

TAK Series #0 thru #05 Unibody PRECISION WIRE STRAIGHTENER

**INSTRUCTIONS FOR USE
WITH TAK TORQUE TOOL**

Revision 01/03/2006

TAK Enterprises Incorporated
70 Enterprise Drive • Bristol, CT 06010-7400
Ph. (860) 583-0517 • Fax (860) 585-0479

www.wirestraighteners.com

SAFETY

Please read the complete instructions before mounting or setting your TAK Precision Wire Straightener (PWS).

Before working with your TAK product, please observe all safety precautions with the use of wire and machinery. DO NOT HANDLE WIRE AROUND EXPOSED ELECTRICAL WIRES OR CIRCUITS. Be careful when working near fellow employees. Make sure machinery is off.

REMEMBER: SAFETY FIRST ALWAYS!

BEWARE

Be sure to confirm the quality requirements of the wire before proceeding. The wire shape *must* be consistent and relatively uniform in mechanical properties to achieve good and consistent results.

MOUNTING PREPARATION:

Mount the PWS between the machine and the wire coil. The PWS may be mounted for a feed from the left or right, with the first or initial bank, called bank 1, in either horizontal or a vertical position. Bank 1 is the only bank that has two ceramic guides where the wire enters and exits. The PWS should be fastened securely to the machine. When mounting, keep in mind it will be necessary to remove banks 3 and 4 as a unit on a 4 plane PWS as part of the set-up procedure.

When aligning for mounting, make sure the guides are level and in line with the machine feed wire line. This is very important to avoid variation in feeding or alignment. Do not attach or allow anything to distort the wire in its path between the PWS and the feed mechanism other than a support in longer feeds.

SET UP INSTRUCTIONS

Your new **TAK Precision Wire Straightener** is shipped to you with all screws pre-tightened at factory assembly. If any are loosened, they will be torque set during your wire setup with the use of a TAK Torque Tool. Do not use any other tool during the setup or tighten more than described here.

For the following procedures, when referring to bearing adjustments, always use opposing screws. This means that when you are backing off one screw you must re-tighten the opposite screw by using the TAK torque tool provided before proceeding to the next step. When you have completed your setup no screws should be loose.

Keep in mind the adjustments are only to position the bearings according to the design and not to create pressure against the material.

Warning, Do Not Over Tighten Any Screws. This can cause permanent damage to the PWS and screw threads and could prevent removal of the adjusting screws should it become necessary.

Tools required:

- Torque Tool (provided by TAK)
- Gauge Block Set
- Standard Allen Wrench Set
- Fast drying marker

Make the following adjustments without wire in the PWS:

- At this point please refer to the “QS” (Quick Set) column on the reference charts for the appropriate series PWS you have. The first requirement is to find the closest wire size on the chart to the wire that you are to be using. Read across to the “QS” column, this is the starting gauge block size for the wire you have chosen.

Example:

WIRE SIZE	SERIES #1																
	10S'	14%	16%	18%	20%	22%	24%	26%	28%	30%	35%	40%	45%	50%	55%	60%	
0.011	0.193	0.194	0.195	0.195	0.195	0.195	0.196	0.196	0.196	0.196	0.197	0.197	0.197	0.198	0.198	0.199	0.200
0.012	0.192	0.194	0.194	0.194	0.195	0.195	0.195	0.195	0.196	0.196	0.197	0.197	0.198	0.198	0.199	0.200	0.200
0.013	0.192	0.194	0.194	0.194	0.194	0.195	0.195	0.195	0.195	0.196	0.196	0.197	0.198	0.198	0.199	0.200	0.200
0.014	0.191	0.193	0.193	0.193	0.194	0.194	0.194	0.195	0.195	0.195	0.196	0.196	0.197	0.197	0.198	0.199	0.200
0.015	0.191	0.193	0.193	0.193	0.194	0.194	0.194	0.195	0.195	0.195	0.196	0.196	0.197	0.197	0.198	0.199	0.200
0.016	0.190	0.192	0.193	0.193	0.193	0.194	0.194	0.194	0.195	0.195	0.196	0.196	0.197	0.197	0.198	0.199	0.200
0.017	0.189	0.192	0.192	0.193	0.193	0.193	0.194	0.194	0.194	0.195	0.195	0.196	0.196	0.197	0.198	0.199	0.200
0.018	0.189	0.191	0.192	0.192	0.192	0.193	0.193	0.194	0.194	0.194	0.195	0.195	0.196	0.197	0.198	0.199	0.200
0.019	0.188	0.191	0.191	0.192	0.192	0.192	0.193	0.193	0.194	0.194	0.195	0.195	0.196	0.197	0.198	0.199	0.200
0.020	0.188	0.191	0.191	0.191	0.192	0.192	0.193	0.193	0.193	0.194	0.195	0.195	0.196	0.197	0.198	0.199	0.200
0.021	0.187	0.190	0.191	0.191	0.191	0.192	0.192	0.193	0.193	0.193	0.194	0.194	0.195	0.196	0.197	0.198	0.200
0.022	0.187	0.190	0.190	0.191	0.191	0.191	0.192	0.192	0.192	0.193	0.193	0.194	0.195	0.195	0.196	0.197	0.200
0.023	0.186	0.189	0.190	0.190	0.191	0.191	0.192	0.192	0.192	0.193	0.193	0.194	0.195	0.195	0.196	0.197	0.200
0.024	0.185	0.189	0.189	0.190	0.190	0.191	0.191	0.192	0.192	0.192	0.193	0.194	0.195	0.195	0.196	0.197	0.200
0.025	0.185	0.188	0.189	0.189	0.190	0.190	0.191	0.191	0.192	0.192	0.194	0.195	0.195	0.196	0.197	0.199	0.200
0.026	0.184	0.188	0.189	0.189	0.190	0.190	0.191	0.191	0.192	0.192	0.193	0.194	0.195	0.195	0.196	0.197	0.200
0.027	0.184	0.187	0.188	0.189	0.189	0.190	0.191	0.191	0.191	0.192	0.193	0.194	0.195	0.195	0.196	0.197	0.200
0.028	0.183	0.187	0.188	0.188	0.189	0.189	0.190	0.190	0.191	0.192	0.193	0.194	0.195	0.195	0.196	0.197	0.200
0.029	0.183	0.187	0.187	0.188	0.188	0.189	0.189	0.190	0.191	0.191	0.193	0.194	0.195	0.195	0.196	0.197	0.200
0.030	0.182	0.186	0.187	0.187	0.188	0.189	0.189	0.190	0.190	0.191	0.192	0.194	0.195	0.195	0.196	0.197	0.200
0.031	0.181	0.186	0.186	0.187	0.188	0.188	0.189	0.189	0.190	0.191	0.192	0.194	0.195	0.195	0.196	0.197	0.200
0.032	0.181	0.185	0.186	0.187	0.187	0.188	0.188	0.189	0.190	0.190	0.192	0.194	0.195	0.195	0.196	0.197	0.200
0.033	0.180	0.185	0.186	0.186	0.187	0.187	0.188	0.189	0.189	0.190	0.192	0.193	0.195	0.195	0.196	0.197	0.200
0.034	0.180	0.184	0.185	0.186	0.186	0.187	0.188	0.188	0.189	0.190	0.192	0.193	0.195	0.195	0.196	0.197	0.200
0.035	0.179	0.184	0.185	0.186	0.186	0.187	0.188	0.188	0.189	0.190	0.191	0.193	0.195	0.195	0.196	0.197	0.200
0.036	0.178	0.184	0.184	0.185	0.186	0.186	0.187	0.188	0.189	0.189	0.191	0.193	0.195	0.195	0.196	0.197	0.200
0.037	0.178	0.183	0.184	0.185	0.185	0.186	0.187	0.188	0.188	0.189	0.191	0.193	0.195	0.195	0.196	0.197	0.200
0.038	0.177	0.183	0.183	0.184	0.185	0.186	0.187	0.188	0.189	0.191	0.193	0.194	0.196	0.196	0.197	0.198	0.200
0.039	0.177	0.182	0.183	0.184	0.185	0.185	0.186	0.187	0.188	0.188	0.190	0.192	0.194	0.195	0.196	0.197	0.200
0.040	0.176	0.182	0.183	0.183	0.184	0.185	0.186	0.187	0.187	0.188	0.190	0.192	0.194	0.195	0.196	0.197	0.200

Rev. 12/97

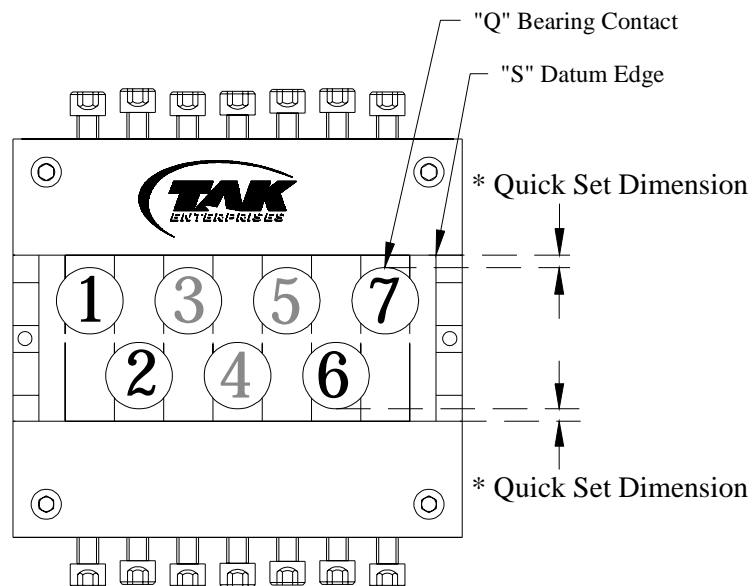
BASIC NOMINAL OPERATING RANGE IS FROM 14% TO 26%

FOR TRUE STRAIGHTNESS A ROLL STRAIGHTENER MAY NOT
ACHIEVE THE BEST RESULTS ON FULL HARD WIRE

2. **Adjust bearings 1, 2, 6 and 7 on all banks** so the QS gauge can be easily inserted between the **Bearing Contact (Q)** and the **Datum Edge (S)**.

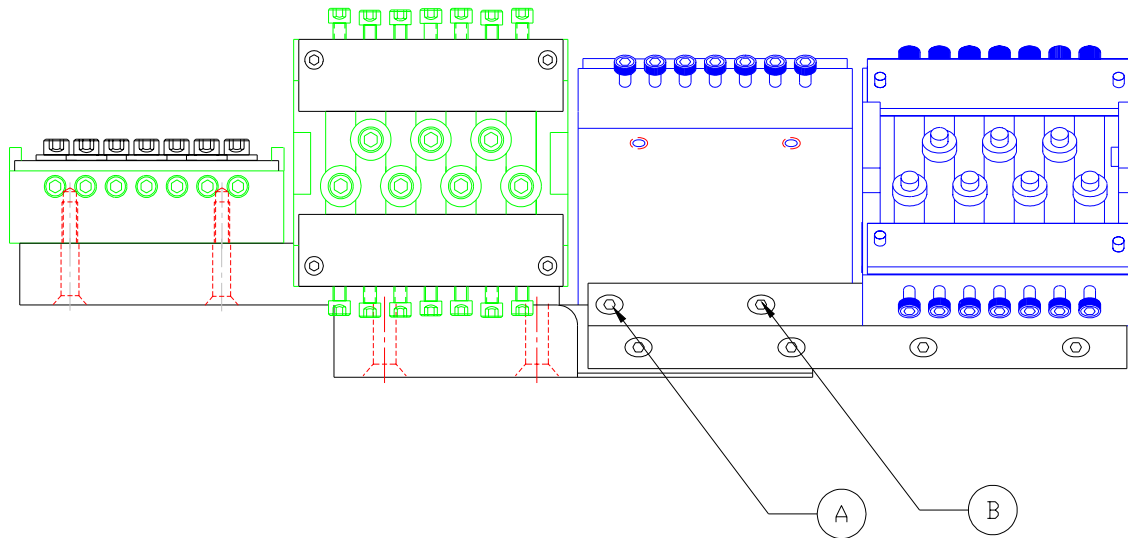
Starting with bearing #1:

- a.) Loosen the screws, as necessary to move bearing #1 back enough so the gauge will fit between the Bearing Contact (Q) and the Datum Edge (S).
- b.) While holding the gauge gently with one hand, turn the appropriate screw with TAK torque tool so the bearing pushes the gauge against the datum edge lightly.
- c.) Now use the torque tool on the opposing screw and continue to turn the torque tool until a distinctive click is heard.
- d.) At this time the gauge should just slip out. If not, back off the screw that is holding the gauge against the datum edge as if it were a micrometer with very slight adjustments (.001) and re-torque the opposing screw.
- e.) Repeat as necessary on all appropriate bearings.



**If you have a 3 or 4 plane PWS go to Step 3.
If you have a 1 or 2 plane PWS skip to Step 4.**

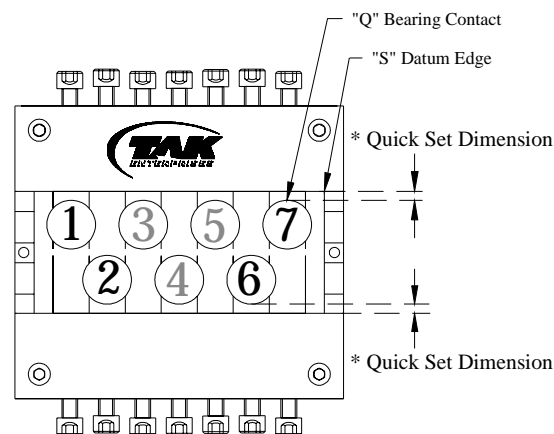
3. **Rotate bank 3 & 4 out of the wire path in one piece.** To do this, loosen one of the flat head screws (A) and remove the other (B). This will enable bank 3 & 4 to swing away at an angle or horizontally. If necessary, remove both screws and put the banks aside until needed.



4. The following procedures are to “break” the wire for controlled “reforming” so we can, with control, “re-straighten” the wire.

The following procedures vary depending on many factors including, but not limited to: wire size, consistency, tensile strength, hardness, surface, coil diameter, cast, cleanliness and condition of the material to be straightened. These procedures, if applied correctly, have been proven to give the most consistent results.

5. Starting with bank #1, (the bank nearest the wire source), adjust only bearings **3, 4 and 5** in (as per steps **a-e** below) approximately 14% of the wire diameter for moderately hard material or up to 50% the diameter for mild material. Depending on the wire size you are working with, read across to the correct percentage column on the appropriate reference chart. This gauge size will give you a starting point for these bearings.



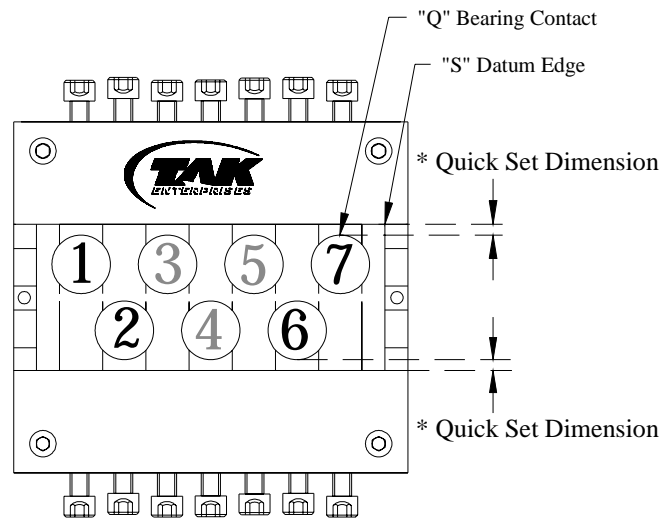
Starting with bearing #3:

a.) Loosen the screws as necessary to move bearing #3 back enough so the gauge will fit between the Bearing Contact (Q) and the Datum Edge (S).

- b.) While holding the gauge gently with one hand, turn the appropriate screw with the torque tool so the bearing pushes the gauge against the datum edge firmly.
- c.) Now use the slip torque wrench on the opposing screw and continue to turn the torque wrench tool until a distinctive click is heard.
- d.) At this time the gauge should just slip out. If not, back off the screw that is holding the gauge against the datum edge as if it were a micrometer with very slight adjustments (.002) and re-torque the opposing screw.
- e.) Repeat as necessary on all appropriate bearings.

The percentage used varies depending on your straightness requirement and the material condition. We **strongly** suggest using smaller percentage adjustments than normally used on other conventional roll wire straightener.

NOTE: A lubricant should be used on the wire during the straightening process including the setup. For better results and to have more consistent straight wire, you should always use a lubricant appropriate for forming.



6. **Insert wire through bank 1 and adjust bearing #5** to keep the wire directed straight to the first bearings on the next bank or passing through middle of the exiting guide. Remember to make very slight adjustment to bearing #5 only each time and follow the instructions for the opposing screws outlined previously. Remember; turn the screws as if you were using a micrometer while making very slight adjustments (.002). The reaction to adjustments on a TAK Precision Wire Straightener is much quicker than other roll type straighteners. Upon completion, **all bearings should rotate** when pushing the wire back and forth through the unit.
7. **Proceed to bank 2.** Set bearings 3, 4 and 5 exactly the same as in bank 1. Now push the wire through banks, 1 and 2. You may not have the required straightness at this time, so you will have to adjust bearing # 5 in one of the two planes.

Helpful Hints for Straightening Wire:

A good way to decide which of the # 5 bearings to adjust is to put a mark, with a fast drying marker, on the topside of the wire just before it goes into the straightener. Then pull the wire through at a constant speed and as level as possible (use a steady rest if available) until the mark has passed completely through and has exited by several inches. By knowing the mark is on the top of the wire when it entered the straightener you can now determine the direction it needs to be corrected. Cut the length off and lay it carefully on a flat surface. Find the mark you just made on the material. Now you can see the direction that it must be corrected and which bank you will adjust.

Normally the 5th bearing will need to be moved the direction you want the wire to go. If you remember this rule it makes it easy to decide and make accurate corrections. Don't forget, you need to make very fine adjustments, turning the screw as if it was a micrometer by making very slight adjustments (.002).

- 8. **To precisely straighten the wire** you now need to adjust bearing 5. Normally the 5th bearing will need to be moved the direction you want the wire to go. If adjusting bearing 5 away from or towards the datum edge does not allow you to control the wire in both directions, return to step 5 and increase the percentage of break on bearings 3, 4, and 5 by a small percentage (2% to 4%).

Things to Remember:

- Bearing # 5 is the most important when it comes to periodic adjustments. It is the **only bearing** that should be adjusted from this point forward.
- Do not adjust any other bearing in this bank for this material as long as you need to keep controlled straightness.

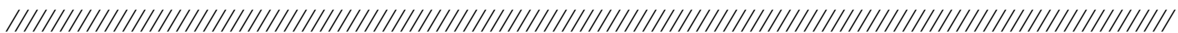
- 9. **Remove the wire before proceeding.**

Once you have reached the desired straightness, document it on your data form.

The wire straightness may not maintain through production unless you use a 4 plane PWS. The next two planes are added for 8-point contact for ultimate control.

- 10. **Reassemble bank 3 and 4 to the first banks**, 1 and 2 before proceeding.
- 11. Now apply the same procedure to bank 3 and 4 by returning to the preceding steps 5 through 8. Only use approximately 1/2 the percentage used on banks 1 & 2 if the material is moderate to hard, otherwise duplicate the settings on banks 1 & 2.

This step may sometimes cause confusion due to the wire not reacting in a logical direction of adjustment. Don't forget to use a permanent black marker for direction finder. This method will allow you to see the reaction to each adjustment you make on the 5th bearing in the appropriate bank.



PLEASE, DON'T FORGET:

USE ONLY BEARING # "5" TO CONTROL STRAIGHTNESS.

DO NOT USE ANY OTHER BEARING TO CONTROL STRAIGHTNESS EVEN THOUGH IT MAY APPEAR TO CHANGE THE WIRE DIRECTION.

Now you must document your setup on the Set-up Data Form. A master is provided for your convenience, please make copies as required. Be sure to follow directions on the data form and fill it out completely with all detail available.

Once the initial setup has been completed, very small adjustments will be required to maintain straightness as long as the condition of the wire remains consistent in its properties. Proper and efficient use of the **TAK PRECISION WIRE STRAIGHTENER** is learned through experience. These operating instructions are meant as a guide. Many customers have developed their own procedures with equal success. Keep in mind that this is a precision unit and must be treated with care. Use proper tools when setting up the unit or attaching to other equipment.

NOTE: Grit, generated during the wire manufacturing process, may contribute to premature bearing wear. Also, some lubricants or conditions of extreme heat can cause swelling in the seal of the rubber sealed bearings. When the seal swells, the bearing becomes stiff and cannot turn freely. A rigid bearing will cause the wire to skid in the wire groove, wearing in one spot and creating a flat.

Once a flat is worn into the groove, the bearing becomes inoperative, which can mark the material, cause it to lock up, or crack the bearing. At this point, our design is ineffectual. To prevent a problem **MAKE SURE ALL OF YOUR BEARINGS ARE TURNING.** Each bearing is marked with a white paint dot, to assist you in determining motion.

If all bearings are rotating, you have no problem. If any are stationary:

1. Check the set-up instructions. Make sure the bearings are touching the wire. The material controls the rotation of the bearing and if it is not touching, the bearing cannot move.
2. If the bearing is touching the material and still remains stationary, remove and replace the bearing immediately.

CAUTION: Never use your finger to rotate bearing during operation. For safety purposes the feed must be off prior to touching bearing.

TAK offers a choice of bearings to suit your individual environments.

- A. Shielded 52100 Steel (standard on TAK products)
- B. Rubber Sealed 52100 Steel
- C. Shielded 440 Stainless Steel

TAK Enterprises, Inc.

Precision Wire Straightener Set-up Data Form

Settings for size _____PWS

NOTE: All planes are shown facing position for ease of documentation.

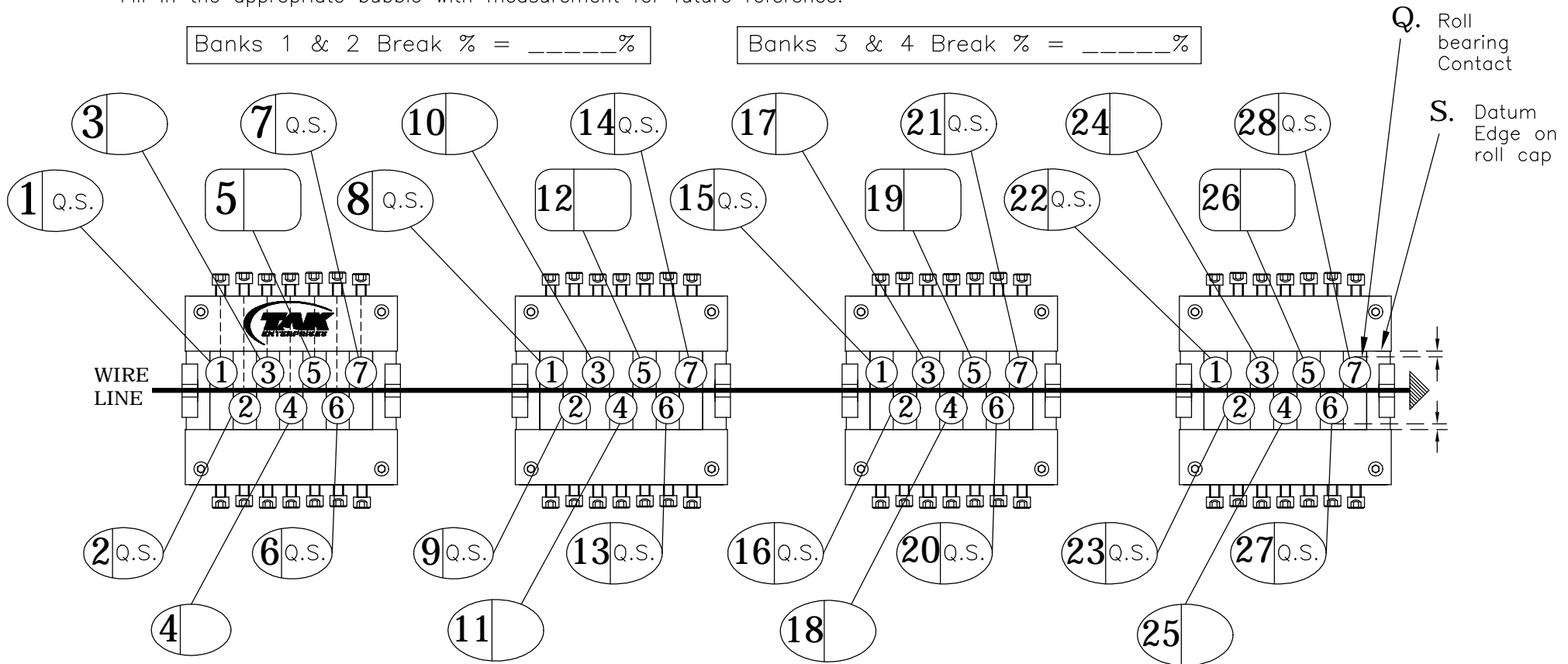
Whether the side with 4 bearings are on top or bottom has no effect on the setting or recording of positions.

Directions: Using a gauge block, take the measurement from the datum edge (S) to point (Q) of each bearing.

Fill in the appropriate bubble with measurement for future reference.

Banks 1 & 2 Break % = _____%

Banks 3 & 4 Break % = _____%



Wire Type: _____ Actual Size: _____ Tolerance: + _____ - _____ Q.S.: _____

Source: _____ Lot: _____ Finish: _____ Coil Size: ID _____ OD _____

SERIES #0

WIRE SIZE	"QS"	14%	16%	18%	20%	22%	24%	26%	28%	30%	35%	40%	45%	50%	55%	60%	80%	100%	150%	200%
HEAVIER PULLING TENSION >>>>>>>																				
0.010	0.141	0.143	0.143	0.143	0.143	0.144	0.144	0.144	0.144	0.144	0.145	0.145	0.146	0.146	0.147	0.147	0.149	0.151	0.156	0.161
0.011	0.141	0.142	0.143	0.143	0.143	0.143	0.143	0.144	0.144	0.144	0.145	0.145	0.146	0.146	0.147	0.147	0.147	0.152	0.157	0.163
0.012	0.140	0.142	0.142	0.142	0.143	0.143	0.143	0.144	0.144	0.144	0.145	0.146	0.146	0.147	0.147	0.147	0.152	0.158	0.164	
0.013	0.140	0.142	0.142	0.142	0.142	0.143	0.143	0.143	0.143	0.144	0.144	0.145	0.146	0.146	0.147	0.147	0.147	0.153	0.159	0.166
0.014	0.139	0.141	0.141	0.142	0.142	0.142	0.142	0.143	0.143	0.143	0.144	0.145	0.145	0.146	0.147	0.148	0.148	0.153	0.160	0.167
0.015	0.139	0.141	0.141	0.141	0.142	0.142	0.142	0.142	0.143	0.143	0.144	0.145	0.145	0.146	0.147	0.148	0.148	0.154	0.161	0.169
0.016	0.138	0.140	0.141	0.141	0.141	0.141	0.142	0.142	0.142	0.143	0.144	0.144	0.145	0.146	0.147	0.148	0.148	0.154	0.162	0.170
0.017	0.137	0.140	0.140	0.140	0.141	0.141	0.141	0.142	0.142	0.142	0.143	0.144	0.145	0.146	0.147	0.148	0.148	0.154	0.163	0.171
0.018	0.137	0.139	0.140	0.140	0.140	0.141	0.141	0.141	0.142	0.142	0.143	0.144	0.145	0.146	0.147	0.148	0.148	0.155	0.164	0.173
0.019	0.136	0.139	0.139	0.140	0.140	0.140	0.141	0.141	0.142	0.142	0.143	0.144	0.145	0.146	0.147	0.148	0.148	0.155	0.165	0.174
0.020	0.136	0.138	0.139	0.139	0.140	0.140	0.140	0.141	0.141	0.142	0.143	0.144	0.145	0.146	0.147	0.148	0.148	0.156	0.166	0.176
0.021	0.135	0.138	0.138	0.139	0.139	0.140	0.140	0.141	0.141	0.142	0.143	0.145	0.146	0.147	0.148	0.148	0.156	0.167	0.177	
0.022	0.134	0.138	0.138	0.138	0.139	0.139	0.140	0.140	0.141	0.141	0.142	0.143	0.144	0.145	0.147	0.148	0.148	0.156	0.167	0.178
0.023	0.134	0.137	0.138	0.138	0.139	0.139	0.139	0.140	0.140	0.141	0.142	0.143	0.144	0.145	0.147	0.148	0.148	0.157	0.168	0.180
0.024	0.133	0.137	0.137	0.138	0.138	0.139	0.139	0.140	0.140	0.141	0.142	0.143	0.144	0.145	0.147	0.148	0.148	0.157	0.169	0.181
0.025	0.133	0.136	0.137	0.137	0.138	0.138	0.139	0.139	0.140	0.140	0.142	0.143	0.144	0.145	0.147	0.148	0.148	0.158	0.170	0.183

Rev. 02/05

BASIC NOMINAL OPERATING RANGE IS FROM 25% TO 55%

FOR TRUE STRAIGHTNESS A ROLL STRAIGHTENER MAY NOT
ACHIEVE THE BEST RESULTS ON FULL HARD WIRE

SERIES #1

WIRE SIZE	"QS"	14%	16%	18%	20%	22%	24%	26%	28%	30%	35%	40%	45%	50%	55%	60%
HEAVIER PULLING TENSION >>>>>>>																
0.011	0.193	0.194	0.195	0.195	0.195	0.195	0.196	0.196	0.196	0.196	0.197	0.197	0.198	0.198	0.199	0.200
0.012	0.192	0.194	0.194	0.195	0.195	0.195	0.195	0.195	0.196	0.196	0.197	0.197	0.198	0.198	0.199	0.200
0.013	0.192	0.194	0.194	0.194	0.194	0.195	0.195	0.195	0.195	0.196	0.196	0.197	0.198	0.198	0.199	0.200
0.014	0.191	0.193	0.193	0.194	0.194	0.194	0.195	0.195	0.195	0.195	0.196	0.197	0.197	0.198	0.199	0.200
0.015	0.191	0.193	0.193	0.193	0.194	0.194	0.194	0.195	0.195	0.195	0.196	0.197	0.197	0.198	0.199	0.200
0.016	0.190	0.192	0.193	0.193	0.193	0.194	0.194	0.194	0.195	0.195	0.196	0.196	0.197	0.198	0.199	0.200
0.017	0.189	0.192	0.192	0.193	0.193	0.193	0.194	0.194	0.194	0.195	0.195	0.196	0.197	0.198	0.199	0.200
0.018	0.189	0.191	0.192	0.192	0.192	0.193	0.193	0.194	0.194	0.194	0.195	0.196	0.197	0.198	0.199	0.200
0.019	0.188	0.191	0.191	0.192	0.192	0.192	0.193	0.193	0.194	0.194	0.195	0.196	0.197	0.198	0.199	0.200
0.020	0.188	0.191	0.191	0.191	0.192	0.192	0.193	0.193	0.193	0.194	0.195	0.196	0.197	0.198	0.199	0.200
0.021	0.187	0.190	0.191	0.191	0.191	0.192	0.192	0.193	0.193	0.193	0.194	0.196	0.197	0.198	0.199	0.200
0.022	0.187	0.190	0.190	0.191	0.191	0.191	0.192	0.192	0.193	0.193	0.194	0.195	0.196	0.198	0.199	0.200
0.023	0.186	0.189	0.190	0.190	0.191	0.191	0.192	0.192	0.192	0.193	0.194	0.195	0.196	0.197	0.199	0.200
0.024	0.185	0.189	0.189	0.190	0.190	0.191	0.191	0.192	0.192	0.193	0.194	0.195	0.196	0.197	0.199	0.200
0.025	0.185	0.188	0.189	0.189	0.190	0.190	0.191	0.191	0.192	0.192	0.194	0.195	0.196	0.197	0.199	0.200
0.026	0.184	0.188	0.188	0.189	0.189	0.190	0.191	0.191	0.192	0.192	0.193	0.195	0.196	0.197	0.199	0.200
0.027	0.184	0.187	0.188	0.189	0.189	0.190	0.190	0.191	0.191	0.192	0.193	0.194	0.196	0.197	0.199	0.200
0.028	0.183	0.187	0.188	0.188	0.189	0.189	0.190	0.190	0.191	0.192	0.193	0.194	0.196	0.197	0.199	0.200
0.029	0.183	0.187	0.187	0.188	0.188	0.189	0.189	0.190	0.191	0.191	0.193	0.194	0.196	0.197	0.198	0.200
0.030	0.182	0.186	0.187	0.187	0.188	0.189	0.189	0.190	0.190	0.191	0.192	0.194	0.195	0.197	0.198	0.200
0.031	0.181	0.186	0.186	0.187	0.188	0.188	0.189	0.189	0.190	0.191	0.192	0.194	0.195	0.197	0.198	0.200
0.032	0.181	0.185	0.186	0.187	0.187	0.188	0.188	0.189	0.190	0.190	0.192	0.194	0.195	0.197	0.198	0.200
0.033	0.180	0.185	0.185	0.186	0.187	0.187	0.188	0.189	0.189	0.190	0.192	0.193	0.195	0.197	0.198	0.200
0.034	0.180	0.184	0.185	0.186	0.186	0.187	0.188	0.188	0.189	0.190	0.192	0.193	0.195	0.197	0.198	0.200
0.035	0.179	0.184	0.185	0.186	0.186	0.187	0.188	0.188	0.189	0.190	0.191	0.193	0.195	0.197	0.198	0.200
0.036	0.178	0.184	0.184	0.185	0.186	0.186	0.187	0.188	0.189	0.189	0.191	0.193	0.195	0.196	0.198	0.200
0.037	0.178	0.183	0.184	0.185	0.185	0.186	0.187	0.188	0.188	0.189	0.191	0.193	0.195	0.196	0.198	0.200
0.038	0.177	0.183	0.183	0.184	0.185	0.186	0.186	0.187	0.188	0.189	0.191	0.193	0.194	0.196	0.198	0.200
0.039	0.177	0.182	0.183	0.184	0.185	0.185	0.186	0.187	0.188	0.188	0.190	0.192	0.194	0.196	0.198	0.200
0.040	0.176	0.182	0.183	0.183	0.184	0.185	0.186	0.187	0.187	0.188	0.190	0.192	0.194	0.196	0.198	0.200

Rev. 12/97

BASIC NOMINAL OPERATING RANGE IS FROM 14% TO 26%

FOR TRUE STRAIGHTNESS A ROLL STRAIGHTENER MAY NOT
ACHIEVE THE BEST RESULTS ON FULL HARD WIRE

SERIES #2

WIRE SIZE	"QS"	10%	12%	14%	16%	18%	20%	22%	24%	26%	28%	30%	35%	40%	45%	50%
<<<< LIGHTEST PULLING TENSION												HEAVIER PULLING TENSION >>>>				
0.027	0.1264	0.129	0.130	0.130	0.131	0.131	0.132	0.132	0.133	0.133	0.134	0.135	0.136	0.137	0.139	0.140
0.030	0.125	0.128	0.128	0.129	0.130	0.130	0.131	0.131	0.132	0.133	0.133	0.134	0.135	0.137	0.138	0.140
0.031	0.124	0.127	0.128	0.128	0.129	0.130	0.130	0.131	0.132	0.132	0.133	0.133	0.135	0.137	0.138	0.140
0.032	0.124	0.127	0.127	0.128	0.129	0.129	0.130	0.131	0.131	0.132	0.133	0.133	0.135	0.136	0.138	0.140
0.033	0.123	0.126	0.127	0.128	0.128	0.129	0.130	0.130	0.131	0.132	0.132	0.133	0.135	0.136	0.138	0.139
0.034	0.122	0.126	0.126	0.127	0.128	0.129	0.129	0.130	0.131	0.131	0.132	0.133	0.134	0.136	0.138	0.139
0.035	0.122	0.125	0.126	0.127	0.127	0.128	0.129	0.130	0.130	0.131	0.132	0.132	0.134	0.136	0.138	0.139
0.036	0.121	0.125	0.126	0.126	0.127	0.128	0.128	0.129	0.130	0.131	0.131	0.132	0.134	0.136	0.137	0.139
0.037	0.121	0.124	0.125	0.126	0.127	0.127	0.128	0.129	0.130	0.130	0.131	0.132	0.134	0.135	0.137	0.139
0.038	0.120	0.124	0.125	0.125	0.126	0.127	0.128	0.128	0.129	0.130	0.131	0.131	0.133	0.135	0.137	0.139
0.039	0.120	0.123	0.124	0.125	0.126	0.127	0.127	0.128	0.129	0.130	0.130	0.131	0.133	0.135	0.137	0.139
0.040	0.119	0.123	0.124	0.125	0.125	0.126	0.127	0.128	0.129	0.129	0.130	0.131	0.133	0.135	0.137	0.139
0.041	0.118	0.122	0.123	0.124	0.125	0.126	0.127	0.127	0.128	0.129	0.130	0.131	0.133	0.135	0.137	0.139
0.042	0.118	0.122	0.123	0.124	0.125	0.125	0.126	0.127	0.128	0.129	0.130	0.130	0.132	0.135	0.137	0.139
0.043	0.117	0.122	0.122	0.123	0.124	0.125	0.126	0.127	0.128	0.128	0.129	0.130	0.132	0.134	0.137	0.139
0.044	0.117	0.121	0.122	0.123	0.124	0.125	0.125	0.126	0.127	0.128	0.129	0.130	0.132	0.134	0.136	0.139
0.045	0.116	0.121	0.121	0.122	0.123	0.124	0.125	0.126	0.127	0.128	0.129	0.130	0.132	0.134	0.136	0.139
0.046	0.115	0.120	0.121	0.122	0.123	0.124	0.125	0.126	0.127	0.127	0.128	0.129	0.132	0.134	0.136	0.138
0.047	0.115	0.120	0.121	0.121	0.122	0.123	0.124	0.125	0.126	0.127	0.128	0.129	0.131	0.134	0.136	0.138
0.048	0.114	0.119	0.120	0.121	0.122	0.123	0.124	0.125	0.126	0.127	0.128	0.129	0.131	0.134	0.136	0.138
0.049	0.114	0.119	0.120	0.121	0.122	0.123	0.124	0.125	0.126	0.127	0.128	0.128	0.131	0.133	0.136	0.138
0.050	0.113	0.118	0.119	0.120	0.121	0.122	0.123	0.124	0.125	0.126	0.127	0.128	0.131	0.133	0.136	0.138
0.051	0.113	0.118	0.119	0.120	0.121	0.122	0.123	0.124	0.125	0.126	0.127	0.128	0.130	0.133	0.136	0.138
0.052	0.112	0.117	0.118	0.119	0.120	0.121	0.122	0.123	0.124	0.126	0.127	0.128	0.130	0.133	0.135	0.138
0.053	0.111	0.117	0.118	0.119	0.120	0.121	0.122	0.123	0.124	0.125	0.126	0.127	0.130	0.133	0.135	0.138
0.054	0.111	0.116	0.117	0.118	0.119	0.121	0.122	0.123	0.124	0.125	0.126	0.127	0.130	0.132	0.135	0.138
0.055	0.110	0.116	0.117	0.118	0.119	0.120	0.121	0.122	0.123	0.125	0.126	0.127	0.130	0.132	0.135	0.138
0.056	0.110	0.115	0.116	0.118	0.119	0.120	0.121	0.122	0.123	0.124	0.125	0.126	0.129	0.132	0.135	0.138
0.057	0.109	0.115	0.116	0.117	0.118	0.119	0.121	0.122	0.123	0.124	0.125	0.126	0.129	0.132	0.135	0.138
0.058	0.109	0.114	0.116	0.117	0.118	0.119	0.120	0.121	0.122	0.124	0.125	0.126	0.129	0.132	0.135	0.138
0.059	0.108	0.114	0.115	0.116	0.117	0.119	0.120	0.121	0.122	0.123	0.124	0.126	0.129	0.132	0.135	0.137
0.060	0.107	0.113	0.115	0.116	0.117	0.118	0.119	0.121	0.122	0.123	0.124	0.125	0.128	0.131	0.134	0.137
0.061	0.107	0.113	0.114	0.115	0.117	0.118	0.119	0.120	0.121	0.123	0.124	0.125	0.128	0.131	0.134	0.137
0.062	0.106	0.112	0.114	0.115	0.116	0.117	0.119	0.120	0.121	0.122	0.124	0.125	0.128	0.131	0.134	0.137
0.063	0.106	0.112	0.113	0.114	0.116	0.117	0.118	0.120	0.121	0.122	0.123	0.125	0.128	0.131	0.134	0.137
0.064	0.105	0.111	0.113	0.114	0.115	0.117	0.118	0.119	0.120	0.122	0.123	0.124	0.127	0.131	0.134	0.137
0.065	0.105	0.111	0.112	0.114	0.115	0.116	0.118	0.119	0.120	0.121	0.123	0.124	0.127	0.131	0.134	0.137

Rev.7/98

BASIC NOMINAL OPERATING RANGE IS FROM 14% TO 16%

FOR TRUE STRAIGHTNESS A ROLL STRAIGHTENER MAY NOT
ACHIEVE THE BEST RESULTS ON FULL HARD WIRE

SERIES #4 UNIBODY

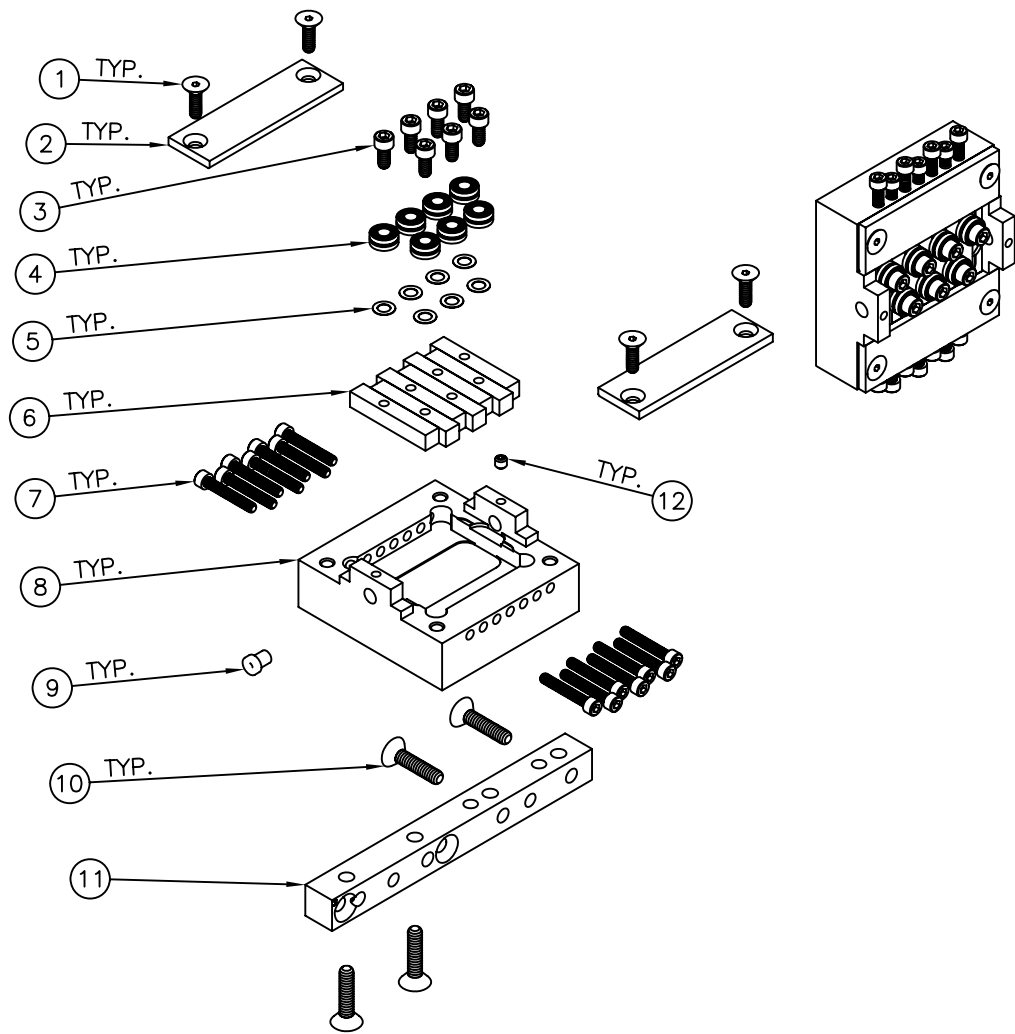
WIRE SIZE	"QS"	4%	6%	8%	10%	12%	14%	16%	18%	20%	22%	24%	26%
<<<<LIGHTEST PULLING TENSION						HEAVIEST PULLING TENSION >>>>							
0.100	0.135	0.139	0.141	0.143	0.145	0.147	0.149	0.151	0.153	0.155	0.157	0.159	0.161
0.102	0.134	0.138	0.140	0.142	0.144	0.146	0.149	0.151	0.153	0.155	0.157	0.159	0.161
0.104	0.133	0.137	0.139	0.141	0.143	0.146	0.148	0.150	0.152	0.154	0.156	0.158	0.160
0.106	0.132	0.136	0.138	0.140	0.143	0.145	0.147	0.149	0.151	0.153	0.155	0.157	0.160
0.108	0.131	0.135	0.137	0.139	0.142	0.144	0.146	0.148	0.150	0.152	0.155	0.157	0.159
0.110	0.130	0.134	0.136	0.138	0.141	0.143	0.145	0.147	0.149	0.152	0.154	0.156	0.158
0.112	0.128	0.133	0.135	0.137	0.140	0.142	0.144	0.146	0.149	0.151	0.153	0.155	0.158
0.114	0.127	0.132	0.134	0.136	0.139	0.141	0.143	0.146	0.148	0.150	0.152	0.155	0.157
0.108	0.131	0.135	0.137	0.139	0.142	0.144	0.146	0.148	0.150	0.152	0.155	0.157	0.159
0.118	0.125	0.130	0.132	0.134	0.137	0.139	0.142	0.144	0.146	0.149	0.151	0.153	0.156
0.120	0.124	0.129	0.131	0.133	0.136	0.138	0.141	0.143	0.145	0.148	0.150	0.153	0.155
0.122	0.123	0.128	0.130	0.132	0.135	0.137	0.140	0.142	0.145	0.147	0.150	0.152	0.154
0.124	0.122	0.127	0.129	0.131	0.134	0.136	0.139	0.141	0.144	0.146	0.149	0.151	0.154
0.126	0.120	0.125	0.128	0.130	0.133	0.136	0.138	0.141	0.143	0.146	0.148	0.151	0.153
0.128	0.119	0.124	0.127	0.129	0.132	0.135	0.137	0.140	0.142	0.145	0.147	0.150	0.153
0.130	0.118	0.123	0.126	0.128	0.131	0.134	0.136	0.139	0.141	0.144	0.147	0.149	0.152
0.132	0.117	0.122	0.125	0.127	0.130	0.133	0.135	0.138	0.141	0.143	0.146	0.149	0.151
0.134	0.116	0.121	0.124	0.126	0.129	0.132	0.135	0.137	0.140	0.143	0.145	0.148	0.151
0.136	0.115	0.120	0.123	0.125	0.128	0.131	0.134	0.136	0.139	0.142	0.145	0.147	0.150
0.138	0.113	0.119	0.122	0.124	0.127	0.130	0.133	0.136	0.138	0.141	0.144	0.147	0.149
0.140	0.112	0.118	0.121	0.123	0.126	0.129	0.132	0.135	0.137	0.140	0.143	0.146	0.149
0.142	0.111	0.117	0.120	0.122	0.125	0.128	0.131	0.134	0.137	0.140	0.142	0.145	0.148
0.144	0.110	0.116	0.119	0.121	0.124	0.127	0.130	0.133	0.136	0.139	0.142	0.145	0.147
0.146	0.109	0.115	0.118	0.120	0.123	0.126	0.129	0.132	0.135	0.138	0.141	0.144	0.147
0.148	0.108	0.114	0.116	0.119	0.122	0.125	0.128	0.131	0.134	0.137	0.140	0.143	0.146
0.150	0.106	0.112	0.115	0.118	0.121	0.124	0.127	0.130	0.133	0.136	0.139	0.142	0.145
0.152	0.105	0.111	0.114	0.117	0.120	0.124	0.127	0.130	0.133	0.136	0.139	0.142	0.145
0.154	0.104	0.110	0.113	0.116	0.120	0.123	0.126	0.129	0.132	0.135	0.138	0.141	0.144
0.156	0.103	0.109	0.112	0.115	0.119	0.122	0.125	0.128	0.131	0.134	0.137	0.140	0.144
0.158	0.102	0.108	0.111	0.114	0.118	0.121	0.124	0.127	0.130	0.133	0.137	0.140	0.143
0.160	0.101	0.107	0.110	0.113	0.117	0.120	0.123	0.126	0.129	0.133	0.136	0.139	0.142
0.162	0.099	0.106	0.109	0.112	0.116	0.119	0.122	0.125	0.129	0.132	0.135	0.138	0.142
0.164	0.098	0.105	0.108	0.111	0.115	0.118	0.121	0.125	0.128	0.131	0.134	0.138	0.141
0.166	0.097	0.104	0.107	0.110	0.114	0.117	0.120	0.124	0.127	0.130	0.134	0.137	0.140
0.168	0.096	0.103	0.106	0.109	0.113	0.116	0.119	0.123	0.126	0.130	0.133	0.136	0.140
0.170	0.095	0.102	0.105	0.108	0.112	0.115	0.119	0.122	0.125	0.129	0.132	0.136	0.139
0.172	0.094	0.100	0.104	0.107	0.111	0.114	0.118	0.121	0.125	0.128	0.131	0.135	0.138
0.174	0.092	0.099	0.103	0.106	0.110	0.113	0.117	0.120	0.124	0.127	0.131	0.134	0.138
0.176	0.091	0.098	0.102	0.105	0.109	0.112	0.116	0.119	0.123	0.126	0.130	0.133	0.137
0.178	0.090	0.097	0.101	0.104	0.108	0.111	0.115	0.119	0.122	0.126	0.129	0.133	0.136
0.180	0.089	0.096	0.100	0.103	0.107	0.110	0.114	0.118	0.121	0.125	0.128	0.132	0.136
0.182	0.088	0.095	0.099	0.102	0.106	0.110	0.113	0.117	0.120	0.124	0.128	0.131	0.135
0.184	0.087	0.094	0.098	0.101	0.105	0.109	0.112	0.116	0.120	0.123	0.127	0.131	0.134
0.186	0.086	0.093	0.097	0.101	0.104	0.108	0.112	0.116	0.119	0.123	0.127	0.130	0.134
0.187	0.085	0.092	0.096	0.100	0.103	0.107	0.111	0.115	0.118	0.122	0.126	0.130	0.133

BASIC NOMINAL OPERATING RANGE IS FROM 8% TO 16%
 FOR TRUE STRAIGHTNESS A ROLL STRAIGHTENER MAY NOT
 ACHIEVE THE BEST RESULTS ON FULL HARD WIRE

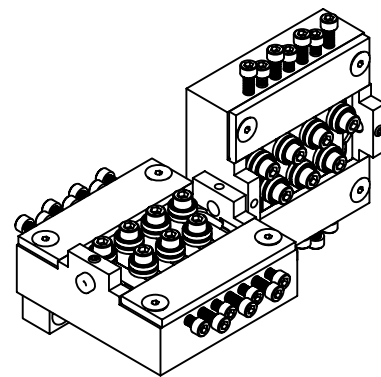
SERIES #5 UNIBODY

WIRE SIZE	"QS"	4%	6%	8%	10%	12%	14%	16%	18%	20%	22%	24%	26%
<<<<LIGHTEST PULLING TENSION					>>>> HEAVIEST PULLING TENSION >>>>								
0.150	0.3816	0.388	0.391	0.394	0.397	0.400	0.403	0.406	0.409	0.412	0.415	0.418	0.421
0.152	0.3805	0.387	0.390	0.393	0.396	0.399	0.402	0.405	0.408	0.411	0.414	0.417	0.420
0.154	0.3793	0.385	0.389	0.392	0.395	0.398	0.401	0.404	0.407	0.410	0.413	0.416	0.419
0.156	0.3782	0.384	0.388	0.391	0.394	0.397	0.400	0.403	0.406	0.409	0.412	0.416	0.419
0.158	0.3770	0.383	0.386	0.390	0.393	0.396	0.399	0.402	0.405	0.409	0.412	0.415	0.418
0.160	0.3759	0.382	0.385	0.389	0.392	0.395	0.398	0.401	0.405	0.408	0.411	0.414	0.417
0.162	0.3747	0.381	0.384	0.388	0.391	0.394	0.397	0.401	0.404	0.407	0.410	0.414	0.417
0.164	0.3736	0.380	0.383	0.387	0.390	0.393	0.397	0.400	0.403	0.406	0.410	0.413	0.416
0.166	0.3724	0.379	0.382	0.386	0.389	0.392	0.396	0.399	0.402	0.406	0.409	0.412	0.416
0.168	0.3713	0.378	0.381	0.385	0.388	0.391	0.395	0.398	0.401	0.405	0.408	0.412	0.415
0.170	0.3701	0.377	0.380	0.384	0.387	0.391	0.394	0.397	0.401	0.404	0.408	0.411	0.414
0.172	0.3690	0.376	0.379	0.383	0.386	0.390	0.393	0.396	0.400	0.403	0.407	0.410	0.414
0.174	0.3678	0.375	0.378	0.382	0.385	0.389	0.392	0.396	0.399	0.403	0.406	0.410	0.413
0.176	0.3667	0.374	0.377	0.381	0.384	0.388	0.391	0.395	0.398	0.402	0.405	0.409	0.412
0.178	0.3655	0.373	0.376	0.380	0.383	0.387	0.390	0.394	0.398	0.401	0.405	0.408	0.412
0.180	0.3644	0.372	0.375	0.379	0.382	0.386	0.390	0.393	0.397	0.400	0.404	0.408	0.411
0.182	0.3632	0.370	0.374	0.378	0.381	0.385	0.389	0.392	0.396	0.400	0.403	0.407	0.411
0.184	0.3621	0.369	0.373	0.377	0.380	0.384	0.388	0.391	0.395	0.399	0.403	0.406	0.410
0.186	0.3609	0.368	0.372	0.376	0.380	0.383	0.387	0.391	0.394	0.398	0.402	0.406	0.409
0.188	0.3598	0.367	0.371	0.375	0.379	0.382	0.386	0.390	0.394	0.397	0.401	0.405	0.409
0.190	0.3586	0.366	0.370	0.374	0.378	0.381	0.385	0.389	0.393	0.397	0.400	0.404	0.408
0.192	0.3575	0.365	0.369	0.373	0.377	0.380	0.384	0.388	0.392	0.396	0.400	0.404	0.407
0.194	0.3563	0.364	0.368	0.372	0.376	0.380	0.383	0.387	0.391	0.395	0.399	0.403	0.407
0.196	0.3552	0.363	0.367	0.371	0.375	0.379	0.383	0.387	0.390	0.394	0.398	0.402	0.406
0.198	0.3540	0.362	0.366	0.370	0.374	0.378	0.382	0.386	0.390	0.394	0.398	0.402	0.405
0.200	0.3529	0.361	0.365	0.369	0.373	0.377	0.381	0.385	0.389	0.393	0.397	0.401	0.405
0.202	0.3517	0.360	0.364	0.368	0.372	0.376	0.380	0.384	0.388	0.392	0.396	0.400	0.404
0.204	0.3506	0.359	0.363	0.367	0.371	0.375	0.379	0.383	0.387	0.391	0.395	0.400	0.404
0.206	0.3494	0.358	0.362	0.366	0.370	0.374	0.378	0.382	0.386	0.391	0.395	0.399	0.403
0.208	0.3483	0.357	0.361	0.365	0.369	0.373	0.377	0.382	0.386	0.390	0.394	0.398	0.402
0.210	0.3471	0.356	0.360	0.364	0.368	0.372	0.377	0.381	0.385	0.389	0.393	0.398	0.402
0.212	0.3460	0.354	0.359	0.363	0.367	0.371	0.376	0.380	0.384	0.388	0.393	0.397	0.401
0.214	0.3448	0.353	0.358	0.362	0.366	0.370	0.375	0.379	0.383	0.388	0.392	0.396	0.400
0.216	0.3437	0.352	0.357	0.361	0.365	0.370	0.374	0.378	0.383	0.387	0.391	0.395	0.400
0.218	0.3425	0.351	0.356	0.360	0.364	0.369	0.373	0.377	0.382	0.386	0.390	0.395	0.399
0.220	0.3414	0.350	0.355	0.359	0.363	0.368	0.372	0.377	0.381	0.385	0.390	0.394	0.399
0.222	0.3402	0.349	0.354	0.358	0.362	0.367	0.371	0.376	0.380	0.385	0.389	0.393	0.398
0.224	0.3391	0.348	0.352	0.357	0.361	0.366	0.370	0.375	0.379	0.384	0.388	0.393	0.397
0.226	0.3379	0.347	0.351	0.356	0.361	0.365	0.370	0.374	0.379	0.383	0.388	0.392	0.397
0.228	0.3368	0.346	0.350	0.355	0.360	0.364	0.369	0.373	0.378	0.382	0.387	0.391	0.396
0.230	0.3356	0.345	0.349	0.354	0.359	0.363	0.368	0.372	0.377	0.382	0.386	0.391	0.395
0.232	0.3345	0.344	0.348	0.353	0.358	0.362	0.367	0.372	0.376	0.381	0.385	0.390	0.395
0.234	0.3333	0.343	0.347	0.352	0.357	0.361	0.366	0.371	0.375	0.380	0.385	0.389	0.394
0.236	0.3322	0.342	0.346	0.351	0.356	0.360	0.365	0.370	0.375	0.379	0.384	0.389	0.394
0.238	0.3310	0.341	0.345	0.350	0.355	0.360	0.364	0.369	0.374	0.379	0.383	0.388	0.393
0.240	0.3299	0.339	0.344	0.349	0.354	0.359	0.363	0.368	0.373	0.378	0.383	0.387	0.392
0.242	0.3287	0.338	0.343	0.348	0.353	0.358	0.363	0.367	0.372	0.377	0.382	0.387	0.392
0.244	0.3276	0.337	0.342	0.347	0.352	0.357	0.362	0.367	0.371	0.376	0.381	0.386	0.391
0.246	0.3264	0.336	0.341	0.346	0.351	0.356	0.361	0.366	0.371	0.376	0.381	0.385	0.390
0.248	0.3253	0.335	0.340	0.345	0.350	0.355	0.360	0.365	0.370	0.375	0.380	0.385	0.390
0.250	0.3241	0.334	0.339	0.344	0.349	0.354	0.359	0.364	0.369	0.374	0.379	0.384	0.389

BASIC NOMINAL OPERATING RANGE IS FROM 8% TO 16%
 FOR TRUE STRAIGHTNESS A ROLL STRAIGHTENER MAY NOT
 ACHIEVE THE BEST RESULTS ON FULL HARD WIRE



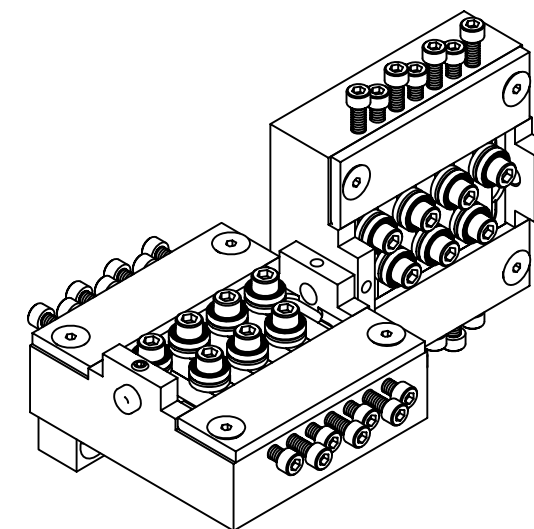
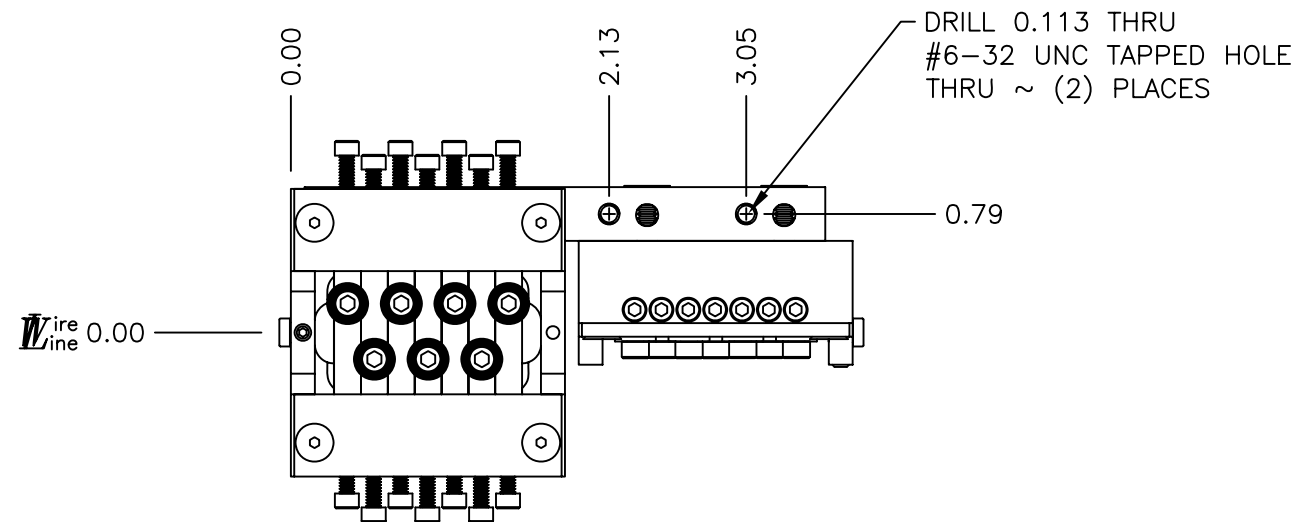
ITEM	QTY.	PART NUMBER	DESCRIPTION
12	2	9003-014	#4-40 X 1/4" SHSS
11	1	1000-303	#0 UNIVERSAL CONNECTOR
10	4	9001-034	#6-32 X 5/8" SHCS
9	2	9800-016	#0 CERAMIC GUIDE
8	2	1000-300	#0 UNIBODY HOUSING
7	28	9000-015	#3-48 X 5/8" SHCS
6	14	1000-301	#0 ROLL PLATES
5	14	9008-108	BEARING SHIM WASHER
4	14	9300-501	#0 STD "V" GROOVE BEARINGS
3	14	9000-017	#4-40 X 1/4" SHCS
2	4	1000-302	#0 UNIBODY ROLL CAP
1	8	9001-017	#4-40 X 1/4" FHCS



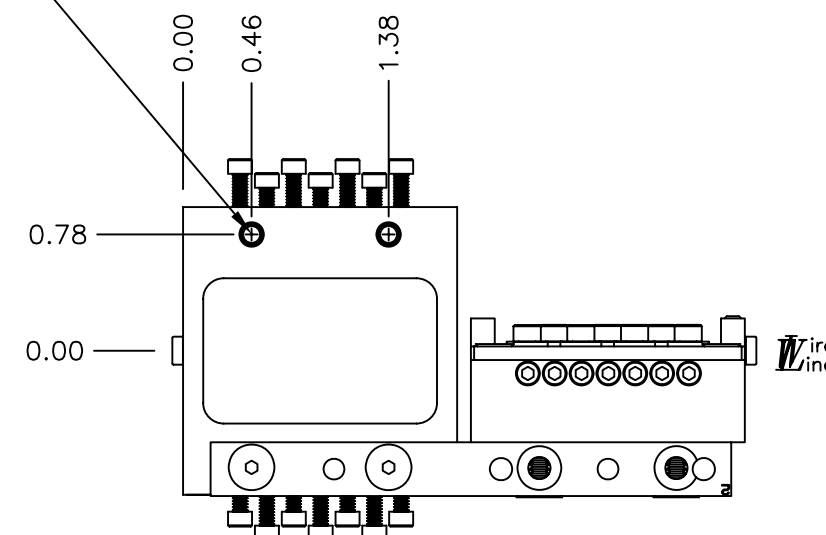
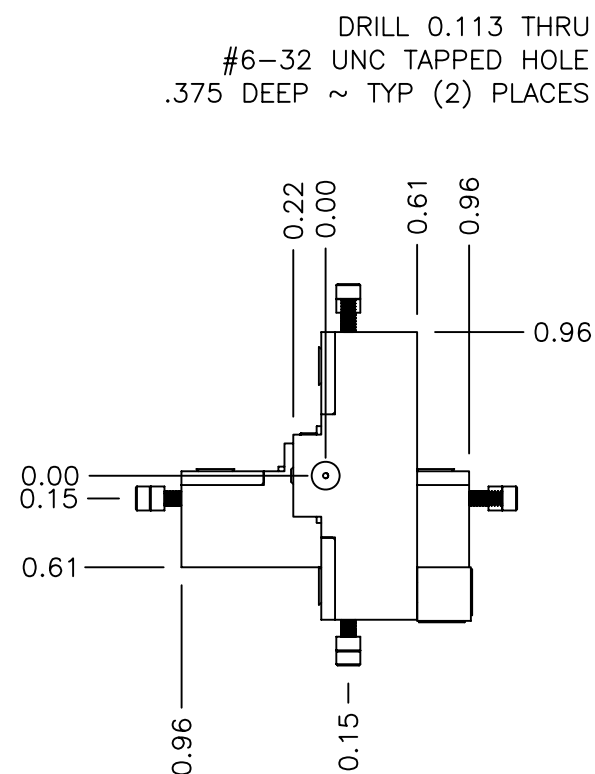
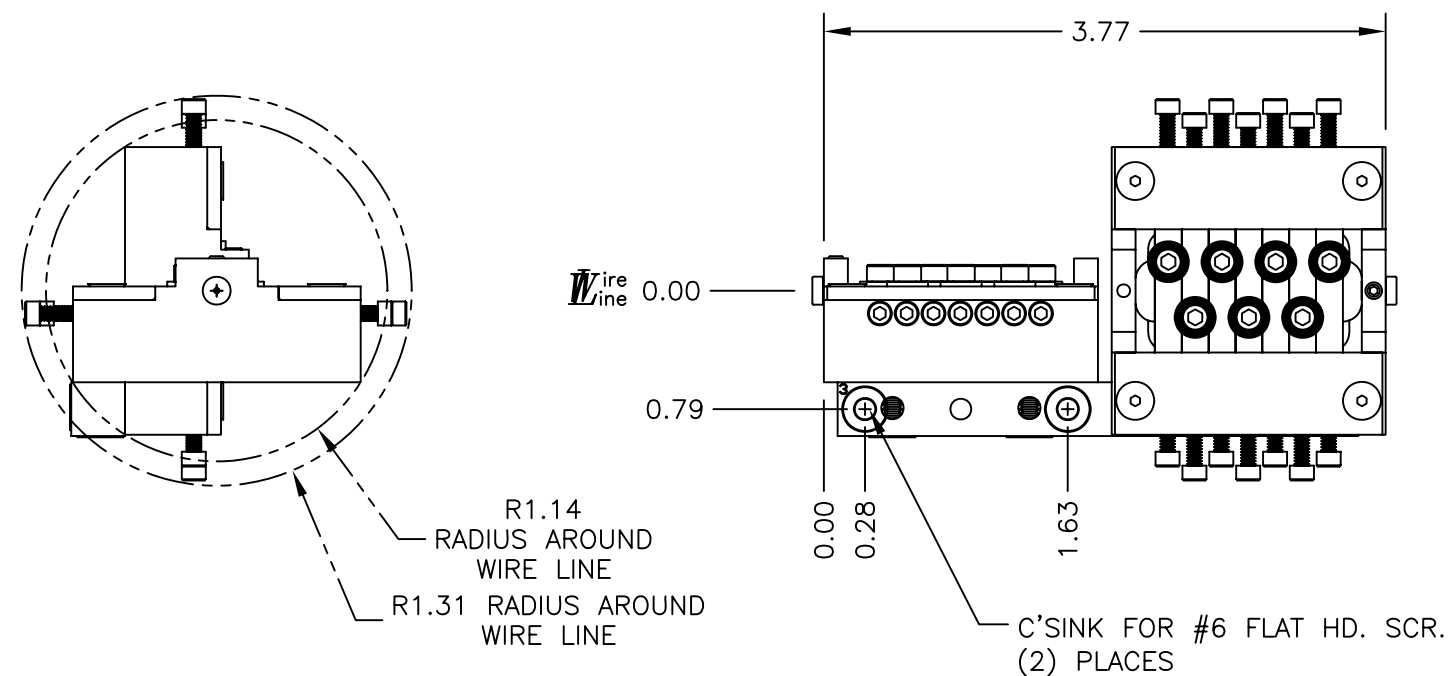
REV	EDN	CHG BY	DATE



TOLERANCE UNLESS OTHERWISE STATED		CAD	DRAWING / PART NO.
Δ ± .3	FRACT +/- 1/16	DWN GDH	1000-012
\perp ± 0.0003	X ± .032	CHK	PART NAME
\odot ± 0.0002	XX ± .015	SCALE	#0 2-PLANE ASSY
\oplus ± 0.0005	XXX ± .005	DATE 021005	CUSTOMER
\ominus ± 0.0005	XXXX ± .0005		



DRILL 0.113 THRU
#6-32 UNC TAPPED HOLE
.375 DEEP ~ TYP (2) PLACES



#0 2-PLANE MOUNTING LOCATIONS

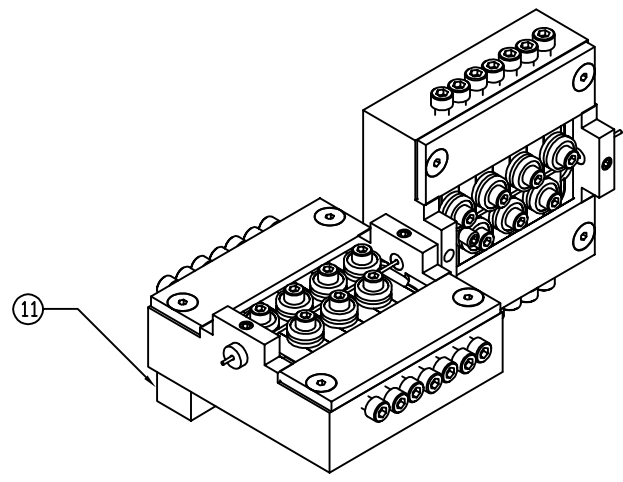
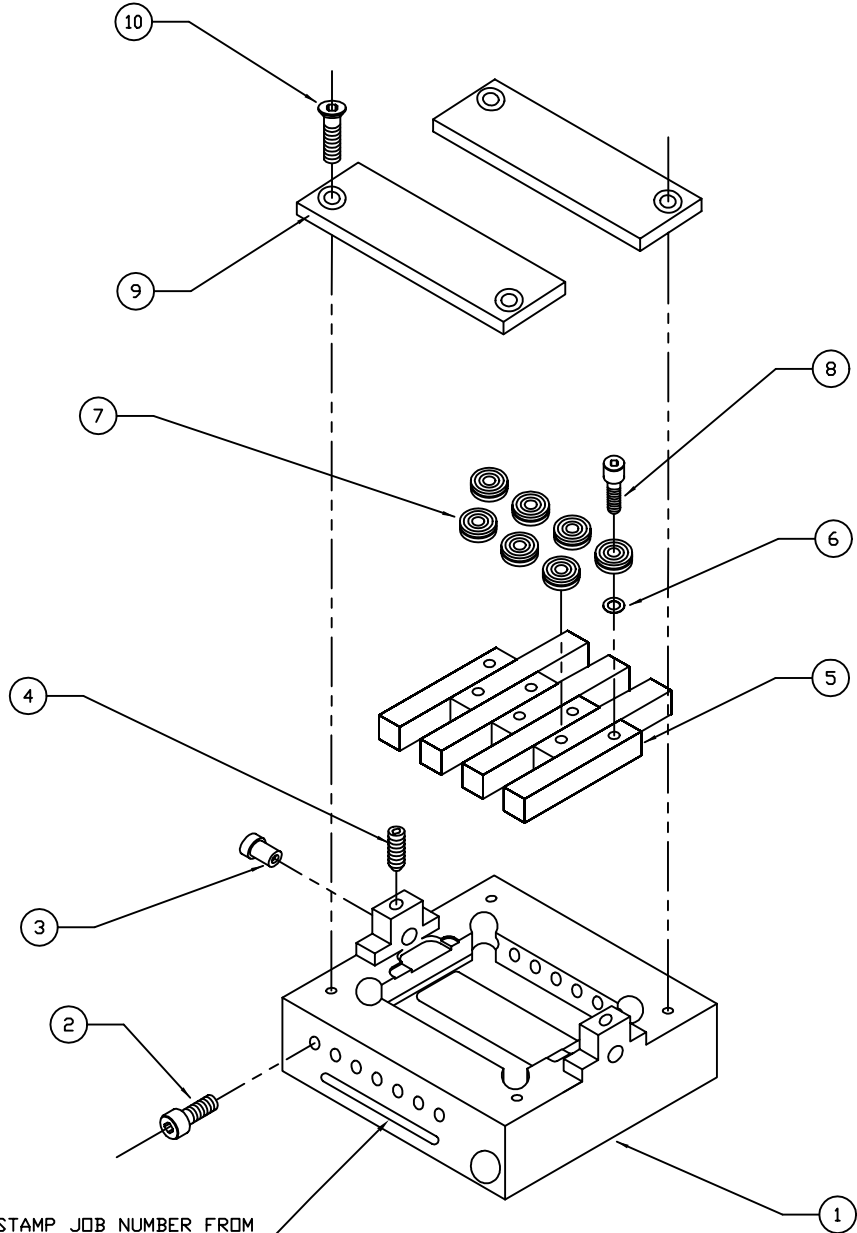


TOLERANCE UNLESS OTHERWISE STATED	
± 3"	FRACT +/- 1/16
± 0.0003	.X ± .032
± 0.0002	.XX ± .015
± 0.0005	.XXX ± .005
± 0.0005	.XXXX ± .0005

CAD	DWN GDH
CHK	SCALE
DATE 093005	

REV	ECN	CHG BY	DATE

DRAWING / PART NO.	1001-012A
PART NAME	SERIES #0 2-PLANE MOUNTING
CUSTOMER	



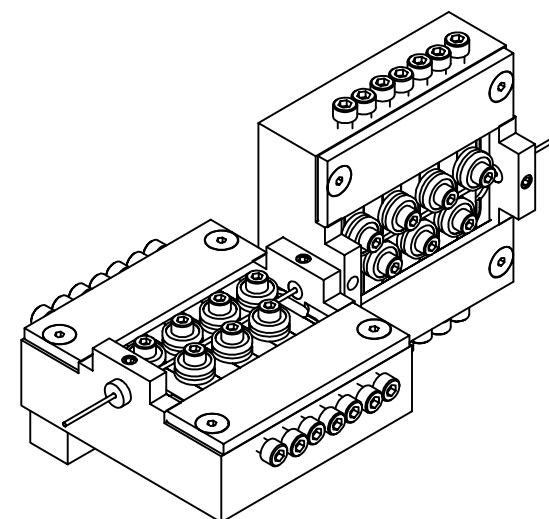
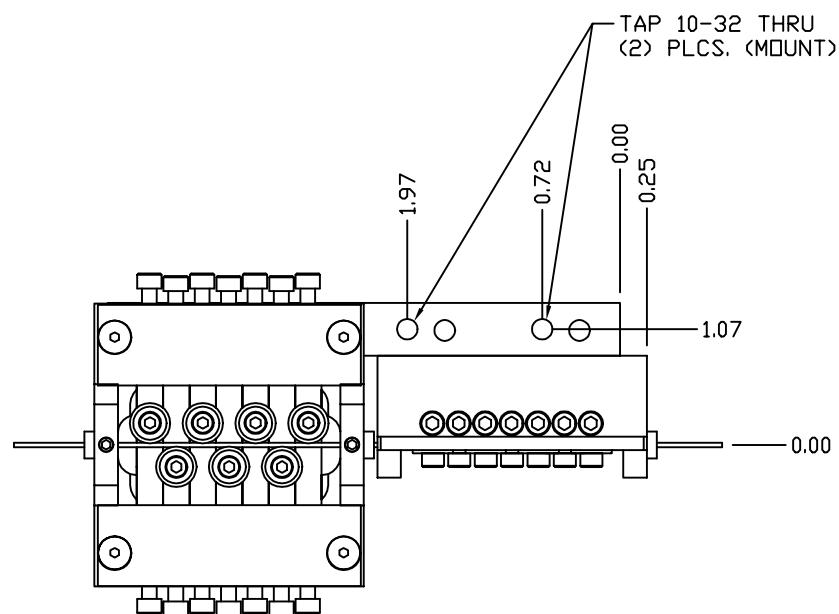
14	1	1300-001	SLIP TORQUE KNOB ASSY #1
13	1	9805-002	LOGO NAMEPLATE (NOT SHOWN)
12	4	9001-076	10-32 X 3/4 FHCS (NOT SHOWN)
11	1	1001-165	UNIVERSAL CONNECTOR
10	8	9001-032	6-32 X 3/8 FHCS
9	4	1001-112	ROLL CAP
8	14	9000-026	5-40 X 3/8 SHCS
7	14	9301-171	STANDARD "V" BEARING
6	14	9008-108	.126ID X .216OD SHIM WASHER
5	14	1001-130	ROLL PLATE
4	2	9003-407	8-32 X 3/16 HSSS NYLON TIP
3	2	9800-003	.048 ID CERAMIC WIRE GUIDE
2	28	9000-046	#6-40 X 3/4 SHCS
1	2	1001-111	UNIVERSAL #1 HOUSING
ITEM	QTY.	PART NUMBER	DESCRIPTION

#01 EXPLODED VIEW
WITH PART LIST

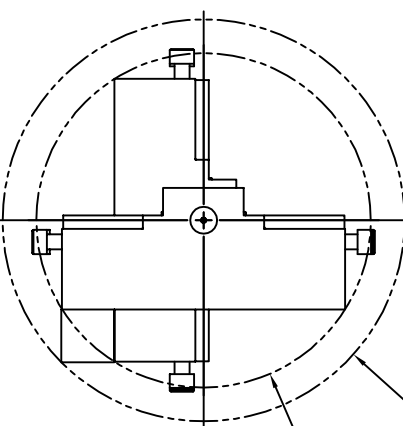


TOLERANCE UNLESS OTHERWISE STATED	CAD	DRAWING / PART NO.
± .3"	DWN TKS	1001-002
± .0003	CHK	PART NAME
± .0002	SCALE 1:1	#01 HOUSING ASSY
± .0005	DATE 103097	CUSTOMER
± .0005		

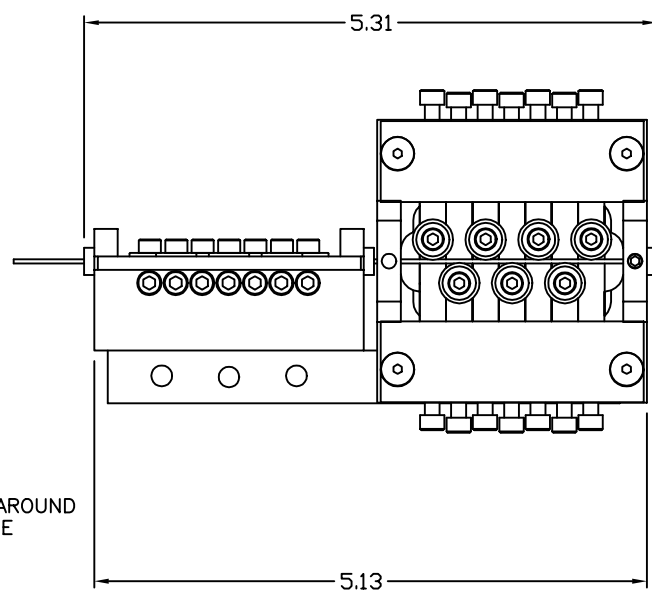
DIMENSIONS FOR MOUNTING
TAK WIRE STRAIGHTENER
SERIES 01 2 PLANE



Wire
Wire

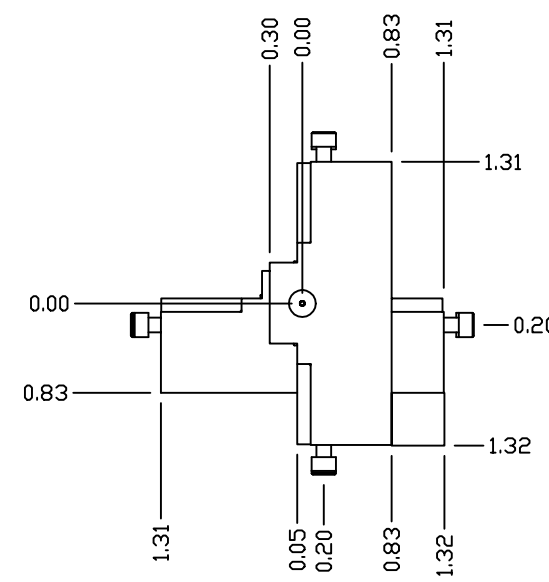


Wire
Wire

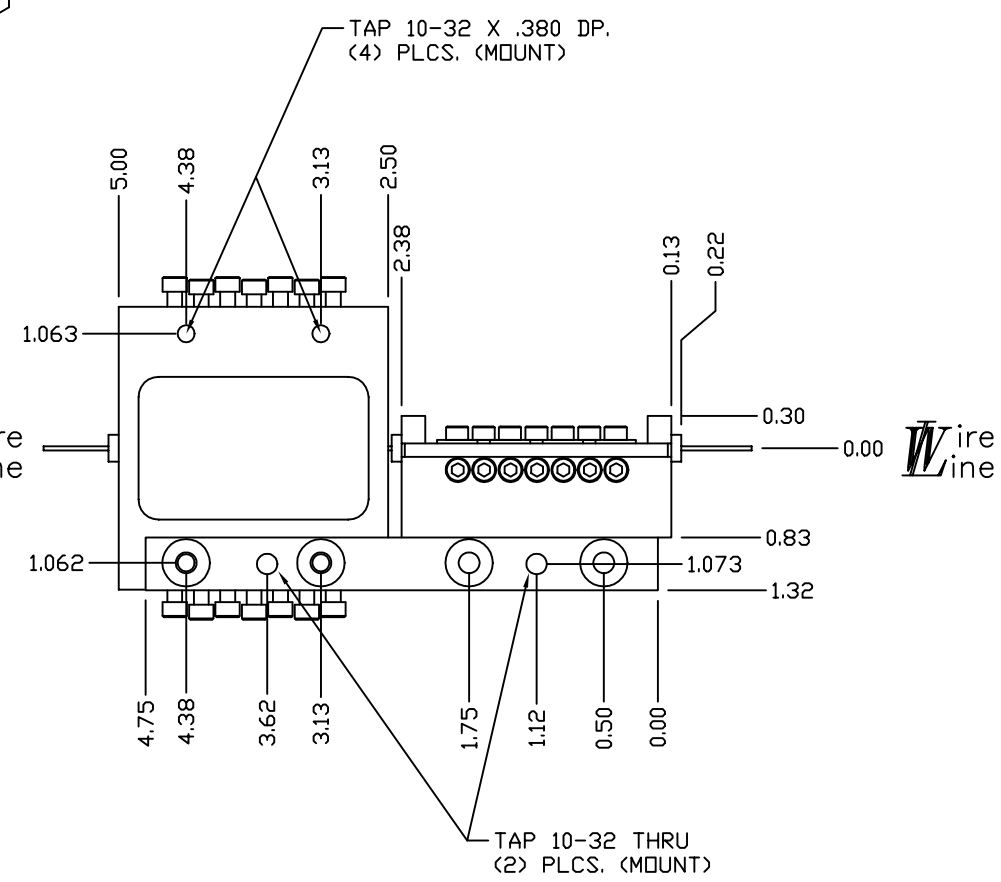


R1.86
RADIUS AROUND
WIRE LINE

Wire
Wire



Wire
Wire



Wire
Wire

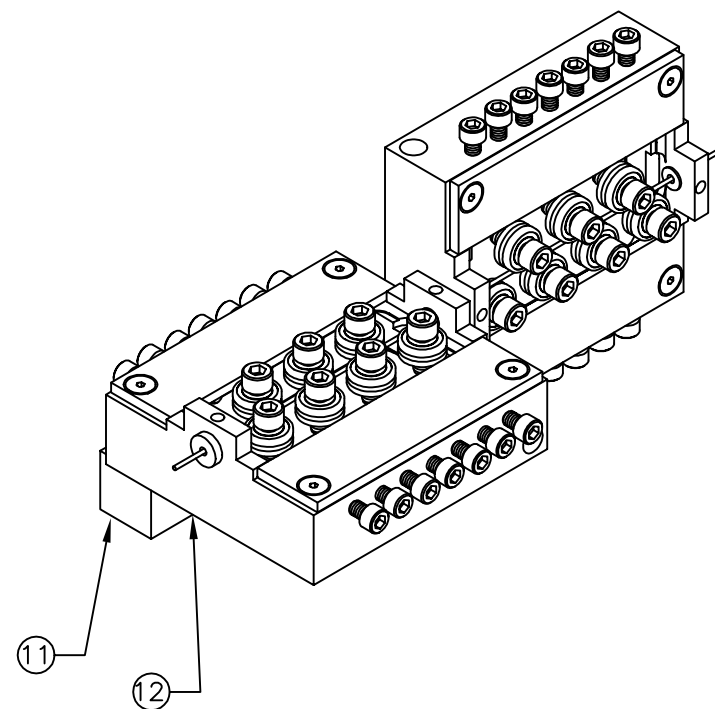
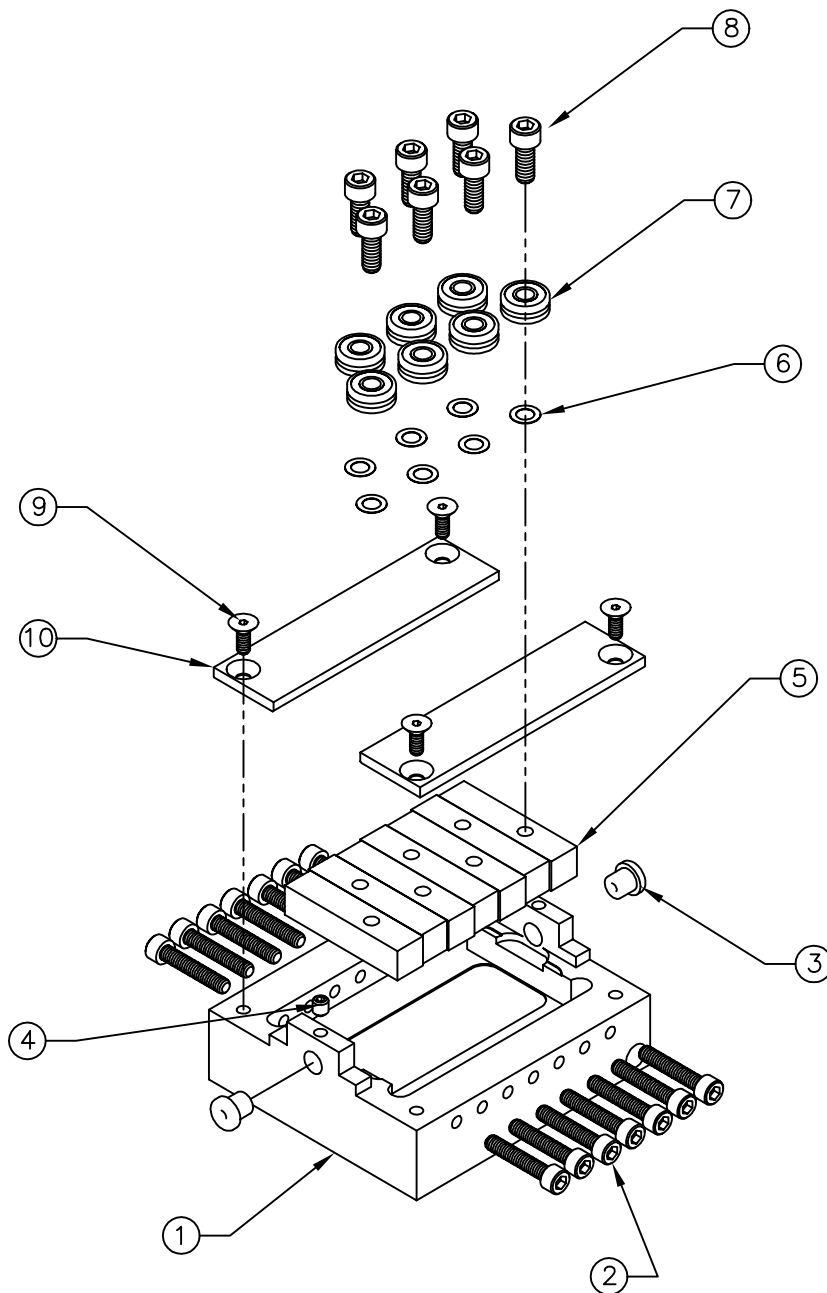
REV	ECN	CHG BY	DATE
A	177B	GDH	111201

#01 2-PLANE ASSY
MOUNTING LOCATIONS



TOLERANCE UNLESS OTHERWISE STATED		CAD
± 3°	FRACT +/- 1/16	DWN BJC
± 0.0003	.X ± .032	CHK
± 0.0002	.XX ± .015	SCALE
± 0.0005	.XXX ± .005	DATE 12/13/96
± 0.0005	.XXXX ± .0005	

DRAWING / PART NO.	
1001-002A	
PART NAME	
#01 2-PLANE MOUNTING	
CUSTOMER	



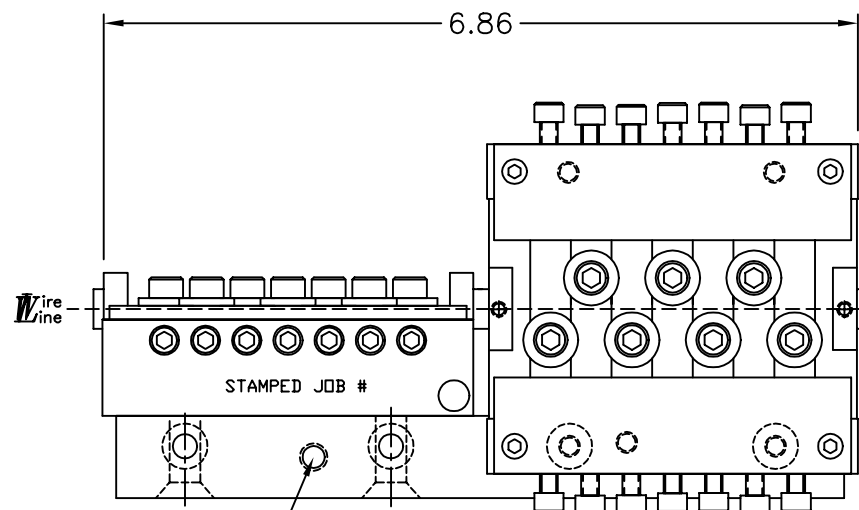
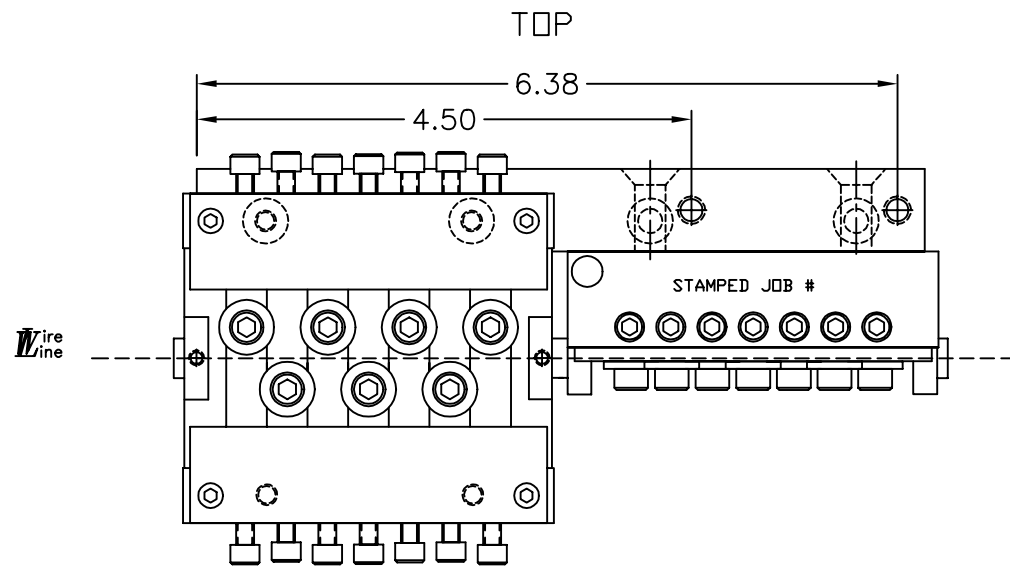
ITEM	PART NUMBER	DISCRIPTION	QTY
14	1300-002	SLIP TORQUE KNOB ASSY #2 (NOT SHOWN)	1
13	9805-002	NAME PLATE (NOT SHOWN)	2
12	9001-078	10-32 X 1 FHCS (NOT SHOWN)	4
11	1002-160	UNIVERSAL CONNECTOR	1
10	9001-032	6/32 X 3/8 FHCS	8
9	1002-112	ROLL CAP	4
8	9000-061	10-24 X 1 1/2 SHCS	14
7	9302-171	STANDARD "V" BEARING	14
6	9008-109	.188 ID X .311 OD HARDENED SHIM WASHER	14
5	1002-130	ROLL PLATE	14
4	9003-407	8-32 X 3/16 NYLON SET SCREW SHSS	2
3	9800-002	.093 ID CERAMIC GUIDE	2
2	9000-052	8-32 X 7/8 SHCS	28
1	1002-111	UNIBODY HOUSING #2	2

#02 EXPLODED 2-PLANE ASSY. WITH PARTS LIST

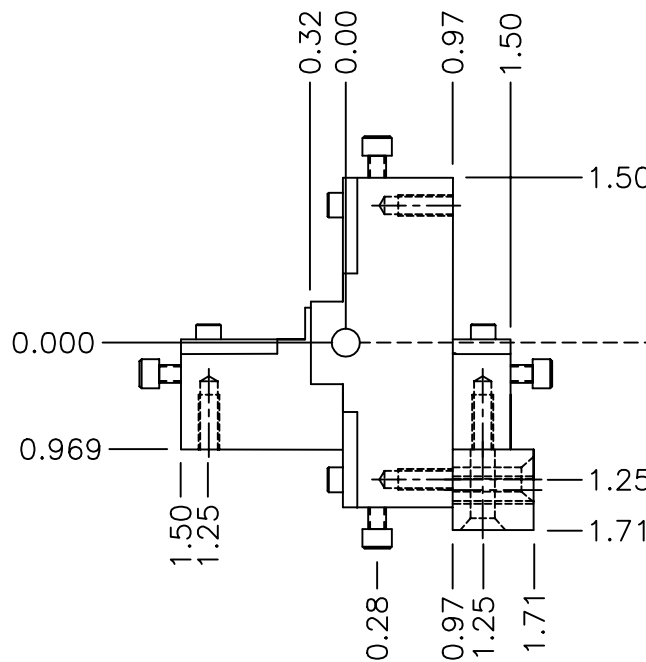


TOLERANCE UNLESS OTHERWISE STATED	CAD	DRAWING / PART NO.
∆ ± .3"	DWN GDH	1002-002
∓ ± 0.0003	CHK	PART NAME
⊕ ± 0.0002	SCALE	HOUSING ASSY
⊖ ± 0.0005	DATE 032995	CUSTOMER
≡ ± 0.0005		

REV	ECN	CHG BY	DATE

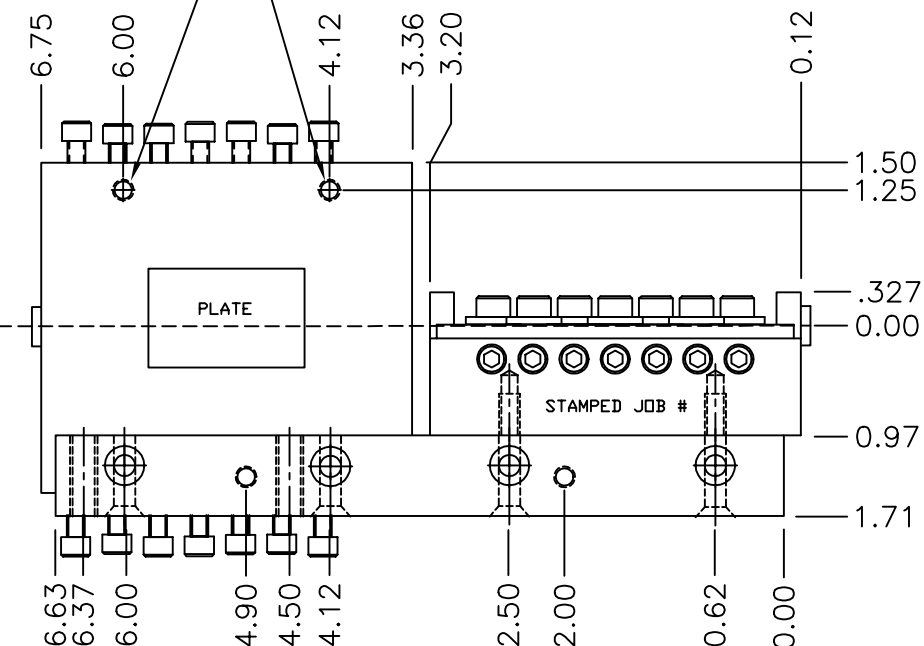


FRONT

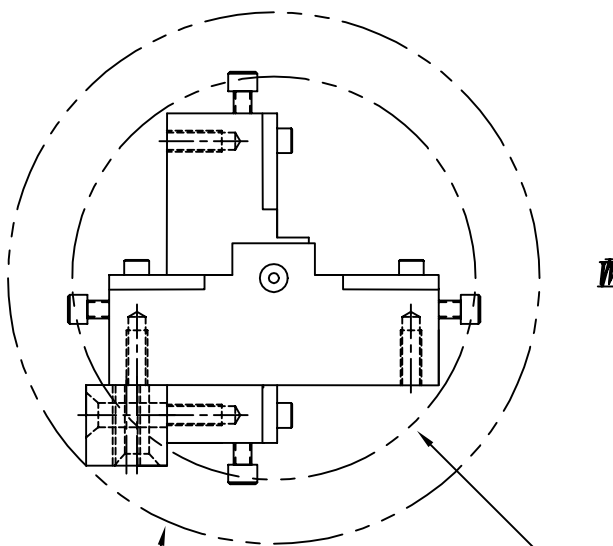


END

10-32 X .50 DEEP
UNUSED TAPPED
HOLES 4 PLCS.



BACK



R1.83 RADIUS
AROUND WIRE LINE

R2.41 RADIUS
AROUND WIRE LINE

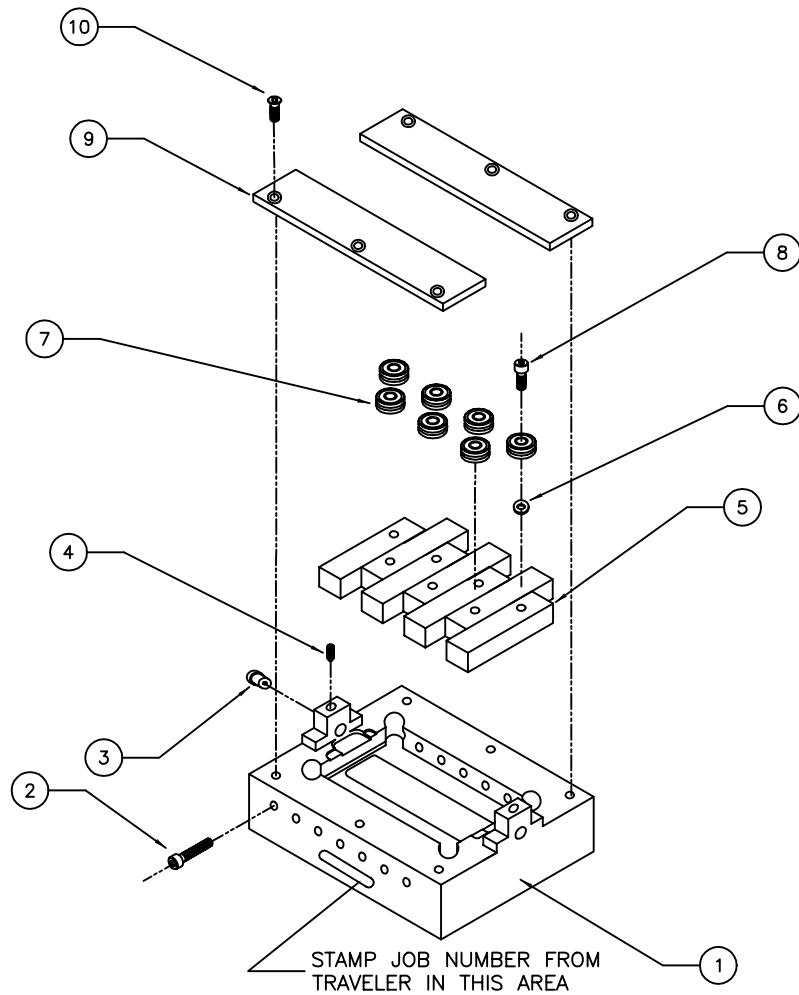
#02 2-PLANE ASSY.
MOUNTING LOCATIONS

TAK WIRE STRAIGHTENER
SERIES 02
2 PLANE

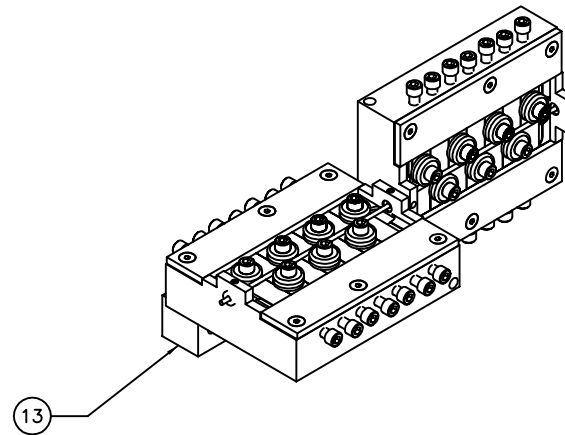


TOLERANCE UNLESS OTHERWISE STATED		CAD	DRAWING / PART NO.
± 3°	FRACT +/- 1/16	DWN TKS	1002-002A
± 0.0003 .X	± .032	CHK	PART NAME
± 0.0002 .XX	± .015	SCALE	#02 2-PLANE ASSY
± 0.0005 .XXX	± .005	DATE 102297	CUSTOMER
± 0.0005 .XXXX	± .0005		

REV	ECN	CHG BY	DATE



15	2	1003-174	BEARING COVER (NOT SHOWN)
14	4	9001-123	5/16-18 X 1-3/4 FHCS (NOT SHOWN)
13	1	1003-163	UNIVERSAL CONNECTOR
12	2	9805-002	NAMEPLATE (NOT SHOWN)
11	1	1300-003	SLIP TORQUE KNOB ASSY (NOT SHOWN)
10	12	9001-074	10-32 X 1/2 FHCS
9	4	1003-112	ROLL CAP
8	14	9000-090	1/4-20 X 3/4 SHCS
7	14	9303-171	BEARING "V" GROOVE
6	14	9008-110	.250ID X .375OD SHIM WASHER
5	14	1003-130	ROLL PLATE
4	3	9003-407	8-32 X 3/16 SHSS NYLON TIP
3	3	9800-005	.140 ID CERAMIC WIRE GUIDE
2	28	9000-110	1/4-28 X 1-1/4 SHCS
1	2	1003-111	UNIVERSAL #3 HOUSING
ITEM	QTY	PART NUMBER	DESCRIPTION



#03 EXPLODED 2-PLANE ASSY WITH PARTS LIST



TOLERANCE UNLESS
OTHERWISE STATED

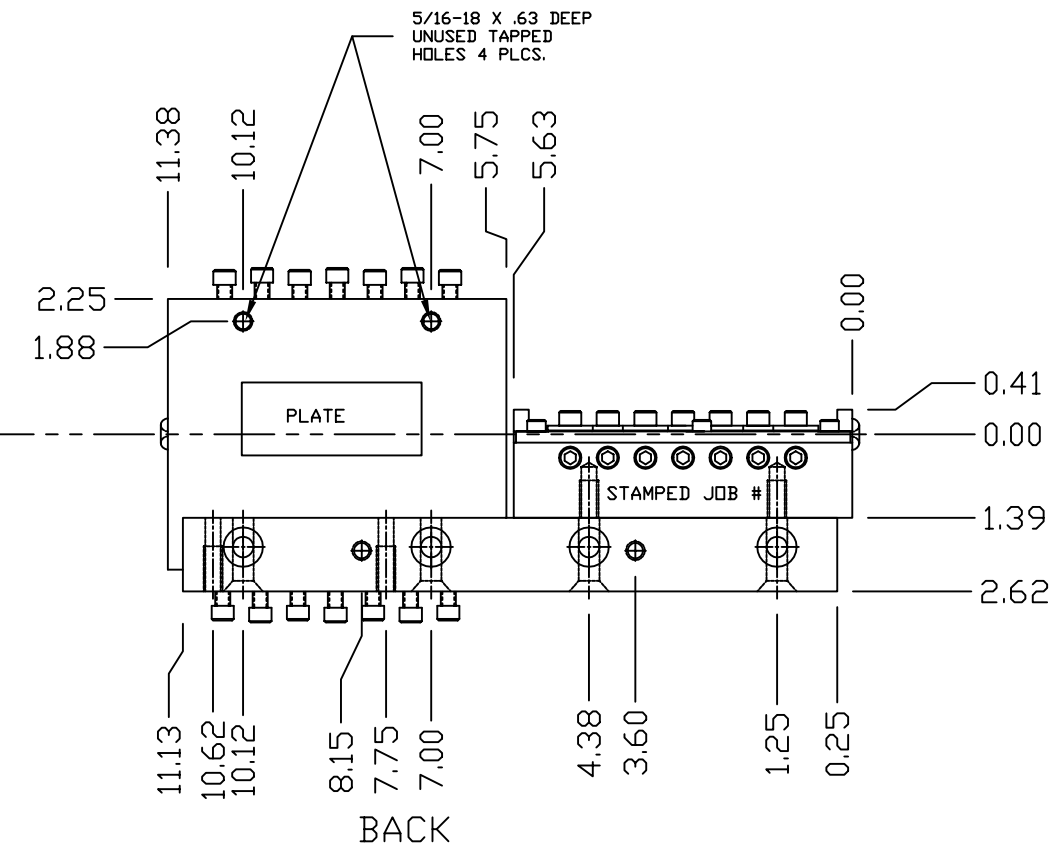
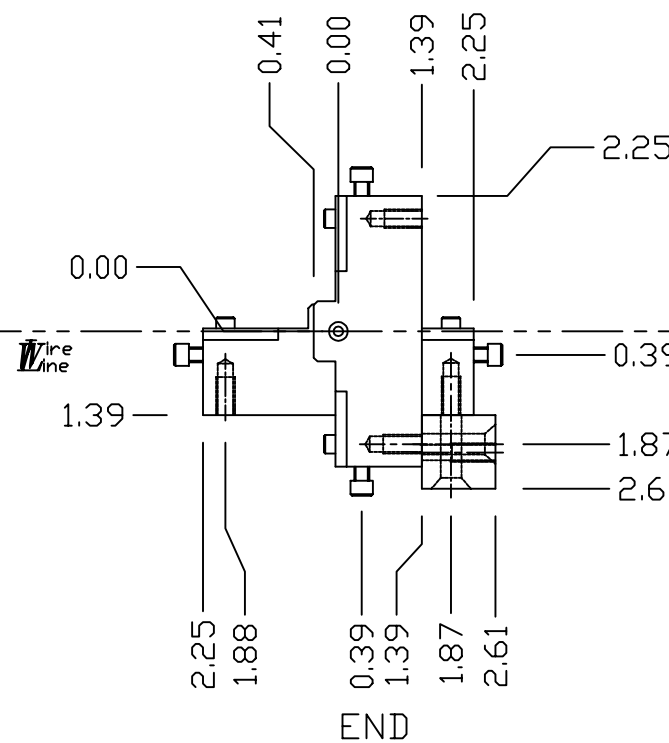
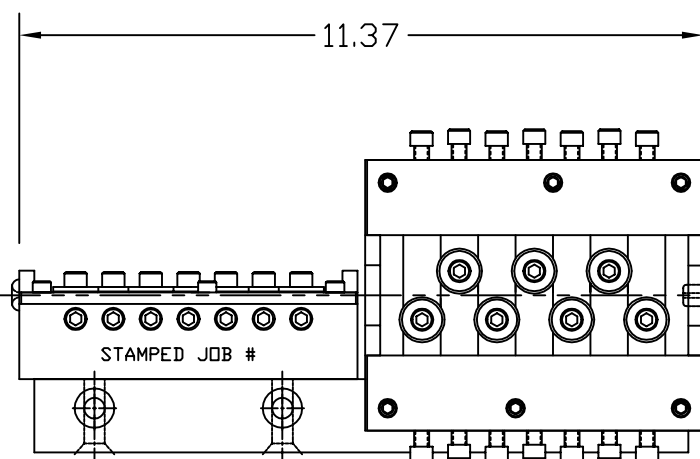
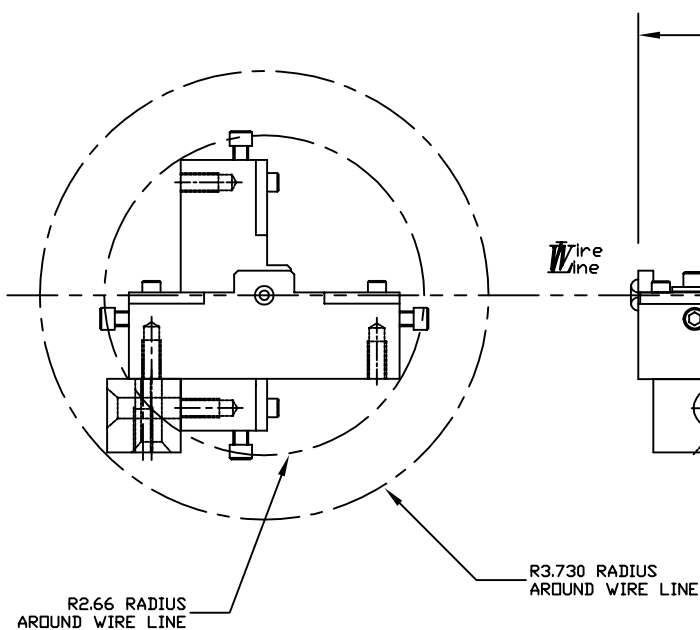
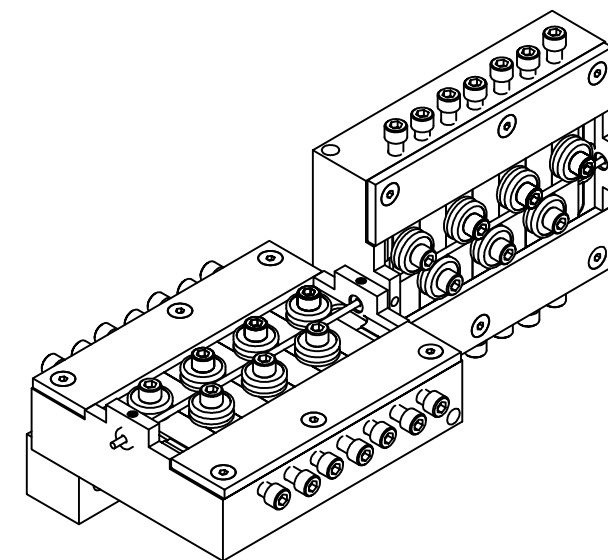
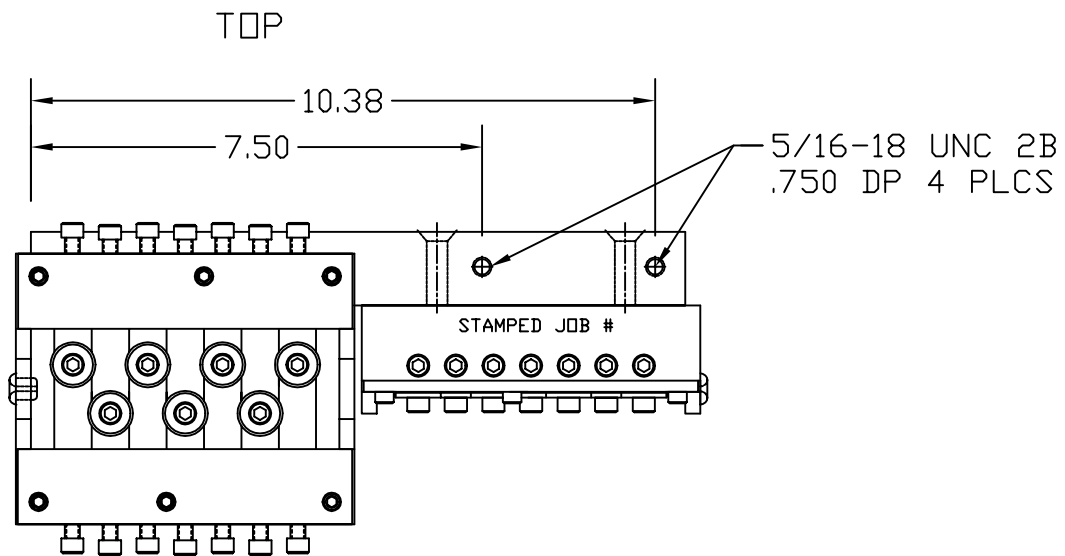
Δ	$\pm 3^\circ$	FRACT	$\pm 1/16$
\perp	± 0.0003	.X	$\pm .032$
\odot	± 0.0002	.XX	$\pm .015$
\oplus	± 0.0005	.XXX	$\pm .005$
\equiv	± 0.0005	.XXX	$\pm .0005$

CAD	
DWN KPL	
CHK	
SCALE	
DATE	3/16/00

DRAWING / PART NO.
1003-002

PART NAME 2PLANE
HOUSING ASSY.

CUSTOMER

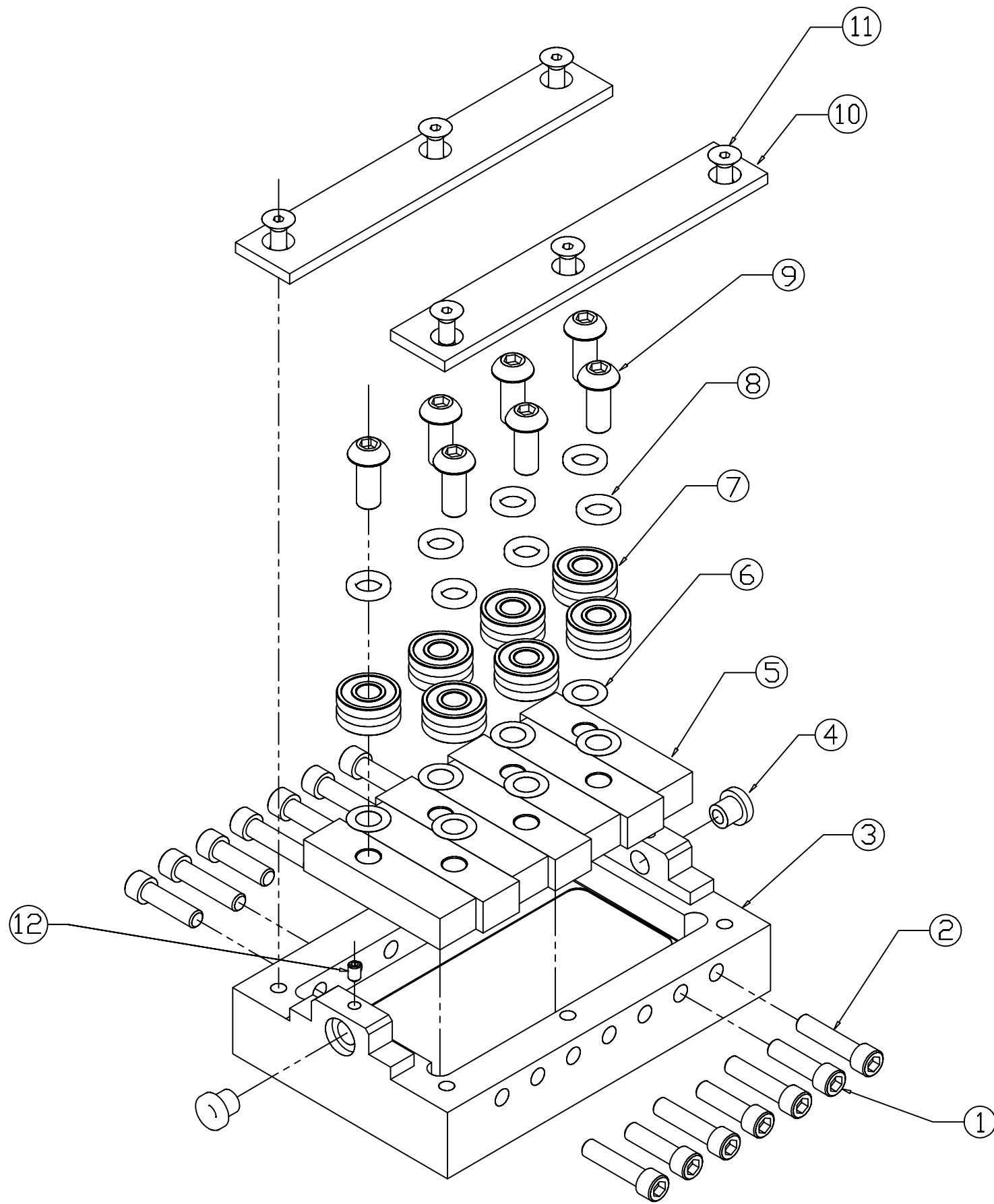


REV	ECN	CHG BY	DATE

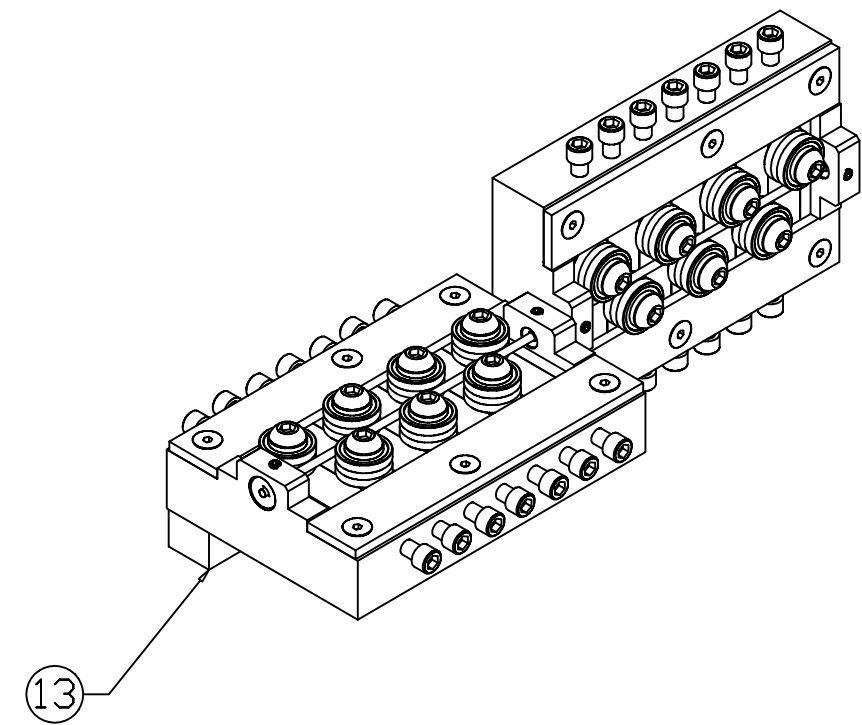
#03 2-PLANE ASSY
MOUNTING LOCATIONS



TOLERANCE UNLESS OTHERWISE STATED		CAD	DRAWING / PART NO.
± 3"	FRACT +/- 1/16	DWN TKS	1003-002A
± 0.0003	.X ± .032	CHK	PART NAME
± 0.0002	.XX ± .015	SCALE	#03 2-PLANE MOUNTING ASSY
± 0.0005	.XXX ± .005	DATE 102797	CUSTOMER
± 0.0005	.XXXX ± .0005		



ITEM	QTY	INVENTORY I.D.	DESCRIPTION
14	4	9001-149	3/8-16 X 1-3/4 FHCS (NOT SHOWN)
13	1	1004-203	#4 UNIVERSAL CONNECTOR
12	3	9003-425	1/4-28 X 3/16 SHSS NYLON TIP
11	12	9001-118	5/16-18 X 3/4 FHCS
10	4	1004-202	#4 ROLL CAP
9	14	900M-070	12MM X 1.75 METRIC SHCS
8	14	9008-117	WASHERS
7	14	9304-166	#4 WIDE "V" BEARING
6	14	9008-118	SHIM WASHER
5	14	1004-201	#4 UNIBODY ROLL PLATE
4	3	9800-012	CERAMIC WIRE GUIDE
3	2	1004-200	#4 UNIBODY HOUSING
2	14	9004-201	3/8-16 X 1-1/2 TORQUE FLANGE SCR
1	14	9004-201	3/8-16 X 1-1/2 TORQUE FLANGE SCR

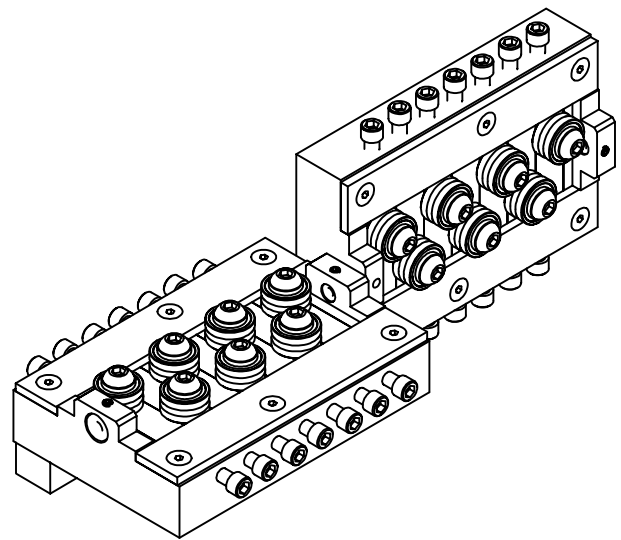


SERIES #04 UNIBODY 2 PLANE PWS ASSY.

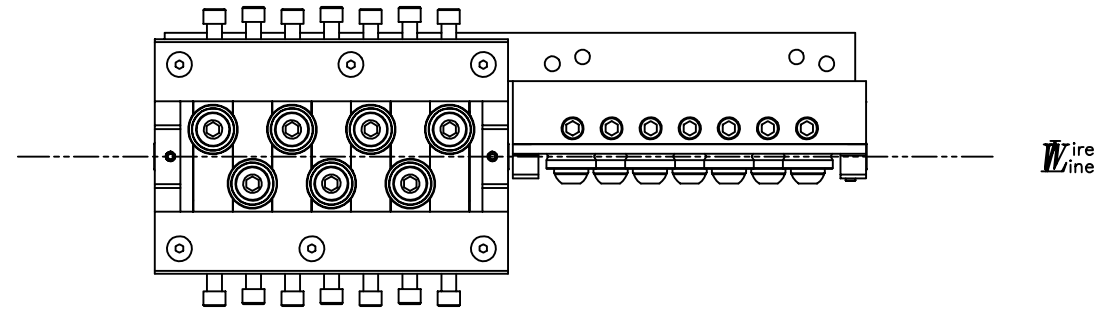
REV	ECN	CHG BY	DATE



TOLERANCE UNLESS OTHERWISE STATED	CAD	DRAWING / PART NO.
± 3°	DWN KPL	1004-012
± 0.0003	CHK	PART NAME
± 0.0002	SCALE	#4 PWS ASSY.
± 0.0005	DATE 6/5/01	CUSTOMER
± 0.0005		EXPLODED VIEW

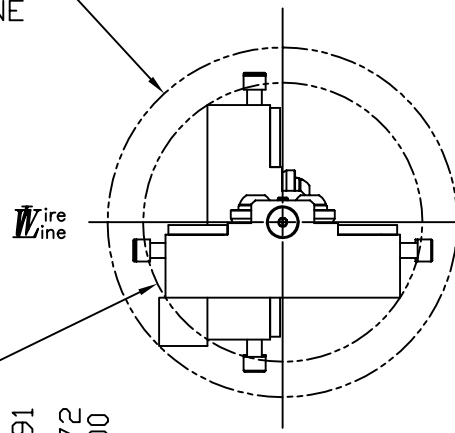


TOP



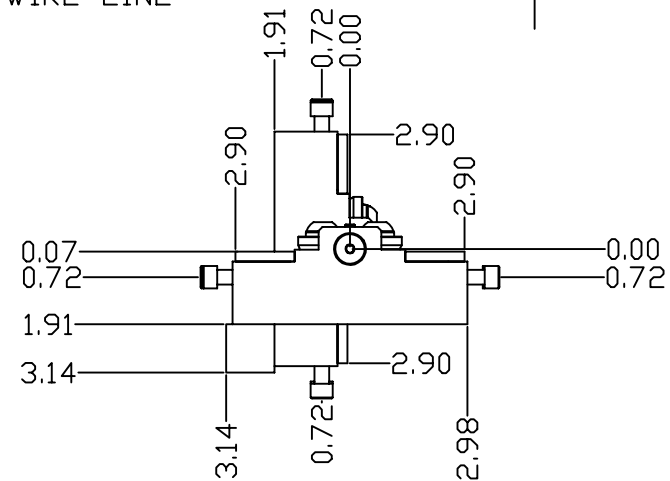
Wire line

Ø8.86 AROUND WIRE LINE

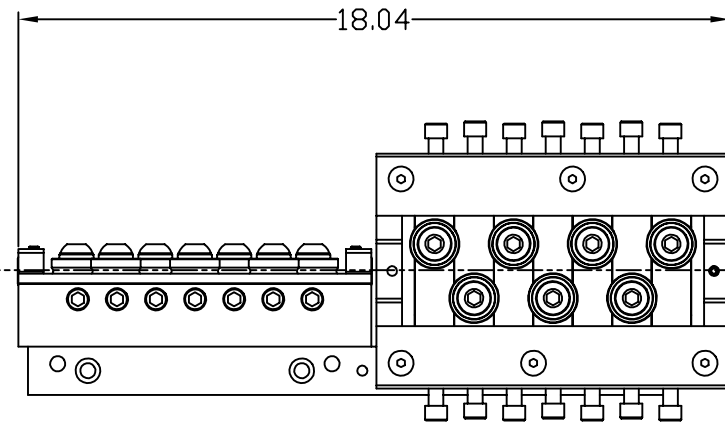


Wire line

Ø7.07 AROUND WIRE LINE

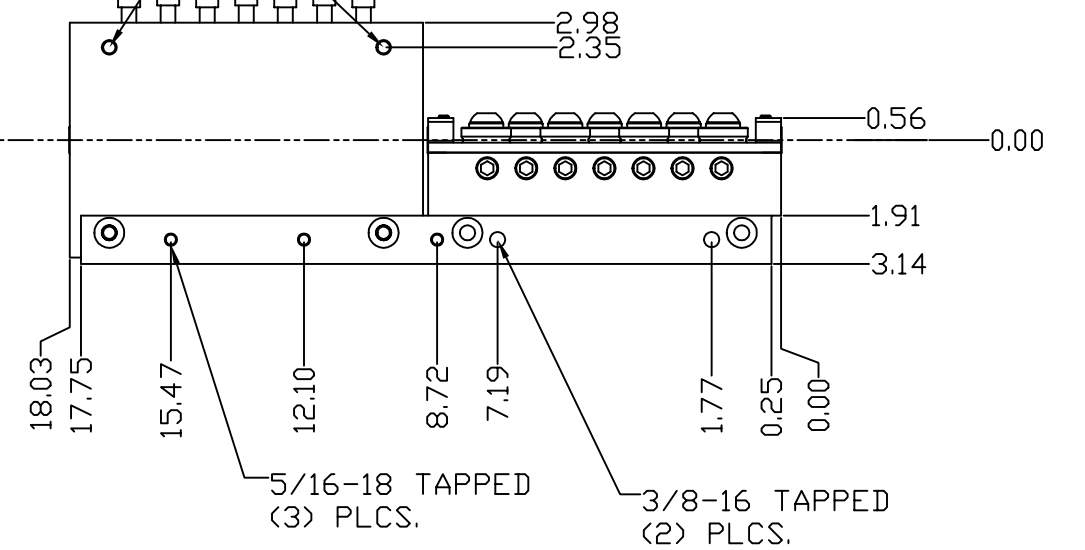


FRONT



Wire line

UNUSED 3/8-16 TAPPED HOLE TYP. 4 PLCS.



BACK

REV	ECN	CHG BY	DATE



TOLERANCE UNLESS OTHERWISE STATED

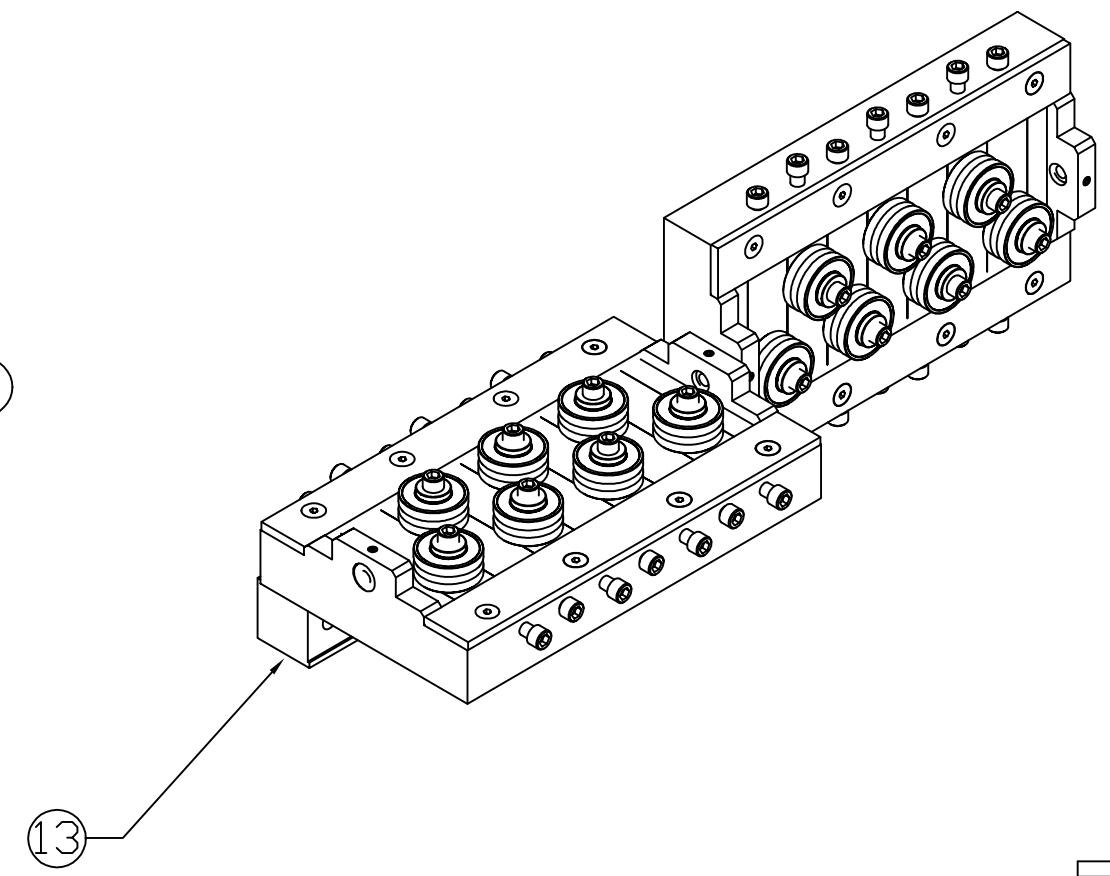
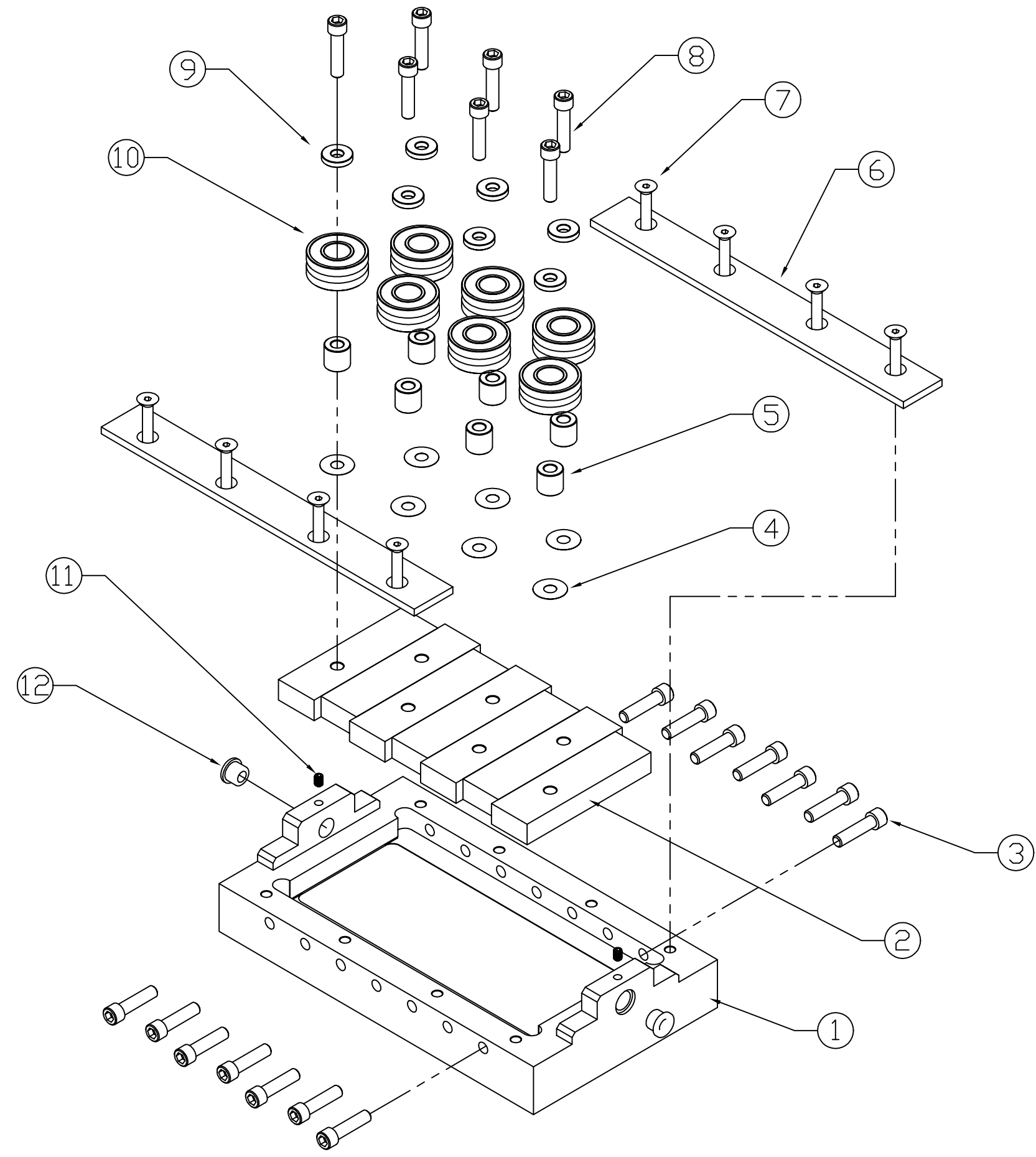
± 3°	FRACT +/- 1/16
± 0.0003	.X ± .032
± 0.0002	.XX ± .015
± 0.0005	.XXX ± .005
± 0.0005	.XXXX ± .0005

CAD	DWN KPL	CHK	SCALE	DATE 6/26/01
-----	---------	-----	-------	--------------

DRAWING / PART NO.	1004-012A #4
PART NAME	MOUNTING
CUSTOMER	

14	4	9001-205	1/2-13 X 2.75 FHCS (NOT SHOWN)
13	1	1005-203	#5 UNIVERSAL CONNECTOR
12	4	9800-013	CERAMIC WIRE GUIDE
11	4	9003-425	1/4-28 X 3/16 SHSS NYLON TIP
10	14	9305-166	#5 WIDE "V" BEARING
9	14	9008-114	HARDENED SHIM WASHER
8	14	9000-148	3/8-16 X 1-1/2 SHCS
7	14	9001-118	5/16-18 X 3/4 FHCS
6	4	1005-202	#5 ROLL CAP
5	14	1005-206	#5 BEARING SLEEVE
4	14	9008-119	HARDENED SHIM WASHER
3	28	9004-201	3/8-16 X 1-1/2 HEX HEAD 12 PT SCREW
2	14	1005-201	#5 UNIBODY ROLL PLATE
1	2	1005-200	#5 UNIBODY HOUSING
ITEM	QTY	INVENTORY I.D.	DESCRIPTION

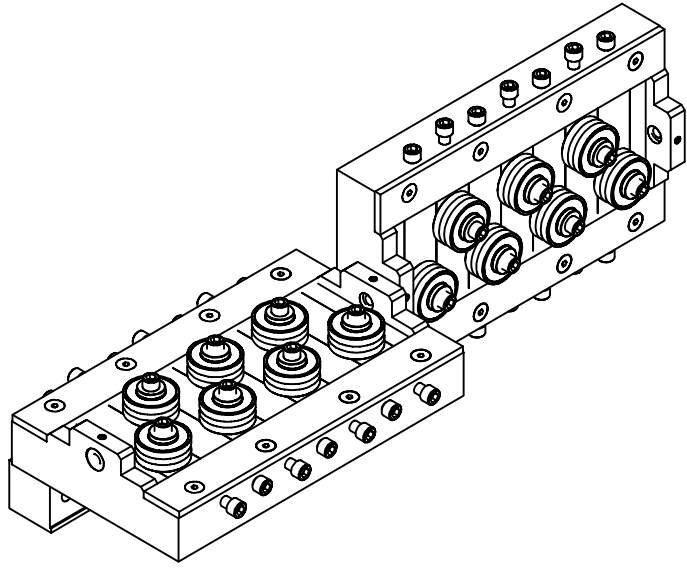
SERIES #05 UNIBODY 2 PLANE PWS ASSY.



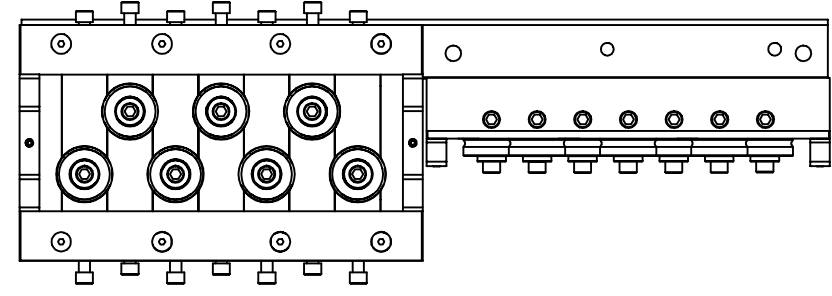
REV	ECN	CHG BY	DATE



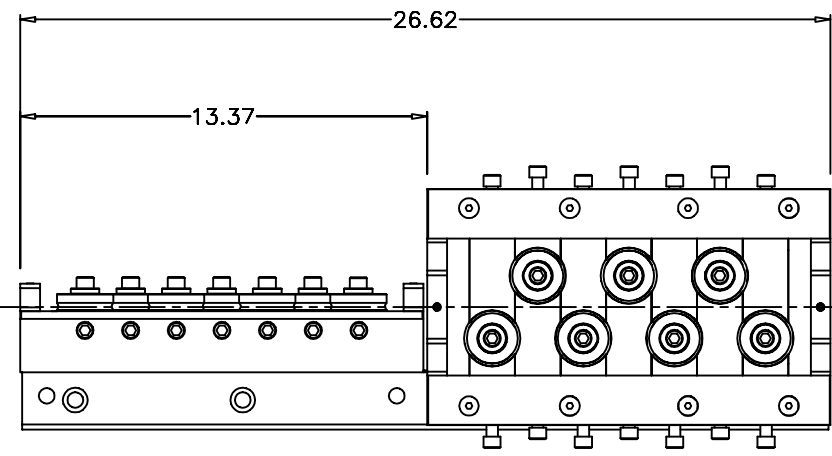
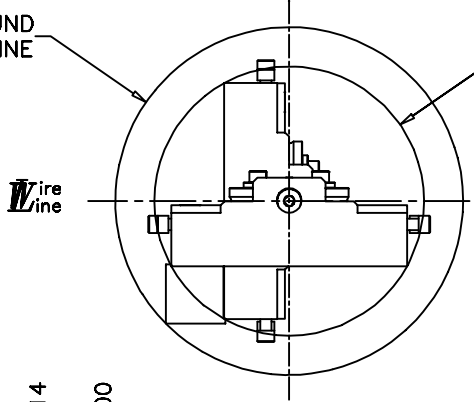
TOLERANCE UNLESS OTHERWISE STATED	CAD	DRAWING / PART NO.
± 3°	FRACT +/- 1/16	DWN KPL 1005-012
± 0.0003	X ± .032	CHK
± 0.0002	XX ± .015	SCALE
± 0.0005	XXX ± .005	CUSTOMER
± 0.0005	XXXX ± .0005	DATE 6/20/01
EXPLODED VIEW		



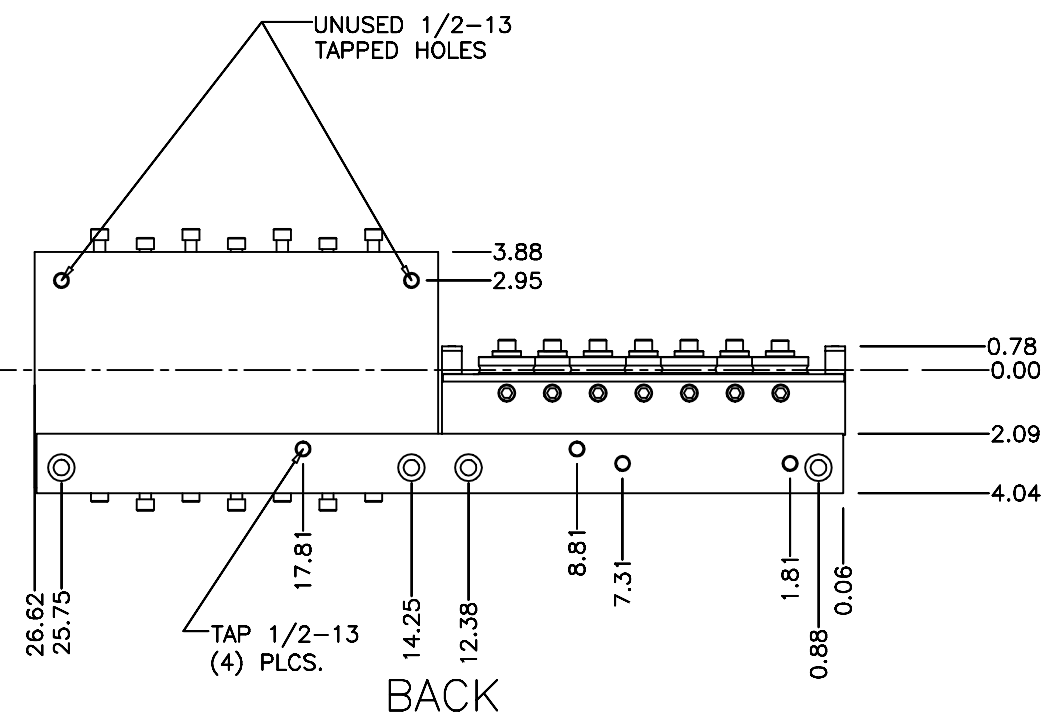
TOP



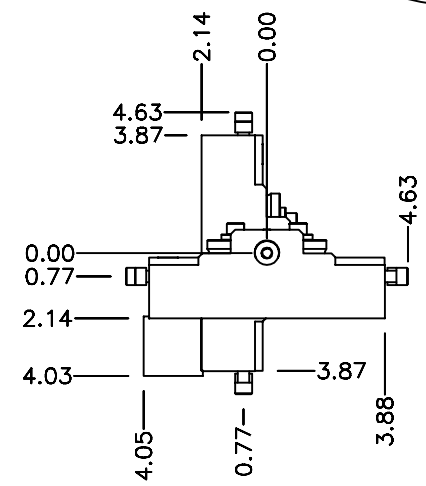
Ø11.43 AROUND WIRE LINE
Ø8.86 AROUND WIRE LINE



FRONT



BACK



REV	ECN	CHG BY	DATE



TOLERANCE UNLESS OTHERWISE STATED	CAD	DRAWING / PART NO.
± 3°	DWN KPL	1005-012A #5
± 0.0003	CHK	PART NAME
± 0.0002	SCALE	MOUNTING
± 0.0005	DATE 6/26/01	CUSTOMER
± 0.0005		

REMEMBER.....

KEEP IT STRAIGHT WITH A TAK PRECISION WIRE STRAIGHTENER.

TAK Enterprises, Inc.
70 Enterprise Drive Bristol, CT 06010-7400
1-(860)-583-0517 Fax 1-(860)-585-0479

www.takenterprises.com

E-mail: tak@takenterprises.com

*Please be aware that the use of **non-TAK replacement parts** for your TAK Precision Wire Straightener can result in:*

- *Split bearings*
- *Marks on soft materials*
- *Damage to plating on material*
- *Non-repeatable set-up (as designed)*
- *Pre-set characteristics ineffective*
- *Record congruity characteristics ineffective*

The TAK PWS's are designed with all features and dimensional tolerances being coordinated for its full functional capabilities. The TAK Straightener will not perform as advertised unless each detail is within the TAK design perimeters with absolute consistency required for dependable and consistent results.



WARNING

The operator of the equipment offered herein must not be in or near the point-of-operation of any such machine or operating parts of any equipment installed on a machine, or bodily injury could result. The EMPLOYER must conspicuously display adequate warning signs on the machine with proper warnings for the machine and the specific application to which the machine and equipment are being applied.

OSHA Sections 1910.147, 1910.211, 1910.212 and 1910.217 contain installation information on the required distance between danger points and point-of-operation guards and devices. No specific references have been made to which paragraph of OSHA 1910.147, 1910.211, 1910.211, 1910.217 or any other applicable sections because the paragraphs may change with each edition of the publications of OSHA provisions.

All equipment manufactured by TAK Enterprises is designed to meet the construction standards of OSHA in effect at the time of sale, however, the EMPLOYER ultimately installs the equipment and is therefore responsible for installation, use, application, training and maintenance, as well as ensuring that adequate warning signs are visible on the machine onto which the equipment will be installed.

OSHA states that the EMPLOYER must ensure that safe operating methods designed to control or eliminate hazards to operating personnel are developed and employed, and that operators are trained in safe operation of the equipment.

It shall be the responsibility of the EMPLOYER to establish and follow a program of periodic and regular inspections and maintenance of machinery to insure that all their parts, auxiliary equipment and safeguards are in a safe operating condition and adjustment. Each machine should be inspected and tested no less than weekly to determine and confirm that the operating condition of the machine meets safety standards. Necessary maintenance or repairs to machinery, auxiliary equipment and safeguards shall be performed and completed before the machine is operated. The EMPLOYER shall maintain accurate records of these inspections and maintenance work performed.

It is not the responsibility of TAK Enterprises to provide notification to the user of this equipment concerning future changes in State or Federal laws, or construction standards.

SAFETY PROGRAM

Accident free operation will result from a well developed, management sponsored and enforced safety program.

Of vital importance to the success of a safety program is the proper selection of guards and devices. However, there is no safety device that will insure "automatic" or "fool proof" safety to your operation.

Of equal importance to the proper selection of machine guards and devices is effective training of operating personnel. Each individual must be trained in the proper operation in accordance with established standards developed for the guards or safety devices employed, with emphasis on why specific guards and safety devices have been provided on the equipment. Rules for safe operation should be in writing, available to company personnel and enforced at all times.

An effective safety program must include regularly scheduled inspections and maintenance of all equipment, with accurate records to reflect the successful completion of inspections and maintenance.

To ensure that a safe working environment is maintained at all times, management, supervisors, safety engineers and all production employees must assume their proper share of responsibility to establish and maintain an effective safety program. All members of the company community should be involved so that an accurate view of the specific areas within the facility that require attention are addressed.

To assist you in the development of and maintenance of an effective safety program, many trade groups and safety related organizations provide guidelines and recommendations that are available to you. However, you must know when and how to apply these guidelines. The equipment manufacturers provide information to assist you in properly adjusting and maintaining your equipment. It is recommended that the employer comply with these guidelines at all times.