

# Tandem Pumps

## Alignment Procedures on MAX Series using PN 22293250, 22295695, & 22213000

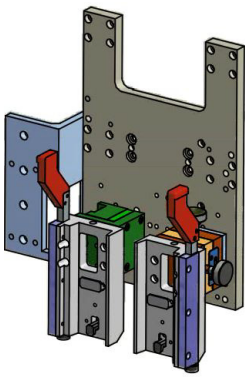
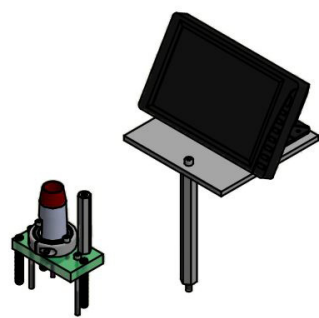
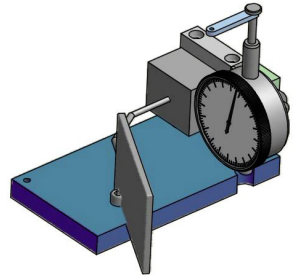
### Purpose

Use this procedure to adjust the X and Y offset between two dispense tips and to adjust the dispense tips to the same relative Z position.

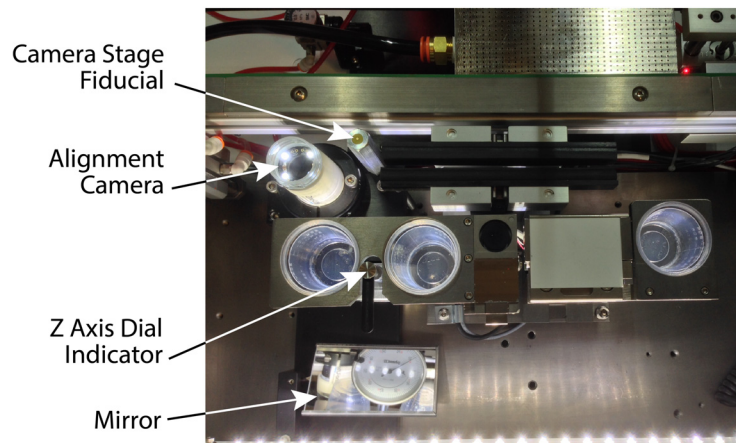
### Requirements

Only qualified service or maintenance personnel with a safety override key should perform this procedure because it requires access to the work area to adjust the pump mounts while gantry is under power.

This procedure assumes two pumps are mounted on a MAX Series dispense system along with the following equipment:

Tandem Pump Mounts	Tandem Pump Alignment Camera & Monitor	Tandem Pump Z Axis Dial Indicator
<a href="#">Drawing 22293250</a> (pg 10)	<a href="#">Drawing 22295695</a> (pg 11)	<a href="#">Drawing 22213000</a> (pg 12)
	Used to align X and Y axes. 	Used to align Z axis. 

**Figure 1:** Top view of Tandem Alignment area



## Description

Your MAX Series system comes with an installed program that facilitates the tandem pump alignment procedure. You may rename the program as needed. The factory name for the program is **Width - DDD - XYZ - Parallel**:

**DDD** - refers to the width. You may change the width value.

**XYZ** - refers to the X, Y and Z adjustments the program performs.

**Parallel** - refers to the parallel adjustment the program performs.

The program uses the Setup Pin tool type for calibration (even though the Setup Pin is not physically used during this procedure) because a Setup Pin tool type offers some benefits for a calibration at this level.

When the Head Mounts Screen displays, you may click on Feature IDs to select a specific portion of the calibration, Width, Z Axis, or Parallel. After you click OK on the Head Mounts Screen, the program continues and may do a Z axis calibration of the dispense tip. The system will prompt you with the standard system message to mount a board before continuing even though no board is used for this procedure.

## Run Alignment Program

Before running the alignment program, open the front hood and insert the safety over-ride key to allow the necessary adjustments to be made while the gantry is under power.

The tandem pump alignment program consists of three parts that run in the following sequence.

### Adjust Spacing (X axis)

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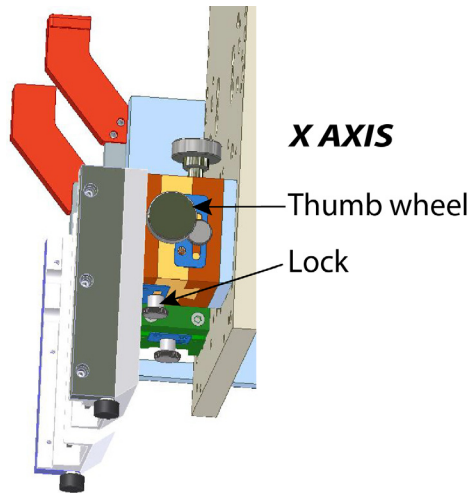
1. Select and run the alignment program named **Width - DDD - XYZ - Parallel**.
2. The gantry moves Head 1 to the adjustment camera. *The dispense tip may not be in the field of view due to the setup offsets.* Refer to [How to make a new Width Adjust](#) (pg 8) for details on how to change this positioning.

Using the trackball or keyboard arrow keys, adjust the position so the center of the dispense tip is in the center of the display. The system is only working with the X position at this time.

3. Click CLOSE. The gantry moves Head 2 the target distance.

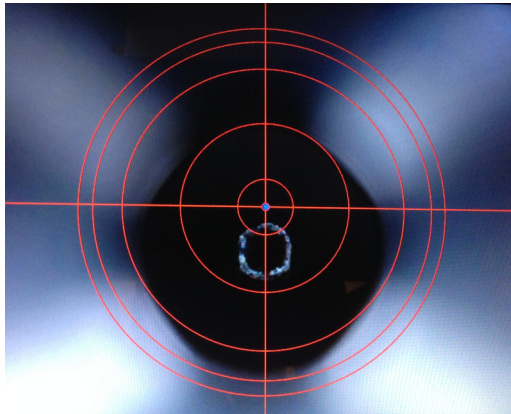
~ continued ~

4. Unlock the adjustment stage lock associated with the knob on the right side of Head 2.



5. Using the knob on the right side of Head 2 adjustment stage, adjust the dispense tip horizontally until it is in the center of the display or in the same position as the Head 1 dispense tip was in the prior step.

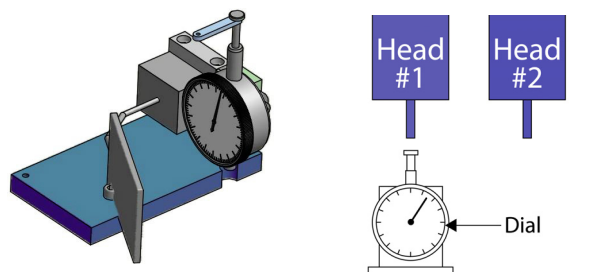
The system is only working with the X position at this time; it is not working with the Y position yet.



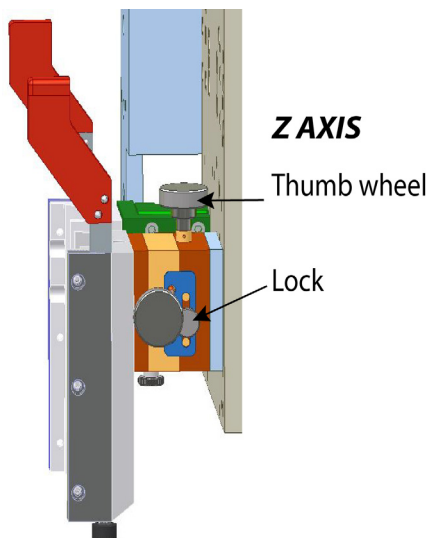
6. Lock the adjustment stage lock (see [Step 4](#)).
7. Click CLOSE.

## Adjust Z Height

Head 1 moves to the Z Access Dial Indicator located in the calibration station area. The needle depresses the dial indicator a specific amount.



1. Using the mirror, view the dial indicator and adjust the dial ring until zero is aligned to the dial indicator needle.
2. Click CONTINUE on the displayed Pause message.
3. The system moves Head 2 to the same Z position on the dial indicator as used for Head 1.
4. Unlock the adjustment stage lock associated with the thumb wheel on top of Head 2.



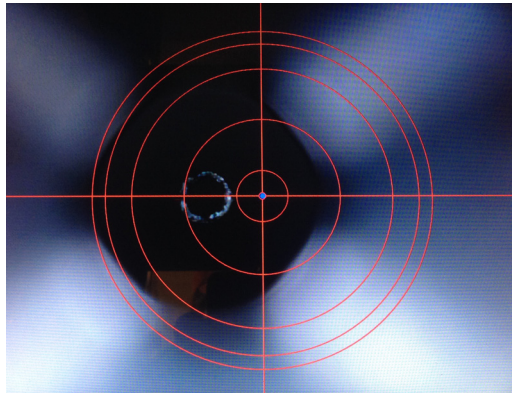
5. Using the Z Axis adjustment thumb wheel on the top of Head 2, adjust until the dial indicator is at the same zero position as Head 1.
6. Lock the adjustment stage lock (see [Step 4](#)).
7. Click CONTINUE.

## Adjust Parallel & Confirm

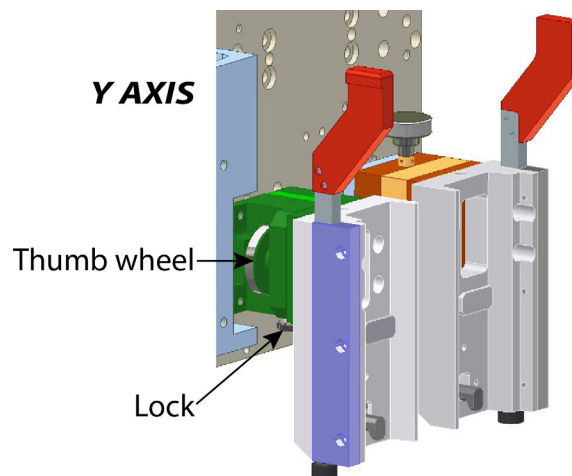
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The system moves Head 2 over the alignment camera.

1. Using the trackball or arrow keys, move the gantry until the vertical position of the Head 2 dispense tip is in the center of the display. The X (horizontal) position is unimportant at this time.

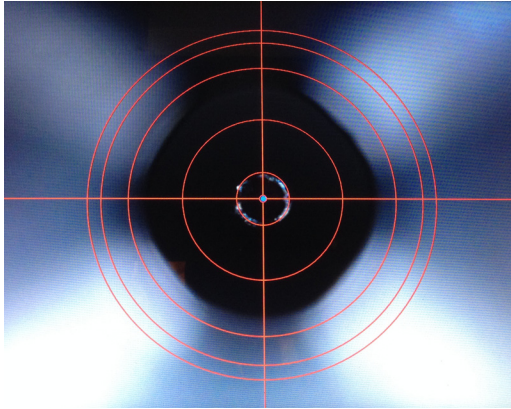


2. Click CLOSE.
3. Unlock the adjustment stage lock associated with the thumb wheel behind Head 1.
4. Using the Y Axis adjustment thumb wheel behind Head 1, adjust the dispense tip to the same vertical position on the display as the Head 2 dispense tip. The X (horizontal) position is not a concern.



5. Lock the adjustment stage lock (see [Step 3](#)).
6. Click CLOSE.

7. To confirm positions, rerun the program. No adjustment should be required. Click ABORT when done.



8. Select the production program and proceed with the standard calibration procedure.

## Width Alignment Program Routines

The width alignment program has a number of routines (segments).

**NOTE:** All of the following routines use the Camera Stage fiducial as their origin.

**NOTE:** DDD in the following refers to the width adjustment distance.

### Width Adjust

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Moves Head 1 to the alignment camera to create a zero position for adjustments. It then moves Head 2 a specific spacing distance for mechanical adjustment.

#### H1a – DDD

Uses a pseudo fiducial to position Head 1 dispense tip over the alignment camera.

The standard camera is not used during this operation.

#### H2a – DDD

This is a nested shape so it uses the adjustments realized from H1a.

Uses a pseudo fiducial to position Head 2 dispense tip over the alignment camera.

### Z Axis Adjust

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Uses a fixed location of “Indicator”. The fixed location is the center of the dial indicator pad.

**NOTE:** When teaching the fixed location Z axis position, the dispense pump must be used.

#### Z H1 Move

Moves Head 1 to a Z-axis position on the dial indicator.

Uses an Operate > Prog Pause to allow the operator to make adjustments.

#### Z H2 – DDD

Includes an X offset for Head 2 as indicated by “DDD”.

Moves Head 2 to same Z-axis position on the dial indicator as used for Head 1.

Uses an Operate > Prog Pause to allow the operator to make adjustments.

#### Z H1H2 DDD

Combined shape for the complete Z-axis alignment procedure.

## Parallel Adjust

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Adjusts the dispense tips in the Y (vertical) axis. Parallel Adjust moves Head 2 over the alignment camera to get a Y position, and then moves Head 1 over the alignment camera for mechanical adjustment.

### PH2 – DDD

Uses a pseudo fiducial to position Head 2 over the alignment camera.

### PH1 Location

Uses a pseudo fiducial to position Head1 over the alignment camera for mechanical adjustment.

This shape is the same regardless of the spacing between the pumps.

## Creating New Adjustments

### How to make a new Width Adjust

#### **Copy H1a – Positions Head 1 over alignment camera**

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1. Copy the shape and name it H1a – DDD
2. Fiducial coordinates remain at (4", 0.6"):
  - a. Fiducial coordinates for H1a must remain at 4" and 0.6". Using these simple numbers makes new width adjusts in H2a easier.
  - b. If H1 is not initially in the field-of-view of the alignment camera, move it into the field-of-view.

#### **Copy H2a – Positions Head 2 over the alignment camera**

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1. Copy the shape and name it H2a – DDD
2. Add the amount of required adjustment to the H1a X fiducial.

For example, if 2.1" adjustment is required, then add 2.1" to 4" for a value of 6.1". The Y axis should have 0 adjustment.

#### **In H1a**

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1. Edit the newly created H1a - DDD
2. Select the H2a - DDD shape and change it to the newly created H2a - DDD

### How to make a new Z Adjust

1. Copy Z H2 – *Positions Head 2 over the z axis alignment indicator*:
  - a. Copy the shape and name it "Z H2 – DDD"
  - b. Edit the shape and change the X coordinates inside the shape to the new offset value.
2. Copy Z H1H2 – *Combined shape for Head 1 and Head 2 Z Axis alignment*:
  - a. Copy the shape and name it Z H1H2 DDD
  - b. Edit the shape and change the Z H2 shape to the newly created Z H2



## How to make a new Parallel Adjust

### Copy PH2 – Adjusts the pumps for parallel (vertical in display)

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1. Copy the shape and name it “PH2 – DDD”
2. Change the fiducial coordinates to a new offset value.
  - a. This position should put the H2 dispense tip over the adjust camera. The coordinates can be found by putting H1 over the alignment camera and recording the X and Y positions.
  - b. Add the amount of adjustment required to the X position and then use this value for the new H2 fiducial.
  - c. The Y fiducial should be the same as the position found in step 2.a.

Once the shapes are made a new program will be required

### Copy a Width program

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1. Copy a Width program. For example, you may make a copy of “Width – DDD – XYZ – Parallel”
2. Rename the program by changing DDD to the new width value.
3. Edit the program lines:
  - a. Change H1a shape to the newly created H1a.
  - b. Change Z H1H2 shape to the newly created Z H1H2 Shape.
  - c. Change PH2 shape to the newly created PH2 shape.

## Troubleshooting

### Terminating Alignment Application

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**Problem:**

You need to terminate the Alignment application.

**Action:**

- 1 - Click once anywhere within the Alignment Display window and a title bar will appear.
- 2 - Click the red X close box and the application will terminate.

### Error Message Displays

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**Problem:**

An error is encountered while starting the application.

The most common cause of an error is a missing camera; without a camera the application has no functionality.

**Action:**

A full screen window automatically displays with details about the error. Use this information to correct the error and restart the application.

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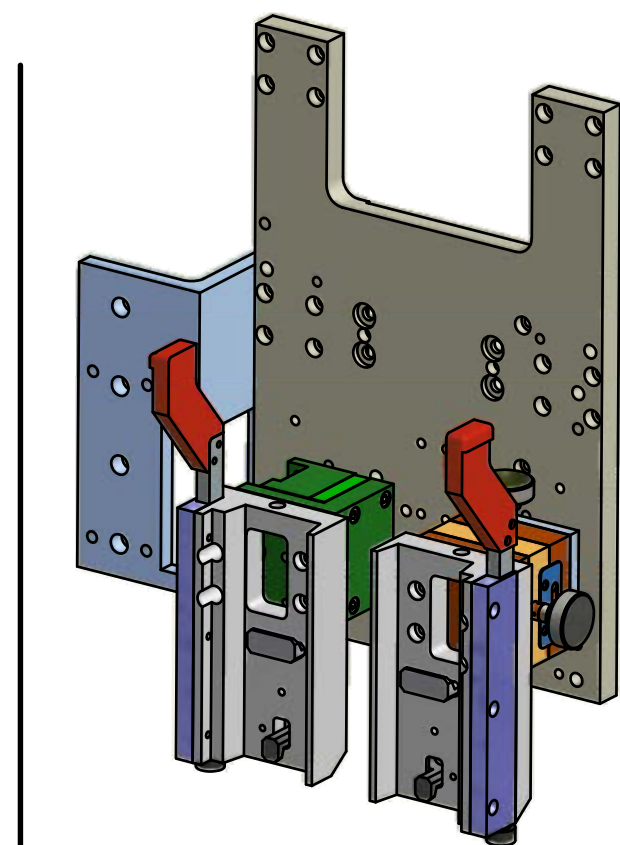
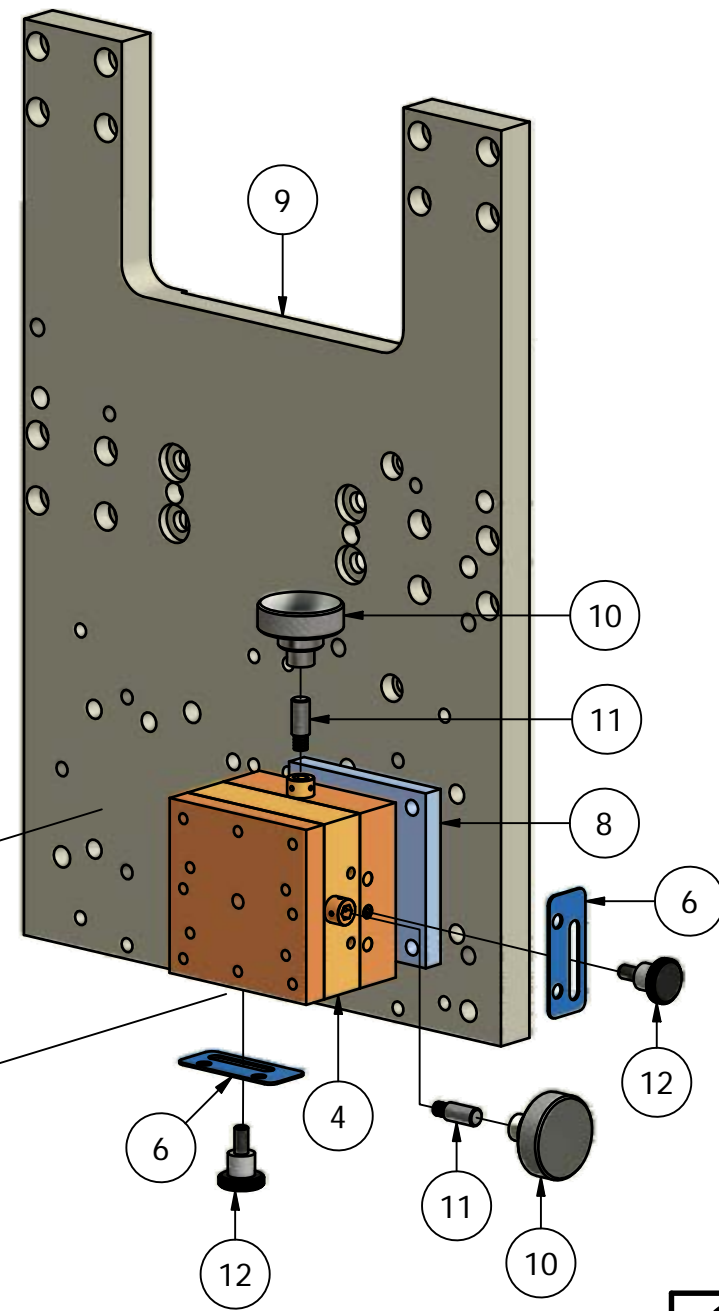
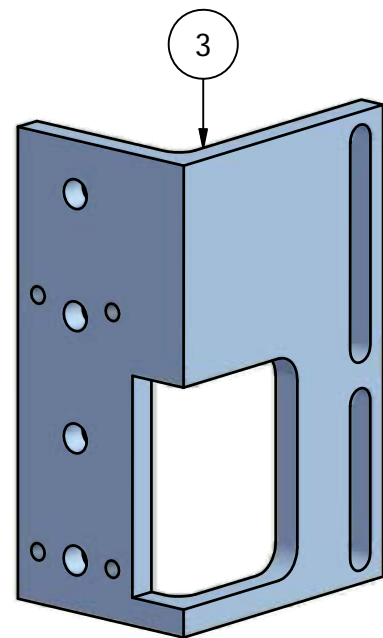
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2

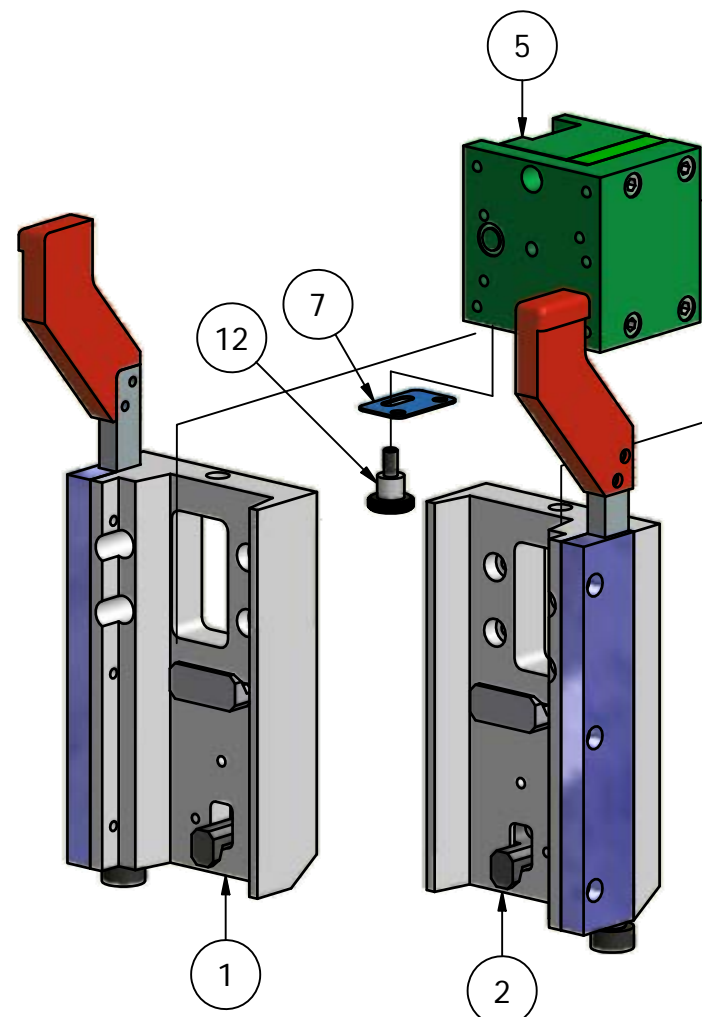
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Parts List

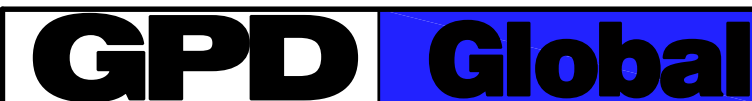
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	22110291	TAPER LOCK QUICK RELEASE
2	1	22110483	TAPER LOCK QUICK RELEASE RH
3	1	22204702	CAMERA BRACKET MODIFIED
4	1	22204723	XY STAGE MODIFIED_OPTOSIGMA
5	1	22204724	Z STAGE_LINEAR_5MM TRAVEL_DOVETAIL
6	2	22204725	FLEXURE LOCK_XY STAGE_60X50MM
7	1	22204727	FLEXURE LOCK_Z STAGE_OPTOSIGMA
8	1	22204728	XY STAGE SPACER_5mm
9	1	22204729	PUMP MOUNT PLATE MODIFICATION
10	2	22204730	THUMB KNOB_X&Z AXIS
11	2	22204731	STUB SHAFT_THUMB KNOB_M4 THREAD
12	3	2525-0023	THUMB SCREW_STEPPED_M3 THD X 6.0 BODY



ASSEMBLED



LAST REVISED 5/12/2015



TOLERANCES UNLESS OTHERWISE SPECIFIED			
	FRACTIONS		METRIC
X.XX	b 1/32	0 MM	b 1.0 MM
X.XXX	b 0.015	0.0 MM	b 0.4 MM
ANGULAR	b 0.005	0.00 MM	b 0.1 MM
RUNOUT	b 0.5°	0.00 MM	b 0.1 MM
	b 0.003 T.I.R.		
FINISH			
NA			
HEAT TREATMENT		DWG SIZE	
NA		B	

DESCRIPTION			
TANDEM PUMP MT_TAPER LOCK_STAGED			
ASSEMBLY			
TANDEM PUMPS			
MATERIAL			
NA			
DWG NO			
22293250			
DRAWN BY ALJ		5/7/2015	
SHEET 1		OF 1	

4

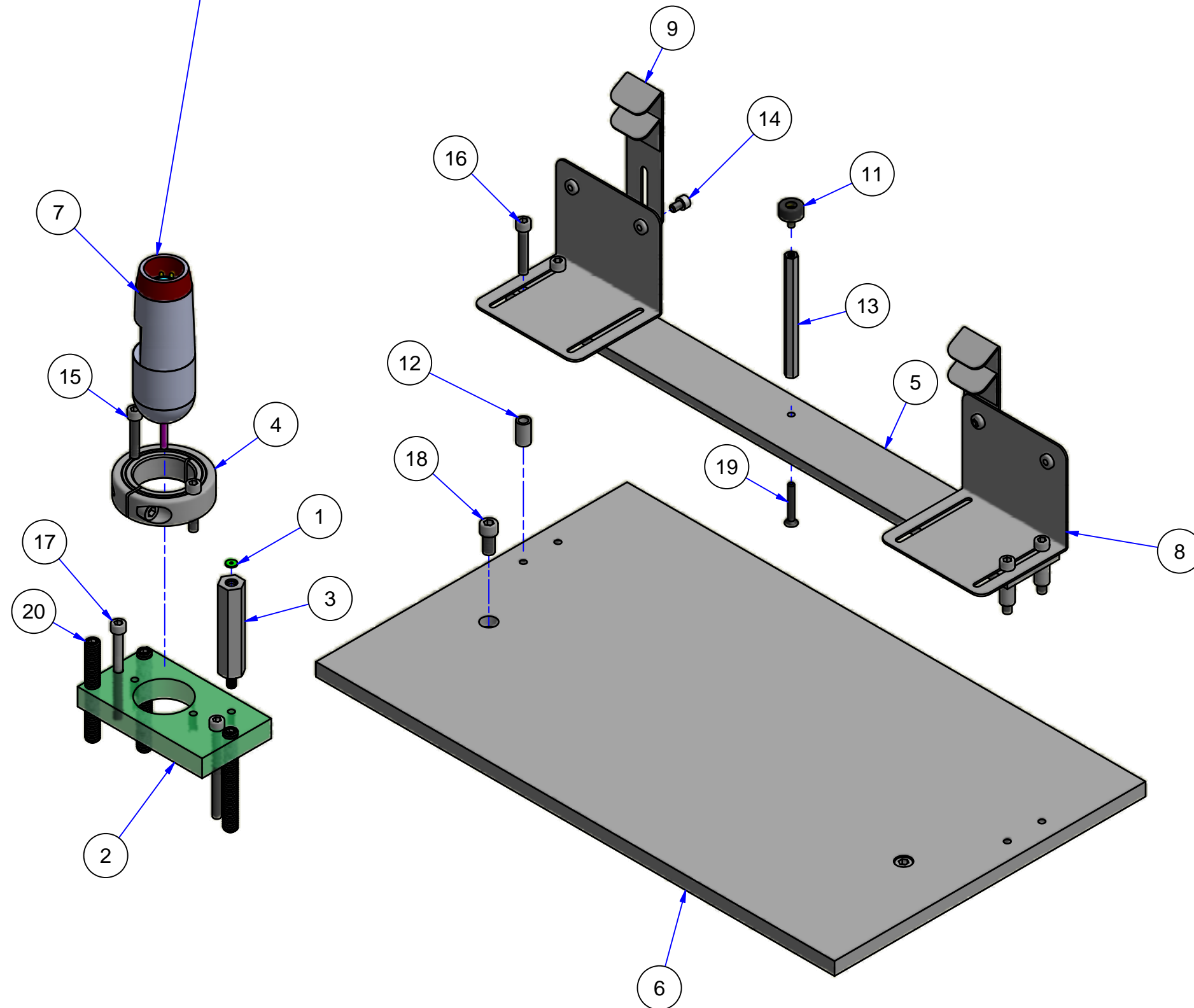
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2

1

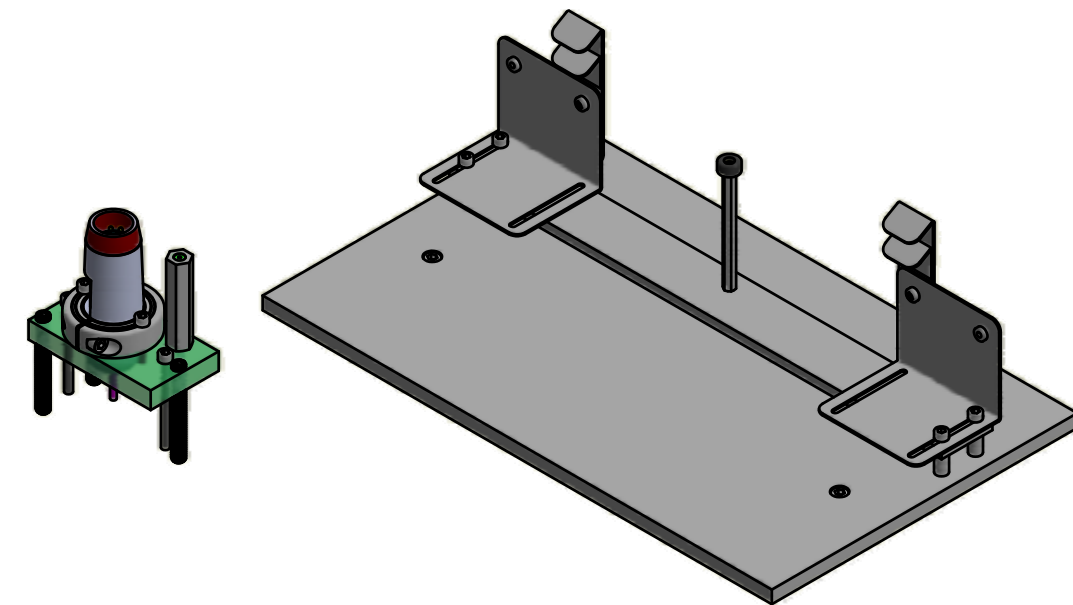
REVISION HISTORY			
REV	DATE	BY	DESCRIPTION
-	-	-	ORIGINAL ISSUE
A	7/29/14	IAH	REMOVED 2000-0033, 22207089, 2825-0055, 3700-0183; ADDED 22207093, 22207094, 2825-0057, 2825-0002, 2825-0058, 22207095
B	5/20/15	IAH	ADDED 22207151, 22207152

MAGNIFICATION ADJUSTMENT FACES LEFT OF MACHINE,  
BOTTOM OF MAGNIFICATION ADJUSTMENT FLUSH WITH COLLAR



Parts List			
ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	1700-0110	FIDUCIAL DOT, 1.5MM
2	1	22207090	PLATE_MOUNT_MICROSCOPE CAMERA_FID
3	1	22207091	MOD_STANDOFF_HEX_10-32 X 3_FIDUCIAL
4	1	22207092	MOD_CLAMP_COLLAR_MICROSCOPE CAM
5	1	22207093	PLATE_CLAMP_LAPTOP_ALIGNMENT FIXTURE
6	1	22207094	PLATE_MOUNT_LAPTOP_ALIGN FIXTURE
7	1	22207095	MOD_MICROSCOPE CAM_TOP REMOVAL
8	2	22207151	BRACKET_MOUNT_COMPUTER LOCK
9	2	22207152	BRACKET_ADJUST_COMPUTER LOCK
10	NS	22295697	ASSY_MONITOR_PROGRAMMED_ALIGN FIXTURE
11	1	2825-0002	FOOT PAD, RUBBER
12	4	2825-0057	SPACER_ALUM_RND_5.3MMID_8MMOD_14MML
13	1	2825-0058	STANDOFF_ALUM_1/4 HEX X 3 LG_6-32
14	2	SACSN0832025	8-32 X 1/4 CAP SCREW
15	2	SACSN1032100	CAP SCREW 10-32 X 1LG SST
16	4	SACSN1032112	CAP SCREW 10-32 X 1-1/LG SST
17	2	SACSN1032225	CAP SCREW 10-32 X 2 1/4 LG SST
18	2	SACSN2520050	CAP SCREW, 1/4-20 X 1/2
19	1	SAFSN0632100	6-32 x 1 FH CAP SCREW
20	3	TACSN3118250	SCR.A.CP.SST. .5/16-18 X 2-1/2

NS = NOT SHOWN



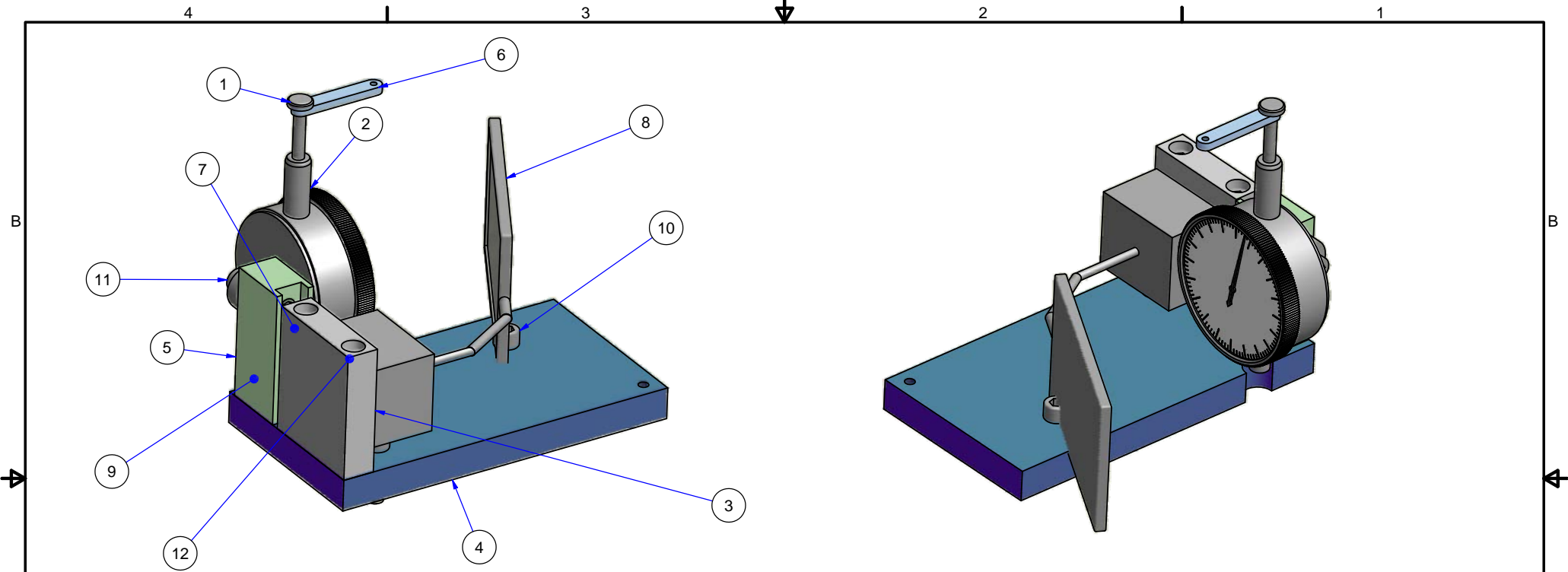
LAST REVISED 5/21/15

**GPD Global**

TOLERANCES UNLESS OTHERWISE SPECIFIED	
FRACTIONS	b 1/32
X.XX	b 0.015
X.XXX	b 0.005
ANGULAR	b 0.5°
RUNOUT	b 0.003 T.I.R.
FINISH	
HEAT TREATMENT	
-	

DESCRIPTION	FIXTURE_ALIGNMENT_TANDEM PUMP
ASSEMBLY	MICROMAX
MATERIAL	-
DWG NO	22295695
DRAWN BY	IAH
DATE	7/3/2014
SHEET	1 OF 1

NOTES:  
1) USE STAINLESS STEEL FASTENERS WHERE POSSIBLE



Parts List

ITEM	QTY	PART NUMBER	DESCRIPTION
1	1	10/3999	INDICATOR_POINT_ .3/8" DIA.
2	1	10_4802	DIAL INDICATOR, 1/2 TRAVEL
3	1	22201455	BLOCK_MAG MOUNT_DUAL VALVE CAL KIT
4	1	22203397	BASE_LEVELING PLATE
5	1	22203398	BAR_VERTICAL SUPPORT_INDICATOR
6	1	22203400	THUMB LEVER_INDICATOR
7	1	ANSI B18.2.2 - 1/4 - 20	Hex Nuts (Inch Series) Hex Nut
8	1	M5531	MIRROR_MAG BASE_PURGE STATION VIEWING
9	2	SACSN0632062	6-32 X 5/8 CAP SCREW SS
10	2	SACSN2520087	CAP SCREW, 1/4-20 X 7/8
11	1	SACSN2520125	CAP SCREW, 1/4-20 X 1-1/4 SST
12	2	SACSN2520200	CAP SCREW, 1/4-20 X 2 SST

LAST REVISED 06/16/15



TOLERANCES UNLESS OTHERWISE SPECIFIED		DESCRIPTION	
FRACTIONS	± 1/32	ANALOG CALIBRATION KIT_DUAL VALVE	
X.XX	± 0.015	0 MM	± 1.0 MM
X.XXX	± 0.005	0.0 MM	± 0.4 MM
ANGULAR	± 0.5°	0.00 MM	± 0.1 MM
RUNOUT	± 0.003 T.I.R.	ASSEMBLY	
FINISH		DUAL VALVE CALIBRATION	
		MATERIAL	
		PLATED ALUMINUM	
		DWG NO	
		22213000	
HEAT TREATMENT		DWG SIZE	
NA		B	
		DRAWN BY ARM 6/19/2010 SHEET 1 OF 1	