

STELRON CAM COMPANY

1495 Mac Arthur Boulevard
Mahwah, New Jersey 07430
tel 201-529-5450 ~ fax 201-529-5493

RD-5 SERIES PRE-LOADED CAM DRIVE MAINTENANCE INSTRUCTIONS

Maintenance Instructions

Thank you for choosing a Stelron cam operated index drive or oscillator. You have indeed made a wise decision. Our engineers have gone to great lengths to include the many important features that enhance durability, serviceability and accuracy in your Stelron drive. The following are just some of those important features:

- 1) Hardened and CNC profile ground, extra large diameter cams operating in a sealed, oil filled housing.
- 2) Near machine tool quality crossed roller and 4 point contact type output bearings on RD provide superior life, overhung load and increased thrust capacity.
- 3) Standard NEMA "C" frame motors.
- 4) Heavy cast aluminum universal mounting housings with machined surfaces and mounting holes on five or six sides.
- 5) Heavy Duty swing arm type micro switches with large diameter steel signal cams.

PRODUCT OVERVIEW

This is a pre-loaded type cam index drive with a hardened cam and precision needle bearing cam followers, operating in a sealed, oil filled housing. Two opposing cam followers contact the cam, eliminating backlash. The acceleration profile is modified sine, unless otherwise specified.

WARNINGS TO THE USER

This unit is sized and warranted to handle a specific dynamic load. Loads will increase with the square of the index time (or camshaft RPM). Index speed can markedly affect product life. Never run this unit faster than originally intended without checking with Stelron first.

Backlash on the input or output of the unit will introduce "jerk" into the system, decreasing life and performance. Always try to minimize backlash.

Any overload devices, whether provided by Stelron or not, cannot claim to protect humans from harm. These devices are meant to protect specific machine components from harm only.

Cycling on demand any faster than the control manufacturer specifies (30 cycles per minute for Danfoss #C-2000 and KB Electronics #KB-PI; 60 cycles per minute for Danfoss Cycletrol 150) will void control warranty and may cause premature failure. Please consult Stelron if your cycling requirements exceed those mentioned above.

LUBRICATION INSTRUCTIONS

The crossed roller output bearings on the RD series indexers are sealed and require no attention. The reducer sump lubricates all reducer bearings via slinging action of the gears. The interference fit between the cam and followers (and the close fit in Stelron low backlash reducers) dictates the use of an extreme pressure type lubricant in the index drive and reducer sumps. We recommend only Mobilgear 600 XP - 460 or Mobil SHC 634 Synthetic Gear Oil for Stelron indexers. This lubricant is available from your local Mobil distributor or Stelron.

The following schedule should be adhered to:

- One shift operation - Change lubricant every twelve months.
- Two shifts operation - Change lubricant six months.
- Three shifts operation - Change lubricant every three months.
- Higher speeds, dirty or high heat conditions may require more frequent lubricant change intervals.

INPUT AND OUTPUT (DIAL) CONNECTIONS

All input and output connections should be tight and free of backlash or windup. Always oversize due to the reversing loads imposed by most cam mechanisms. In synchronous machinery, oversized timing belts with as large diameter as possible pulleys should be used. Taperlock or Ringfedder hubs are preferred. Worm gear reducers are preferred due to their inefficiency in backdriving and low backlash.

Dial plates should be bolted and doweled to the indexer. The pilot bore (ID) of the dial should be dimensioned to the nominal size of the indexer pilot $+0.001"$, -0.000 .

OVERLOAD CLUTCH ADJUSTMENT

Stelron index drives and oscillators are equipped with two types of overload protection:

- 1) Internal Output Clutch (RD series)

A separate instruction sheet is included for the slip clutch in the gear reducer (#2). Stelron's Internal Output Clutch (#1) utilizes two or three ball individually adjustable ball-detent type "spring towers" that protrude through clearance holes in the dial plate. The dial mounting surface turns independently (on its own crossed axis roller bearing) of the main follower wheel when an overload is encountered. Adjustment of the trip torque is accomplished by use of a spanner wrench in the discs on top of the spring towers.

Adjustment should be done under the actual load of the drive at the actual production running speed. Try to tighten each of the spring towers approximately the same. The shafts in the middle of the clutch will pop up when the clutch disengages. A plate may be used to span these shafts and trip a limit or prox switch that shuts the input drive off. The dial plate must be re-positioned and the shafts must be pushed back down to re-engage the clutch. No further maintenance or care is needed once the clutch is set.

TROUBLE SHOOTING

Unit Does Not Stop In Position or Positioning is Erratic-

Make sure unit is in dwell. This is the most common cause of problems in cam indexers. Rotate camshaft until movement has stopped on output. Rotate in same direction another 15 degrees. Unit should now be in dwell. Grab output of indexer and try and rotate. There should be no movement. If there is no movement, the signal cam may need to be adjusted or the indexer may be out of time (in a synchronous machine). The signal cam should send a stop signal so the motor stops the camshaft consistently in the dwell of the cam. Positioning problems occur when the motor stops the camshaft out of the dwell position. If there is movement detected when the unit is in dwell, there may be an internal problem in the indexer, usually bent or worn followers. First check that all input and output connections to the drive are tight and free of windup and backlash. Also check output clutch settings. See repair instructions below if all connections are tight and clutch is set properly.

Motion Is Not Smooth -

Make sure there is no backlash or windup in both the input and output couplings. Indexers and oscillators exert a reversing torque on both input and output connections. Any looseness shows up as erratic motion and can significantly shorten life.

GENERAL REPAIR INSTRUCTIONS

Cam follower replacement on your Stelron RD series index drive is straightforward thanks to the barrel cam design. Since the pre-load is ground into the cam, pre-load adjustment is not required upon re-assembly. Proceed as follows:

- 1) Make sure indexer is in the dwell. Note that keyways on the input (cam) shaft of Stelron index drives are aligned with one of the junctions of index (motion) and dwell (stop). Turn the camshaft until output movement stops then turn at least another 15 degrees.
- 2) Make witness marks on the dial or machine member that attaches to indexer output and the indexer output flange. Plan to re-assemble exactly as you dis-assembled.
- 3) Remove dial or machine output member.
- 4) Remove the screws that hold the output bearing retainer in place.
- 5) Using the threaded holes provided, install jacking screws to separate the bearing retainer from the index drive housing.
- 6) Remove the bearing retainer. Note the number and color (thickness) of shims that you are removing.
- 7) Lift the entire output assembly out of the index drive housing. Carefully turn it over and set it down on a workbench.
- 8) Set screws lock the threaded stud followers in their bores. Loosen the setscrews then unscrew the cam followers.
- 9) Reinstall an entire new set of cam followers and lock them in place with the locking set screws.
- 10) Carefully place the output wheel back in the cavity in the indexer housing, engaging the two cam followers over the rib of the cam.
- 11) Replace the same number and color (thickness) of shims as removed.
- 12) Replace the bearing retainer ring and re-tighten the retaining screws.
- 13) Change indexer oil to remove any contamination.

The input shaft and output bearings in your Stelron index drive are considerably oversized relative to expected loads. They rarely require service of any kind. If replacement is required, please note the following:

- 1) The output bearings used on the RD series drives are pre-loaded by precision grinding the two housing halves. This means that the outside thickness of the bearing will vary and require shims under the bearing mounting ring. Measure the thickness of the bearing and compare this to the space in the cavity where the bearing fits. Use Stelron provided shims under the bearing retaining ring to make the resulting space for the bearing be .002-.005" less than the thickness of the bearing.
- 2) The Timken input shaft bearings use shims behind the bearing retainer caps to adjust the pre-load on these bearings. No side to side movement of the cam shaft is permitted. Shifting the cam in the housing will affect pre-load as well as positioning accuracy. Always measure the distance from a reference point on the housing to the dwell portion of the cam rib and hold this dimension upon re-assembling the camshaft back into the unit.

REPAIR PARTS

A bill of materials is provided detailing all parts used in Stelron indexers. Commercially available parts are available from Stelron or the manufacturer. Special parts, on the bill of material, are available from Stelron only. Please call Stelron, or your local Stelron sales engineer, for any additional help in diagnosing possible index drive/oscillator problems.

Lubrication Instructions for Indexers

RD-5:

Apply Mobilgear 600XP 460 (or equivalent) or Mobil SHC 634 Synthetic Gear Oil to half the cam height.

MotoReducers: All Models:

Apply Mobil Oil 600W (or equivalent) or Mobil SHC 634 Synthetic Gear Oil to fill level.

Note: On all oil filled components breather must be installed at the highest level for mounting position.

Recommended Frequency of Inspection

Typical Usage

One Shift: Inspect at least once a month.
Two shifts: Inspect once every two weeks.
Three shifts: Inspect once a week.
Severe duty: Inspect as often as necessary to maintain lubricity.

Lubrication

Mobil, U.S.A. Exxon, U.S.A.

or

Stelron Components, Inc. 1495 MacArthur Blvd., Mahwah, NJ 07430
tel (201) 529-5450 fax (201) 529-5493

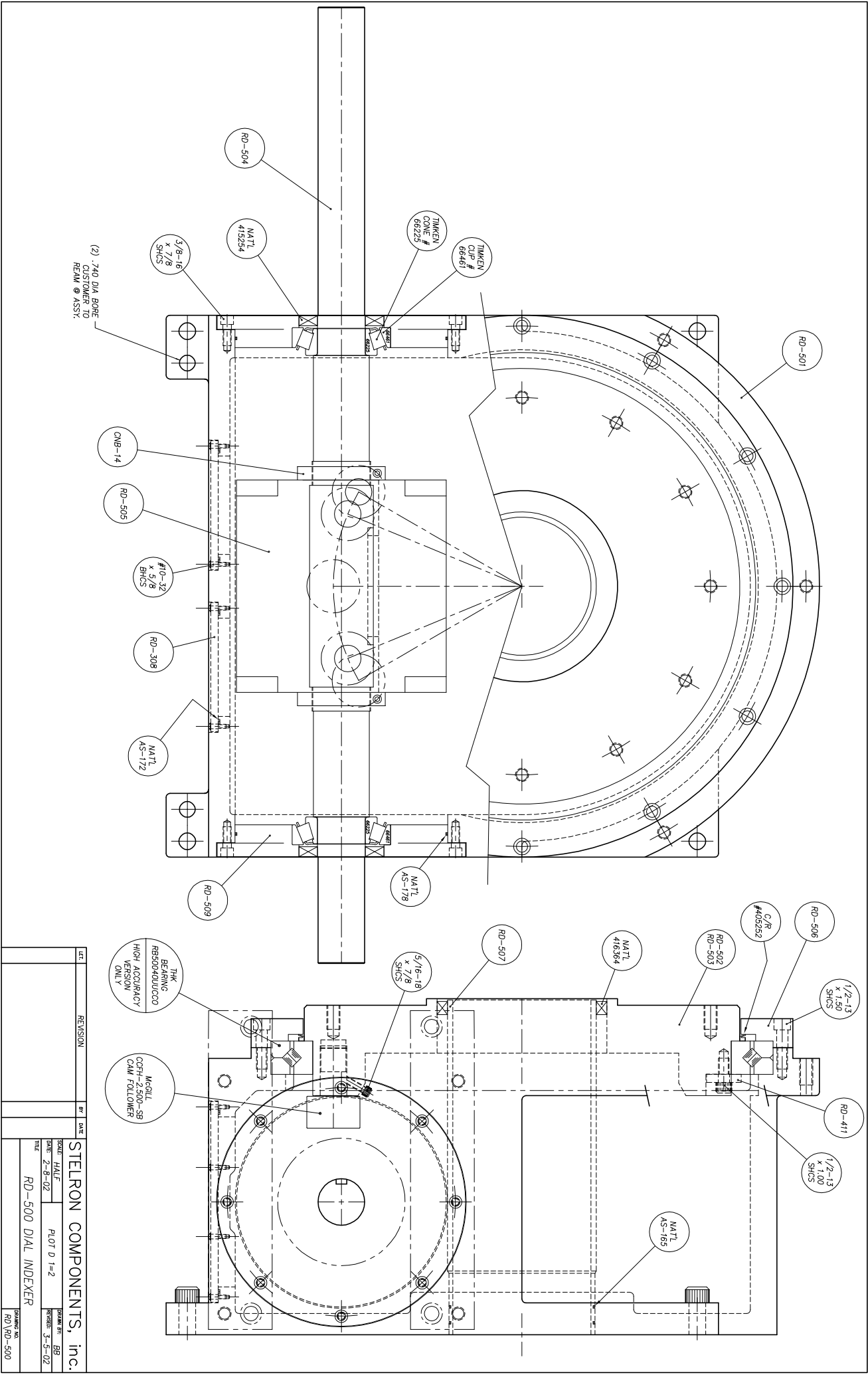
RD-5 BILL OF MATERIALS

MANUFACTURED PARTS

| ITEM | P/N | QTY. | DESCRIPTION | MATERIAL / NOTES |
|------|----------|-------|-----------------------------|---|
| 1 | RD-500 | - | ASSEMBLY DRAWING/LAYOUT | - |
| 2 | | | | |
| 3 | RD-501-P | - | HOUSING PATTERN DRAWING | "319" CAST ALUMINUM |
| 4 | RD-501 | - | HOUSING (DETAIL) | RD-501P |
| 5 | RD-502 | 1 | FOLLOWER WHEEL 12 POSITIONS | 20.88 X 7" X 4.56 F.L. EZ-CUT 45 |
| 6 | RD-503 | 1 | FOLLOWER WHEEL 16 POSITIONS | 20.88 X 7" X 4.56 F.L. EZ-CUT 45 |
| 7 | RD-504 | 1 | CAM SHAFT | 2.9995 DIA. X OAL ~ 1144 G&P |
| 8 | RD-505 | 1 | CAM (BLANK) | 10" DIA. X 10.00 F.L. ~ C1144 |
| 9 | RD-506P | - | BEARING RETAINER PATTERN | "319" CAST ALUMINUM |
| 10 | RD-506 | 1 | OUTPUT BEARING RETAINER | RD-506P |
| 11 | RD-507 | 1 | CENTER TUBE | 7" OD X 6-1/2 ID X 15.75 F.L. DOM TUB'G |
| 12 | RD-308 | 2 | ACCESS COVER | USE (2) RD-308 ~ LEXAN |
| 13 | RD-509 | 2 | TIMKEN RETAINER CAPS | 12" OD X 1.500 F.L. ~ 6061 ALUM. |
| 14 | RD-510 | X | TIMKEN SHIMS | PLASTIC SHIM (ARTUS) |
| 15 | RD-411 | 12,16 | BEARING RETAINER WASHER | 1-5/8 DIA. X 3/8 F.L. CRS |
| 16 | RD-512 | 2 | CONE MOUNTING PLATE | 1.245 X 3" X 15" F.L. ~CRS |
| 17 | RD-516 | X | THK. SHIMS | PLASTIC SHIM STK. (ARTUS) |
| 18 | RD-517 | 1 | MICRO. SW. CAM (TYPE 2) | XXX DIA. X 3/8 LEDLOY |
| 19 | RD-518 | 1 | MICRO SW. CAM (TYPE 1) | XXX DIA. X 3/8 LEDLOY |
| 20 | | | | |
| 21 | | | | |
| 22 | | | | |
| 23 | | | | |
| 24 | | | | |
| 25 | | | | |
| 26 | | | | |

COMMERCIAL PARTS

| ITEM | P/N | QTY. | DESCRIPTION |
|------|--------------|-------|--|
| 27 | RB50040JUCC0 | 1 | (THK) OUTPUT ROLLER BEARING (HI ACCURACY TYPE) |
| 28 | #66461 | 2 | TIMKEN CUPS TAPER ROLLER BEARING CUP |
| 29 | #66225 | 2 | TIMKEN CONES TAPER ROLLER BEARING CONE |
| 30 | #415254 | 2 | (NAT'L) SEALS CAM SHAFT |
| 31 | #416364 | 1 | (NAT'L) SEAL OUTPUT TUBE |
| 32 | 405252 | 1 | SEAL OUTPUT BEARING (VEE RING) (SKF C/R) |
| 33 | #AS-165 | 2 | (NAT'L) TUBE O-RINGS |
| 34 | #AS-170 | 2 | (NAT'L) COVER O-RING (SAME AS RD-3) |
| 35 | #AS-178 | 2 | (NAT'L) TIMKEN RETAINER O-RING |
| 36 | KEY | 1 | 1/2 X 1/2 X 4.75 F.L. KEY (CAM) |
| 37 | CNB-14 | 2 | LOCK NUTS ~ (WHITTET - HIGGINS) |
| 38 | CCF-2.500-SB | 12,16 | HEAVY CAM FOLLOWER (McGILL) |
| 39 | | | |
| 40 | | | |
| 41 | | | |



| REV | DATE | BY | REVISION |
|-----|------|----|----------|
| 1 | | | |

| | | | |
|----------|---------------------|-------------|-----|
| PROJECT | HALF | DESIGNED BY | BB |
| DATE | 2-8-02 | PLANT D | 1-2 |
| TITLE | RD-500 DIAL INDEXER | | |
| REVISION | 3-5-02 | | |

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|----------------------------|
| STELLERON COMPONENTS, Inc. |
| RD-500 |

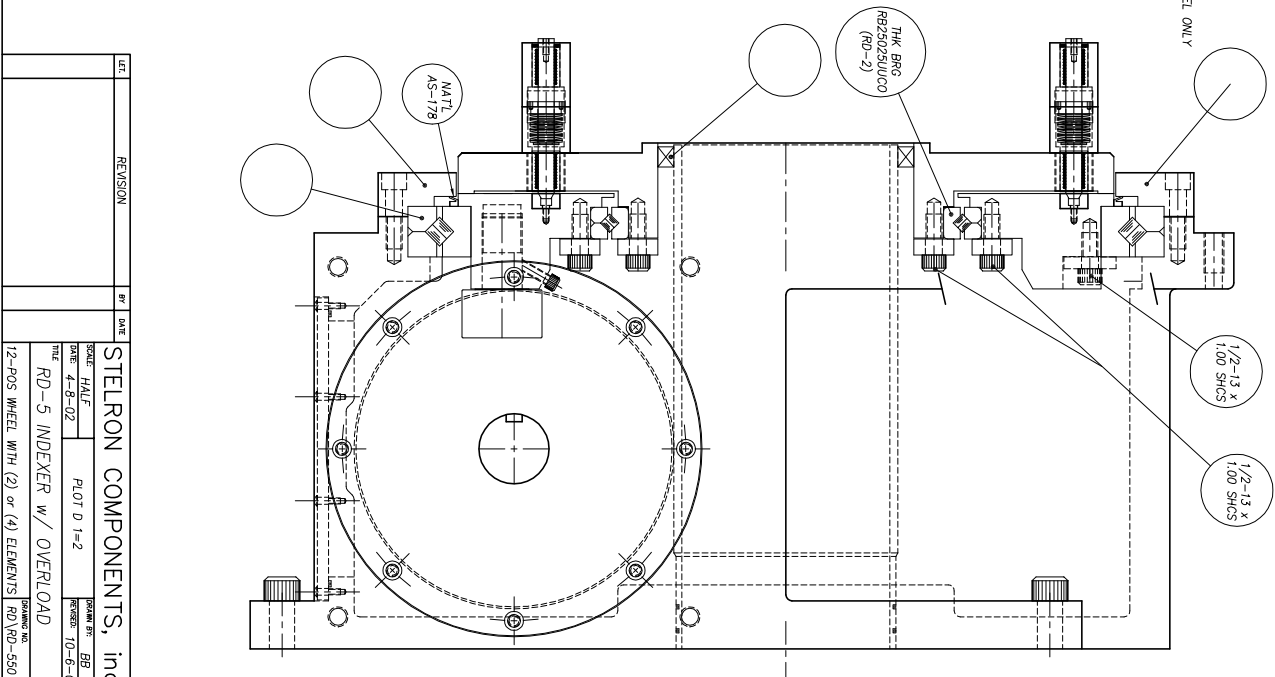
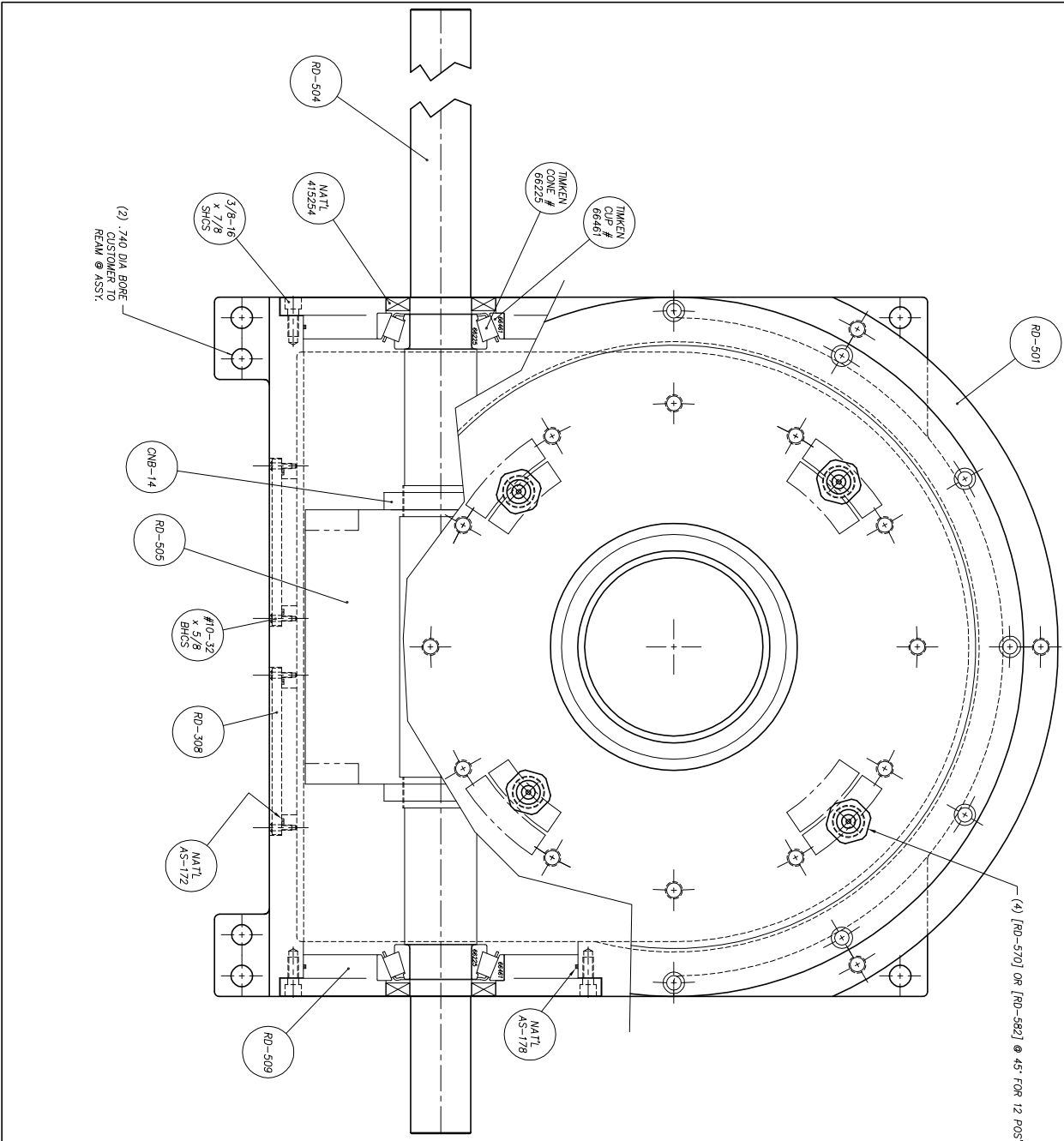
RD-5 (OUTPUT OVERLOAD) BILL OF MATERIALS

MANUFACTURED PARTS

| ITEM | P/N | QTY. | DESCRIPTION | MATERIAL / NOTES |
|------|----------|-------|-------------------------------|---|
| 1 | RD-550 | - | ASSEMBLY DRAWING/LAYOUT | - |
| 2 | | | | |
| 3 | RD-501-P | - | HOUSING PATTERN DRAWING | "319" CAST ALUMINUM |
| 4 | RD-501 | - | HOUSING (DETAIL) | RD-501P |
| 5 | RD-504 | 1 | CAM SHAFT | 2.9995 DIA. X OAL ~ 1144 G&P |
| 6 | RD-505 | 1 | CAM (BLANK) | 10" DIA. X 10.00 F.L. ~ C1144 |
| 7 | RD-506P | - | BEARING RETAINER PATTERN | "319" CAST ALUMINUM |
| 8 | RD-506 | 1 | OUTPUT BEARING RETAINER | RD-506P |
| 9 | RD-507 | 1 | CENTER TUBE | 7" OD X 6-1/2 ID X 15.75 F.L. DOM TUB'G |
| 10 | RD-308 | 2 | ACCESS COVER | USE (2) RD-308 ~ LEXAN |
| 11 | RD-509 | 2 | TIMKEN RETAINER CAPS | 12" OD X 1.500 F.L. ~ 6061 ALUM. |
| 12 | RD-510 | X | TIMKEN SHIMS | PLASTIC SHIM (ARTUS) |
| 13 | RD-411 | 12,16 | BEARING RETAINER WASHER | 1-5/8 DIA. X 3/8 F.L. CRS |
| 14 | RD-516 | X | THK. SHIMS | PLASTIC SHIM STK. (ARTUS) |
| 15 | RD-517 | 1 | MICRO. SW. CAM (TYPE 2) | XXX DIA. X 3/8 LEDLOY |
| 16 | RD-518 | 1 | MICRO SW. CAM (TYPE 1) | XXX DIA. X 3/8 LEDLOY |
| 17 | RD-551 | 1 | DIAL MOUNTING PLATE | 20.88 OD X 7" ID X 3" ~ EZ-CUT 45 |
| 18 | RD-552 | 1 | FOLLOWER WHEEL (12 POSITION) | 20.88 X 10" X 3" ~ EZ-CUT 45 |
| 19 | RD-553 | 1 | FOLLOWER WHEEL (16 POSITION) | 20.88 X 10" X 3" ~ EZ-CUT 45 |
| 20 | RD-555 | 1 | BEARING RETAINER (INNER RACE) | 10.8 X 7.7 X 1/2 ~ EX-CUT 20 |
| 21 | RD-556 | 1 | BEARING RETAINER (OUTER RACE) | 14.5 X 11.25 X 1/2 ~ EZ-CUT 20 |
| 22 | RD-558 | X | GAP SHIMS | PLASTIC SHIM STOCK (ARTUS) |
| 23 | | | | |
| 24 | | | | |
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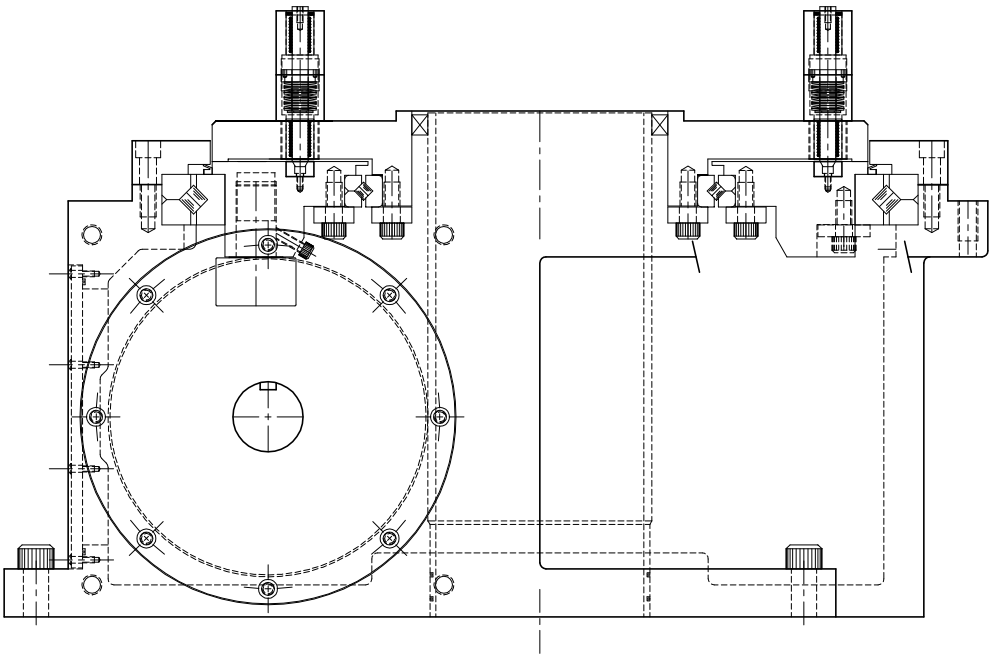
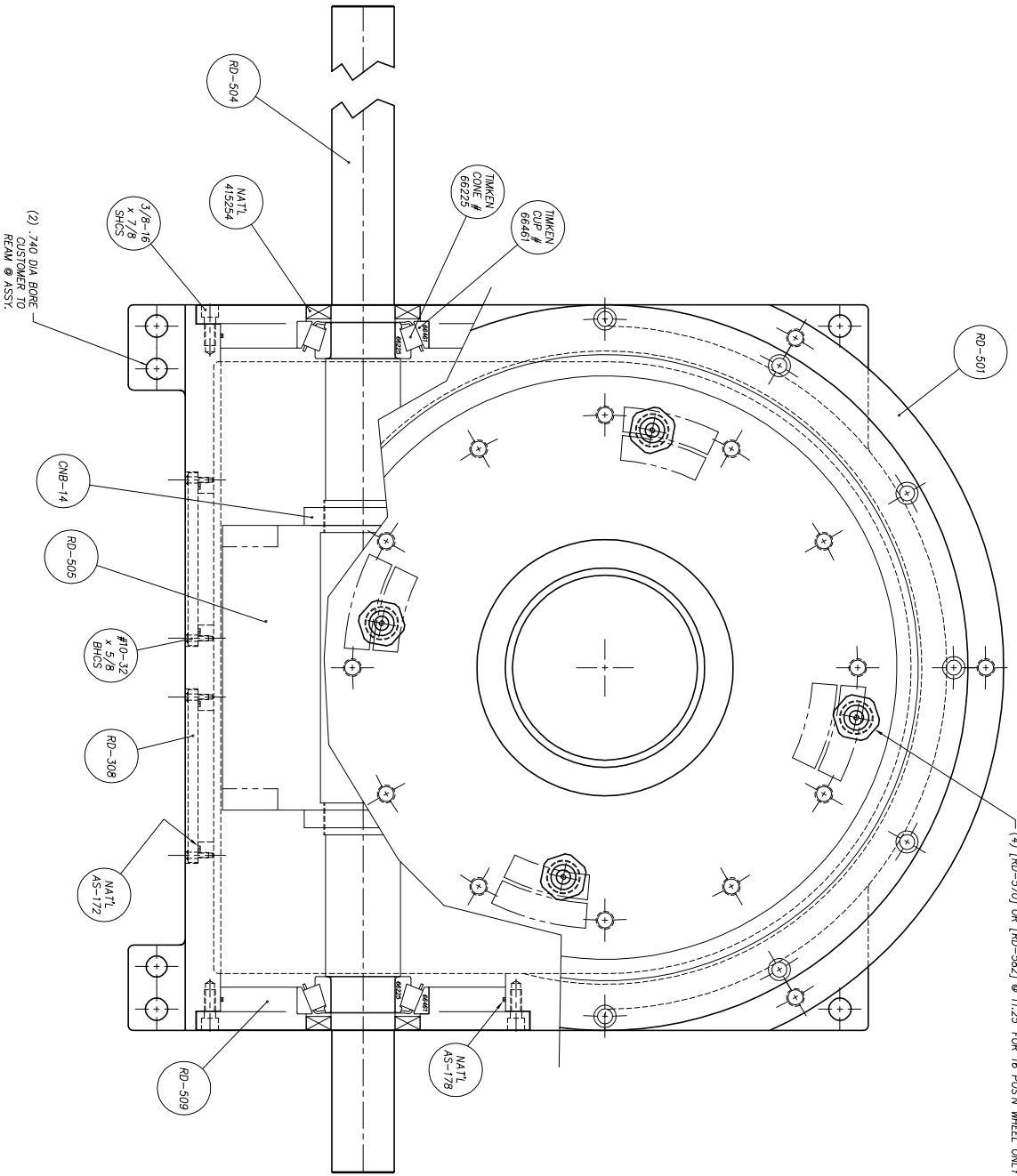
COMMERCIAL PARTS

| ITEM | P/N | QTY. | DESCRIPTION |
|------|---------------|--------|---|
| 27 | RB50040JUCC0 | 1 | (THK) OUTPUT ROLLER BEARING (HI ACCURACY TYPE) |
| 28 | #66461 | 2 | TIMKEN CUPS TAPER ROLLER BEARING CUP |
| 29 | #66225 | 2 | TIMKEN CONES TAPER ROLLER BEARING CONE |
| 30 | #415254 | 2 | (NAT'L) SEALS CAM SHAFT |
| 31 | #416364 | 1 | (NAT'L) SEAL OUTPUT TUBE |
| 32 | 405252 | 1 | SEAL OUTPUT BEARING (VEE RING) (SKF C/R) |
| 33 | #AS-165 | 2 | (NAT'L) TUBE O-RINGS |
| 34 | #AS-170 | 2 | (NAT'L) COVER O-RING (SAME AS RD-3) |
| 35 | #AS-178 | 2 | (NAT'L) TIMKEN RETAINER O-RING |
| 36 | KEY | 1 | 1/2 X 1/2 X 4.75 F.L. KEY (CAM) |
| 37 | CNB-14 | 2 | LOCK NUTS ~ (WHITTET - HIGGINS) |
| 38 | CCF-2.500-SB | 12,16 | HEAVY CAM FOLLOWER (McGILL) |
| 39 | #RB25025UUC0 | 1 | (THK) OVERLOAD BEARING ~ (SAME AS RD-2) |
| 40 | CR#402752 | 1 | INTERNAL SEAL *NO LONGER USED-SEAL IS IN THK BRG |
| 41 | RD-570/RD-582 | 2 or 4 | DETENT TOWERS (STELRON SPECIAL) |



| REV | REVISION | BY | DATE |
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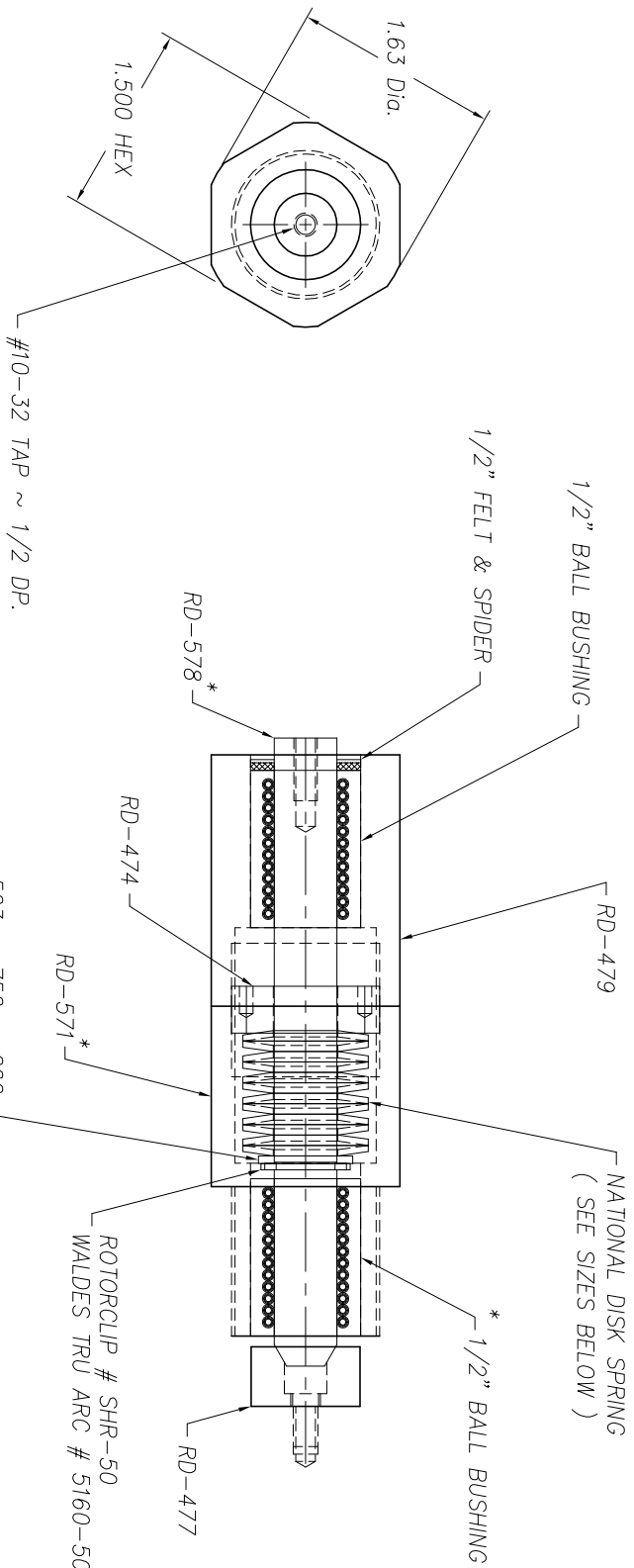
STELRON COMPONENTS, Inc.
 PRODUCT HALF PLOT D 1=2
 DATE 4-8-02
 DRAWN BY BB
 CHECKED BY
 TITLE RD-5 INDEXER w/ OVERLOAD
 REVISION 10-6-03
 SCALE 1:1
 1/2-POS WHEEL WITH (2) or (4) ELEMENTS RD/RD-550



| REV | DATE | BY | REVISION |
|-----|------|----|----------|
| | | | |

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|----------------------------|--------------------------|----------|---------|
| STELLARON COMPONENTS, Inc. | | DATE | REV |
| PRODUCT | HALF | 4-8-02 | 1-2 |
| TITLE | RD-5 INDEXER w/ OVERLOAD | DESIGNER | BB |
| | | REVISION | 10-6-03 |

16-POS WHEEL WITH (2) or (4) ELEMENTS RD/RD-550



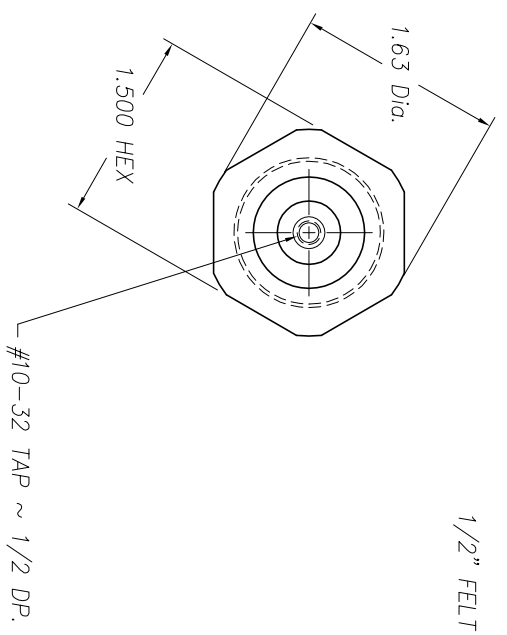
- NATIONAL DISK SPRING OR EXACT EQUIVALENT
- # AI-105-135 (1.000 x .512 x .035)
 - # AI-105-139 (1.000 x .512 x .039)
 - # AI-105-149 (1.000 x .512 x .049)
 - # AI-105-159 (1.000 x .512 x .059)

.503 x .750 x .062
 STRIPPER BOLT SHIM
 MCMMASTER CARR # 91124A090

* SAME AS RD-470 EXCEPT A LONGER BODY (RD-571)
 A LONGER PLUNGER (RD-578) & ADD'L BALL BUSHING

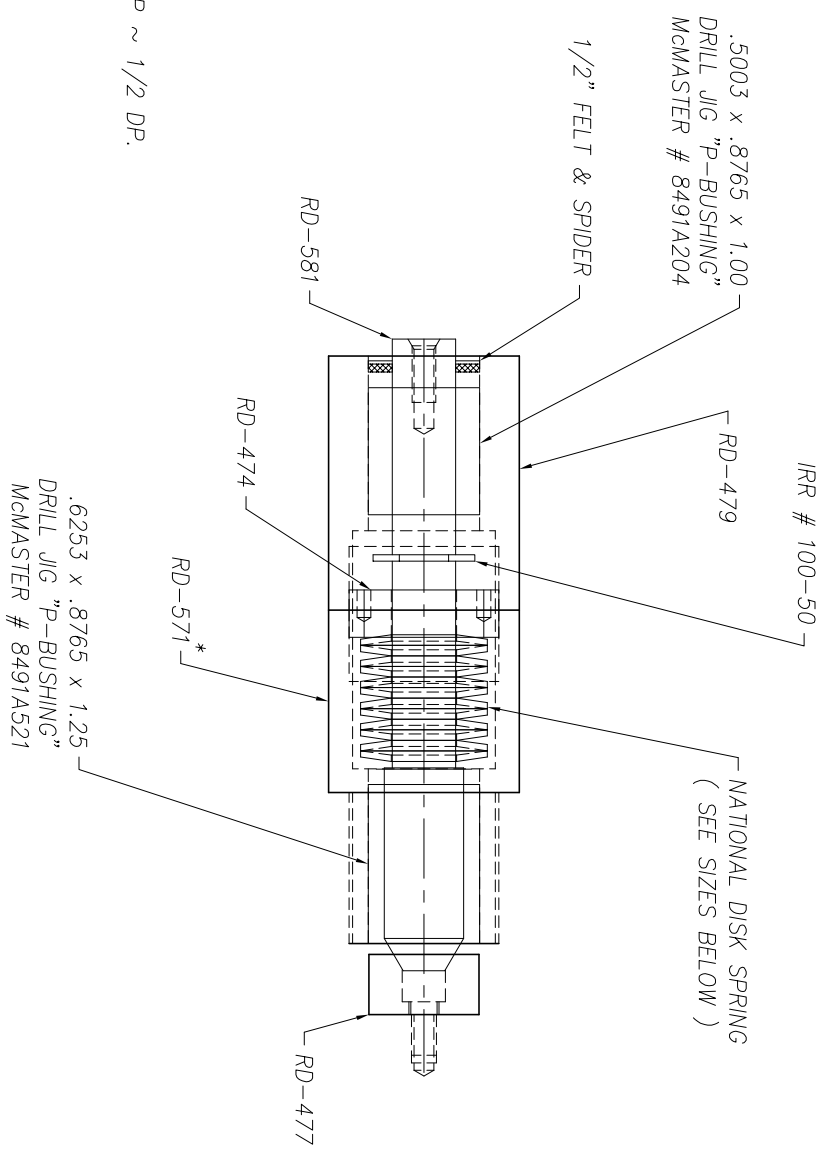
STELTRON COMPONENTS, inc.

| | | |
|--------------------------------|------------|------------------|
| SCALE: FULL | PLOT B 1=1 | DRAWN BY: BB |
| DATE: 5-7-02 | | REUSED: 10/15/04 |
| TITLE RD-500 OVERLOAD TOWER | | |
| DRAWING NO. RD-570 | | |



NATIONAL DISK SPRING OR EXACT EQUIVALENT

- # AI-105-135 (1.000 x .512 x .035)
- # AI-105-139 (1.000 x .512 x .039)
- # AI-105-149 (1.000 x .512 x .049)
- # AI-105-159 (1.000 x .512 x .059)



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|---|--|--|--|
| <p>SCALE: FULL</p> <p>DATE: 8-30-07</p> | | <p>PLOT B 1=1</p> | |
| | | <p>DRAWN BY: BB</p> <p>REVS: 9-27-07</p> | <p>TITLE</p> <p>RD-500 HD OVERLOAD TOWER</p> |
| <p>STELTRON COMPONENTS, inc.</p> | | | <p>DRAWING NO.</p> <p>RD-582</p> |