-	-	1.75	.052	-	-
11 1/2	-	-	-	-	.079	.077	1.5	.046	-	-
12	.063	.061	.062	.054	-	-	1.25	.040	-	-
13	.059	.057	-	.051	-	-	1.0	.034	0	.034
14	.056	.054	.056	.048	.067	.065	0.9	.032	1	.031
15	.053	.051	-	.046	-	-	0.85	.031	-	-
16	.050	.048	.046	.043	-	-	0.81	-	2	.029
17	.048	.046	-	.041	-	-	0.80	.029	-	-
18	.046	.044	-	.040	.054	.051	0.75	.028	-	-
19	.044	.042	-	.038	-	-	0.73	-	3	.027
20	.042	.041	-	.037	-	-	0.70	.027	-	-
21	.041	.039	-	.035	-	-	0.66	-	4	.026
22	.039	.038	-	.034	-	-	0.60	.024	-	-
24	.037	.036	-	.032	-	-	0.59	-	5	.024
25	.036	.035	-	.031	-	-	0.55	.023	-	-
26	.035	.034	-	.031	-	-	0.53	-	6	.023
27	.034	.033	-	.030	.040	.037	0.50	.022	-	-
28	.033	.032	-	.029	-	-	0.48	-	7	.021
30	.031	.030	-	.028	-	-	0.45	.021	-	-
32	.030	.029	-	.027	-	-	0.43	-	8	.020
34	.029	.028	-	.026	-	-	0.40	.020	-	-
35	.028	.0275	-	.025	-	-	0.39	-	9	.019
36	.028	.027	-	.025	-	-	0.35	.018	10	.018
37	.027	.0265	-	.024	-	-	0.31	-	11	.017
38	.027	.026	-	.024	-	-	0.28	-	12	.017
40	.026	.025	-	.023	-	-	0.25	0.16	-	-
42	.025	.0246	-	.023	-	-	-	-	-	-
48	.023	.023	-	.021	-	-	-	-	-	-
50	.023	.022	-	.021	-	-	-	-	-	-
56	.021	.021	-	.020	-	-	-	-	-	-
60	.021	.020	-	.019	-	-	-	-	-	-

