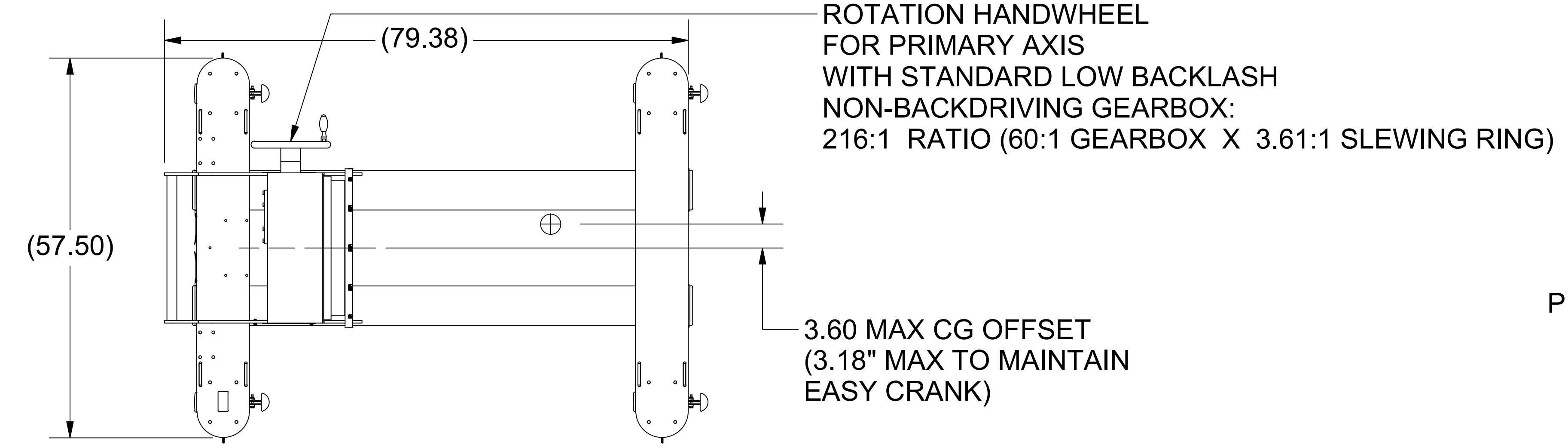

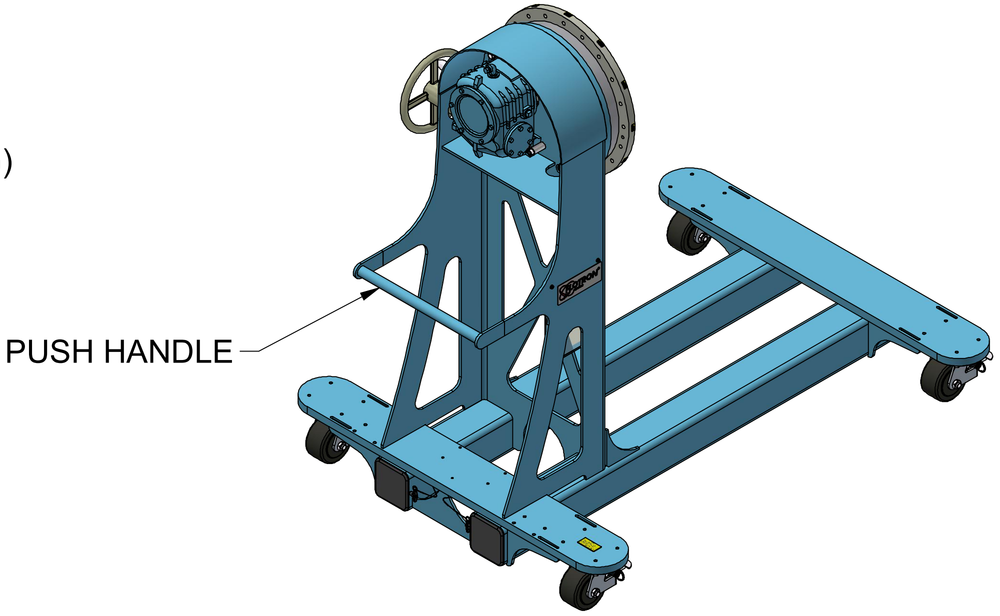

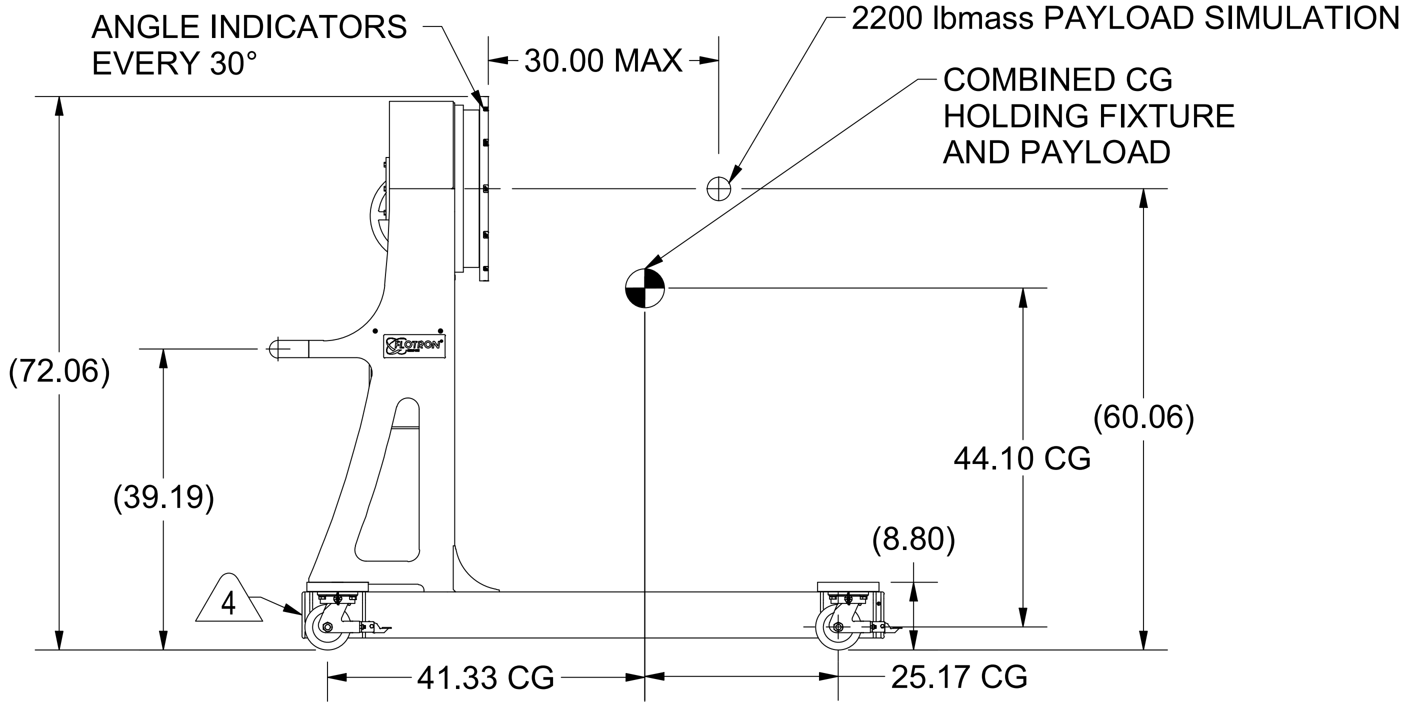

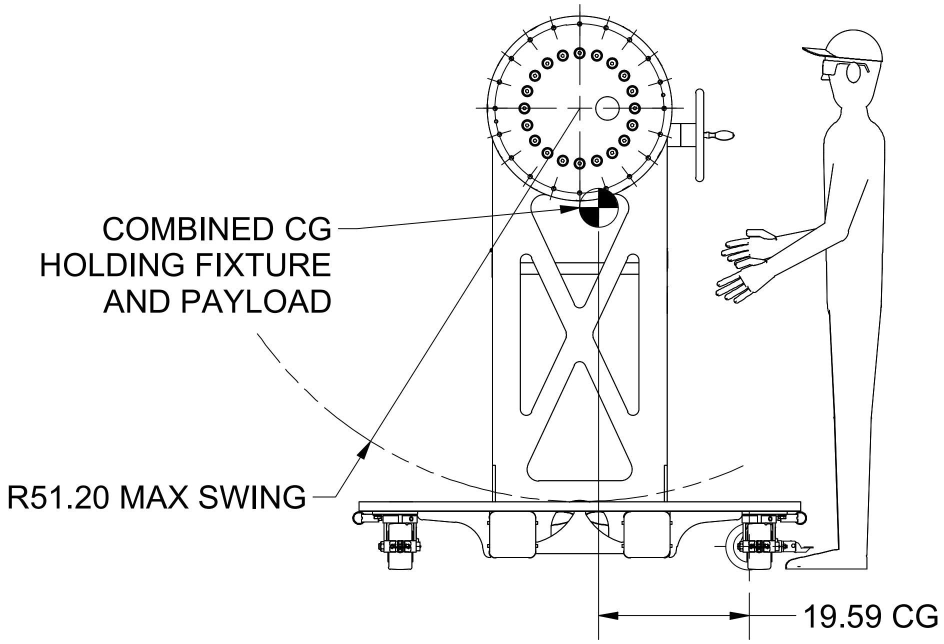

LATERAL STABILITY
WITH 2,200 LB PAYLOAD: 19.59 / 44.11 = .44 G

5. WEIGHT IN TITLE BLOCK INCLUDES 2,200 LB PAYLOAD.

4 GEARBOX SIDE END CAPS CAN BE REMOVED AND FRAME LIFTED FROM GEARBOX END WITH FORKLIFT. FORKS MUST GO MINIMUM 1 FOOT PAST **UNLOADED** CG (42" INTO TUBE MIN.) AND AT LEAST 58" INTO TUBE FOR **LOADED** FIXTURE.

3. BASIC CONFIGURATION SHOWN ON SHEET 1: CTL-60-P24-C6. FOR ADDITIONAL CONFIGURATION OPTIONS, SEE SHEET 2 FOR KIT PART NUMBERS.

2. FINISHES/LUBRICANTS:
   A. **"STANDARD"** FLOTRON FINISHES (SHOWN) - CLASS 10K (ISO 7 CLEAN ROOM COMPATIBLE FINISHES) - FLOTRON BLUE POWDER COATED FRAMES; GEARBOX SPRAY PAINTED FLOTRON BLUE (CARDINAL 6441-9631); NICKEL PLATED COMPONENTS (NO ZINC); STAINLESS STEEL OR BLACK OXIDE FASTENERS AND MISC. HARDWARE; CASTERS LUBRICATED WITH STA-LUBE SL3131 HEAVY DUTY DRUM BRAKE GREASE; (KRYTOX GPL207 FOR FASTNERS THAT ARE NOT ON A TORQUE CHART); MOBILTAC 375NC (OR EQUIVALENT) TO ALL SLEWING RING TEETH; SLEWING RING INNER RACEWAY COMES PRE-LUBRIATED WITH MOBILUX EP2 (OR EQUIVALENT) AND NO ADDITIONAL LUBRICATION IS REQUIRED.
   B. **"C"** FINISH - CLASS 1K (ISO 6 CLEAN ROOM COMPATIBLE FINISHES) - SKY WHITE POWDER COATED FRAMES; GEARBOX SPRAY PAINTED GLOSS WHITE EPOXY (DUPONT PFW-510-S9); NICKEL PLATED COMPONENTS (NO ZINC); STAINLESS STEEL OR BLACK OXIDE FASTENERS AND MISC. HARDWARE; CASTERS LUBRICATED WITH KRYTOX GPL 207; (KRYTOX GPL207 FOR FASTNERS THAT ARE NOT ON A TORQUE CHART); MOBILTAC 375NC (OR EQUIVALENT) TO ALL SLEWING RING TEETH; SLEWING RING INNER RACEWAY COMES PRE-LUBRIATED WITH MOBILUX EP2 (OR EQUIVALENT) AND NO ADDITIONAL LUBRICATION IS REQUIRED.

1. LOAD RATING FOR PRIMARY AXIS (NO SA OPTION): 2,200 LBS @ 30" WITH 3.6" MAX ECCENTRICITY CONSIDERING A SIMULTANEOUS 1/2g SIDE LOAD (WORST CASE DIRECTION) AND A 1G VERTICAL LOAD. SFy=3 & SFult=5.
   MAX TORQUE ON 60:1 RATIO **(STANDARD)** GEARBOX: 8,000 IN-LBS (7,000 IN-LBS MAX EASY CRANK)
   MAX TORQUE ON 300:1 RATIO **(DR3)** GEARBOX: 8,000 IN-LBS (8,000 IN-LBS MAX EASY CRANK)

NOTES:

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UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES

LINEAR TOLERANCES:		ANGULAR TOLERANCES:
±.03 .XX	±.010 .XXX	±.5°

DO NOT SCALE DRAWING
INTERPRET DIMENSIONING AND
TOLERANCING PER ASME Y15.5-2018
INTERPRET DWG. PER ASME Y14.100

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CANTILEVERED HOLDING FIXTURE, 60 IN HEIGHT

SCALE	SIZE	DRAWING NO.
1 : 25	B	8024-000PROP

WT: 3549.7 lbmass
Cad software: Inventor
SHEET 1 OF 9

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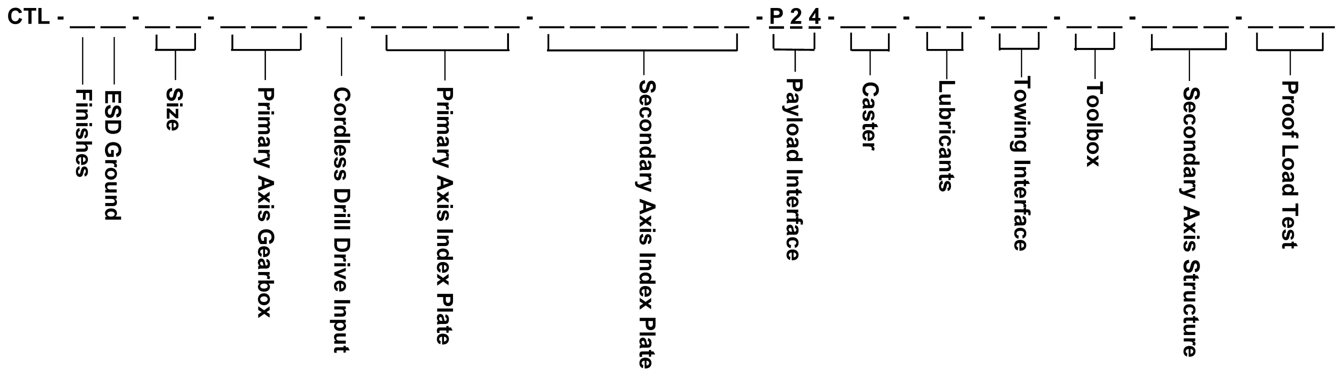
Small Satellite Fixture

Creating a model number



Finishes
(blank) - Standard finishes (no zinc)
C - - - - - Clean room finishes

ESD Ground
(blank) - No ESD ground
E - - - - - Ground lug and drag chain for use in EPA's

Size
36 - - - 36" Primary axis centerline to floor height
48 - - - 48" Primary axis centerline to floor height
60 - - - 60" Primary axis centerline to floor height
AH - - -30" to 60" Adjustable centerline to floor height

Primary Axis Gearbox
(blank) – Standard 60:1 ratio gearbox
DR3 - - - 300:1 ratio gearbox (*Must select "D" option)*

Cordless Drill Drive Input
(blank) – No drill drive (hand crank only)
D - - - - - Battery powered right angle drill permanently mounted to gearbox input shaft.
(Must select DR3 gearbox option)

Primary Axis Index plate
(blank) – No index plate on primary axis
IND30 – 30° Index plate on primary input
(Must select AH option)

Secondary Axis Index plate
(blank) – No index plate on secondary axis
SAIND30 Secondary axis of rotation index plate
(Must select SA option)

Payload Interface
P24 - - - Standard Ø24" circular interface plate
20X through holes for ½" fasteners on Ø22" bolt circle

Proof Load Test
(blank) - - No proof load test
PLT - - - - Standard proof load test (includes deliverable report)

Secondary Axis of Rotation Structure
(blank) - No secondary axis of rotation
SA1 - - - - Secondary axis of rotation (Bolt Position 1)
SA2 - - - - Secondary axis of rotation (Bolt Position 2)
SA3 - - - - Secondary axis of rotation (Bolt Position 3)
SA4 - - - - Secondary axis of rotation (Bolt Position 4)
SA5 - - - - Secondary axis of rotation (Bolt Position 5)
SA6 - - - - Secondary axis of rotation (Bolt Position 6)
*NOTE: See proposal drawing to determine correct bolt position.
Bolt positions can be changed in the field, but bolt position selected will be the bolt position fixture is shipped with. SA1-SA4 not available with CTL-36 size.*

Toolbox
(blank) - No storage toolbox
BX - - - Storage toolbox included

Towing Interface
(blank) - No tow bar
T1 - - - - Tow bar included

Lubricants:
(blank) - Standard lubricant
L1 - - - - Caster swivel bearings lubricated with Krytox GPL 207
L2 - - - - Caster swivel bearings lubricated with Braycote 601EF
NOTE: "C" finish includes L1 lubricants

Caster
C6 - - - Ø6" x 3" Heavy duty nylon wheel caster with brakes and swivel locks
C8 - - - Ø8" x 2 ½" Heavy duty nylon wheel caster with brakes and swivel locks

CTL CREATING A MODEL NUMBER

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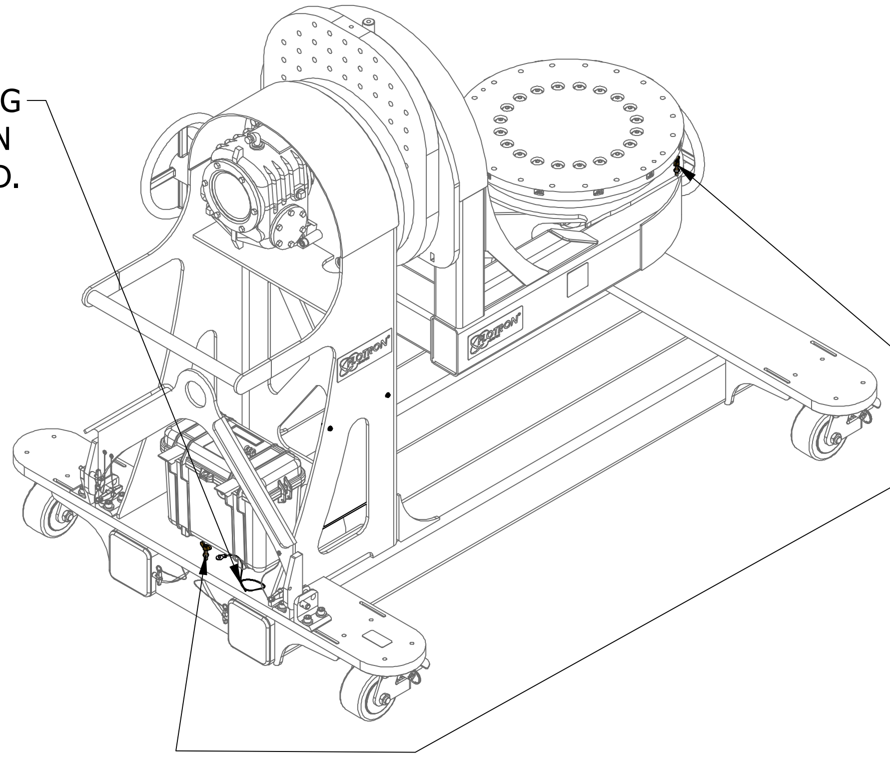
VARIES	B	8024-000PROP

SHEET 2 OF 9

ESD **E** GROUNDING OPTION

ESD KIT INCLUDES TESTS FOR CONTINUITY



DRAG CHAIN ON BOTTOM OF DRIVE SIDE LEG
CAN BE SNAPPED INTO STOWED POSITION
DURING TRANSPORTATION IF DESIRED.

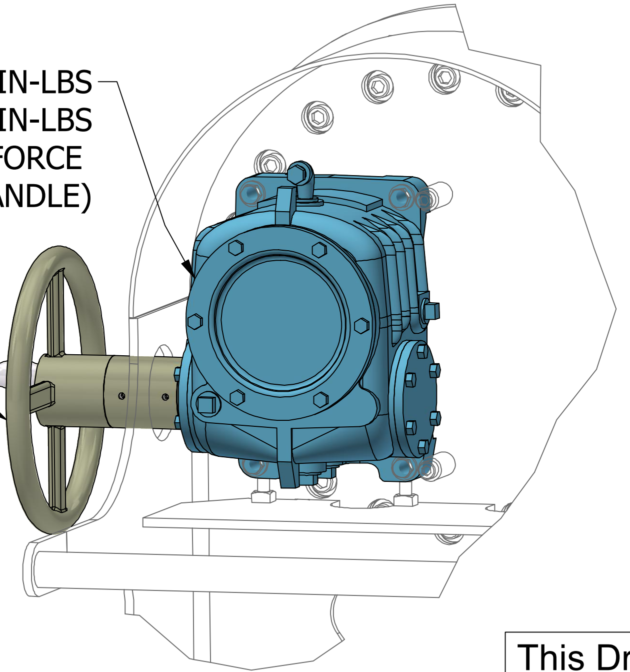
5/16-24 BRASS GROUNDING LUGS ON
SECONDARY AXIS CRADLE AND BASE FRAME

STANDARD GEARBOX OPTION (60:1)

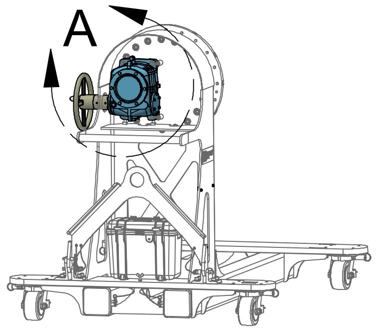
NON-BACKDRIVING 60:1 RATIO SINGLE STAGE DOUBLE ENVELOPING WORM GEAR DRIVE.

STANDARD GEARBOX TORQUE CAPACITY: 8,000 IN-LBS
STANDARD GEARBOX MAX EASY CRANK TORQUE: 7,000 IN-LBS
(EASY CRANK IS DEFINED AS A 12 LB INPUT FORCE
ON THE CRANK HANDLE)

216 TURNS ON INPUT HANDWHEEL
FOR 1 ROTATION OF INTERFACE

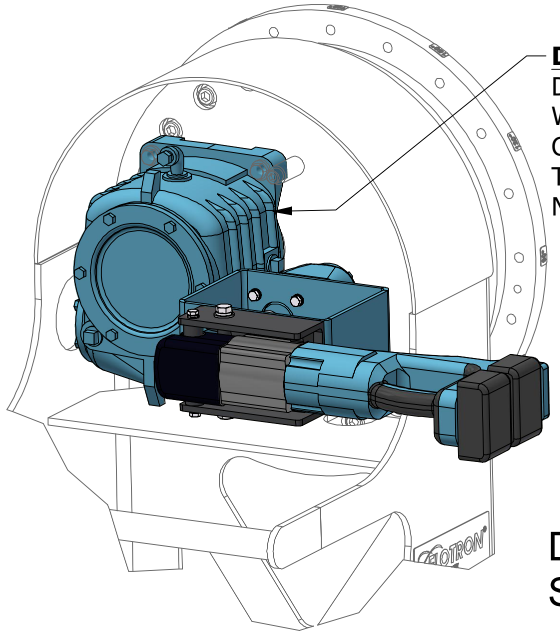


DETAIL A
SCALE 1 :8



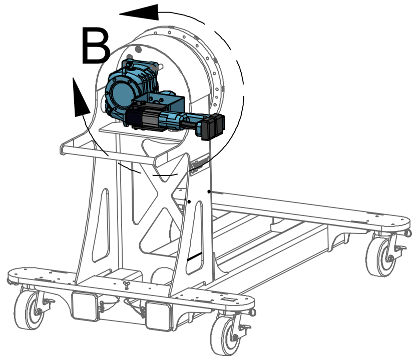
DR3 GEARBOX OPTION (300:1) WITH DRILL DRIVE **D** OPTION

NON-BACKDRIVING 300:1 RATIO TWO STAGE DOUBLE ENVELOPING WORM GEAR DRIVE.



DR3 GEARBOX TORQUE CAPACITY: 8,000 IN-LBS
DRILL MAX RPM IS 1,200 RESULTING IN A MAX OUTPUT PAYLOAD ROTATION OF 1.1 RPM.
WITH **D** OPTION, FULL GEARBOX TORQUE CAPACITY CAN BE USED.
COMES STANDARD WITH CLUTCH BETWEEN THE GEARBOX AND HAND CRANK
TO PREVENT OVER-TORQUE OF GEARBOX IN CASE INDEX PIN WAS
NOT REMOVED BEFORE ROTATION OR PAYLOAD ECCENTRICITY IS TOO HIGH.

DETAIL B
SCALE 1 : 10



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SCALE VARIES
SIZE B
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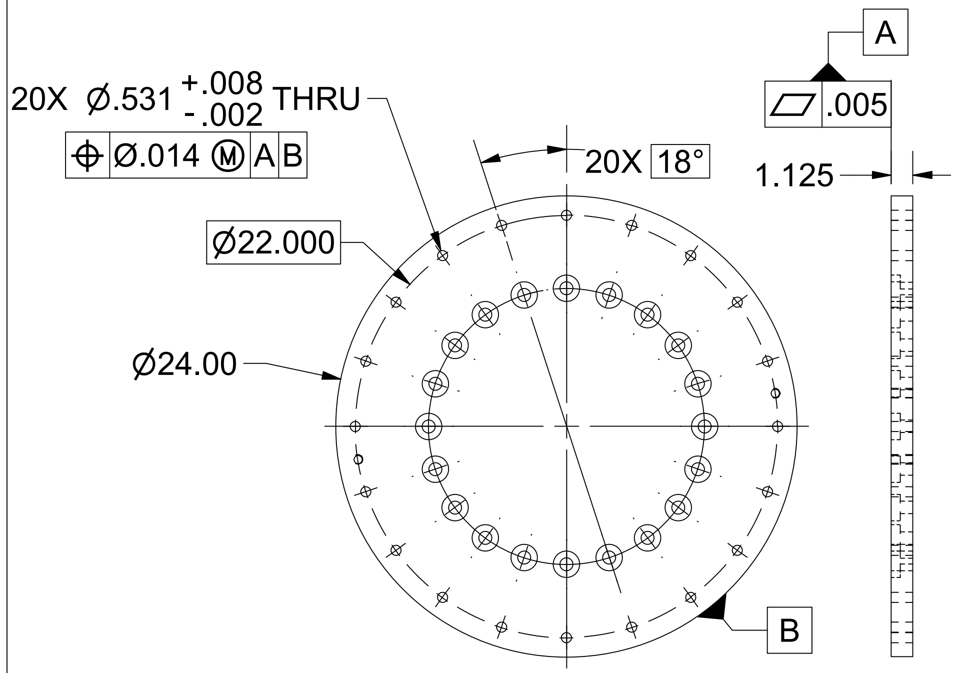
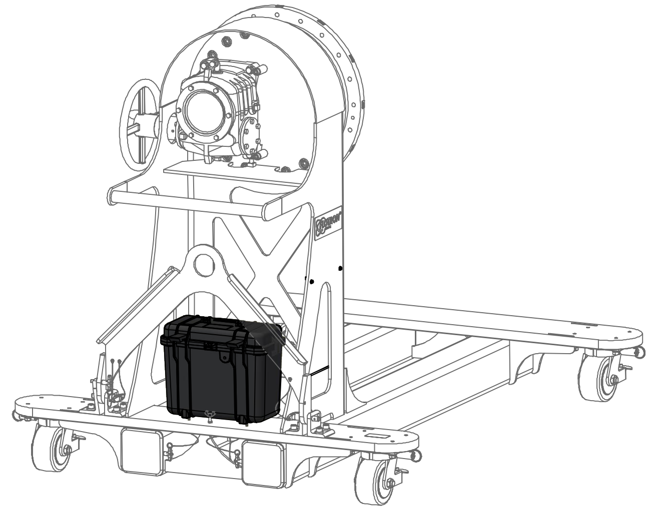
SHEET 3 OF 9

P24 INTERFACE PLATE DETAIL

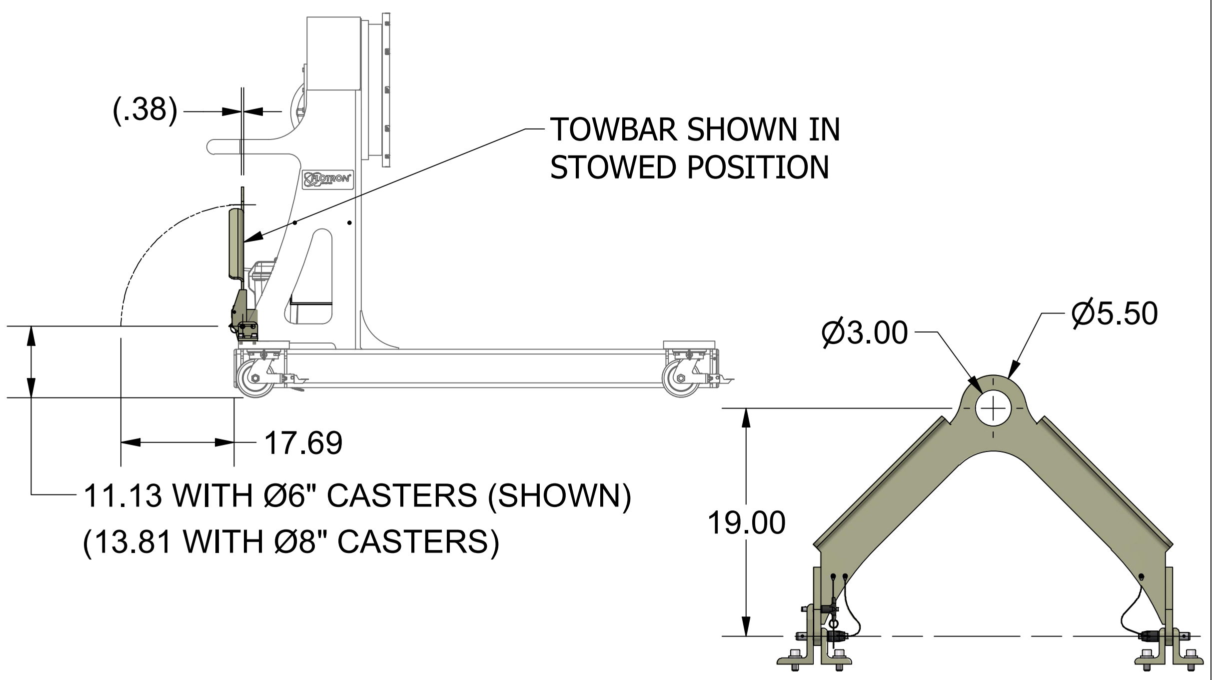


BX TOOLBOX

STORAGE BOX FOR TOOLS, SMALL PARTS, AND MISC. HARDWARE

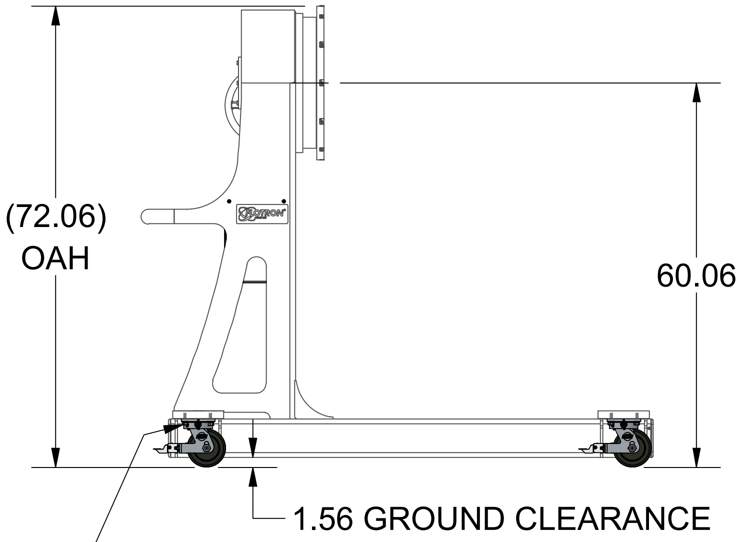


T3 REMOVEABLE TOW BAR

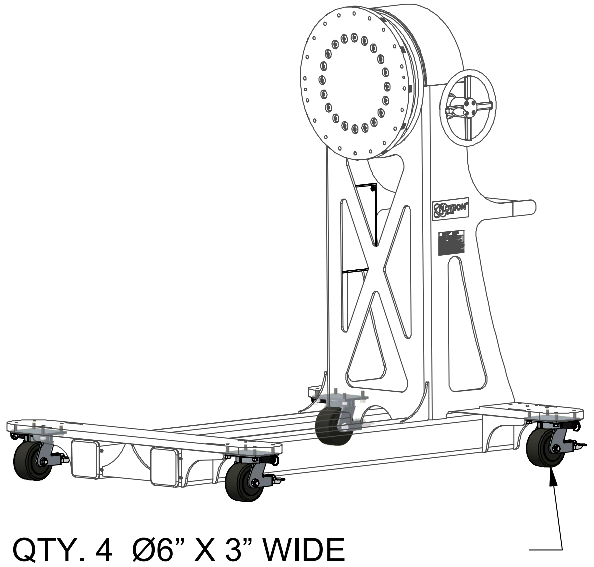


CASTER OPTIONS

Ø6" **C6** CASTERS

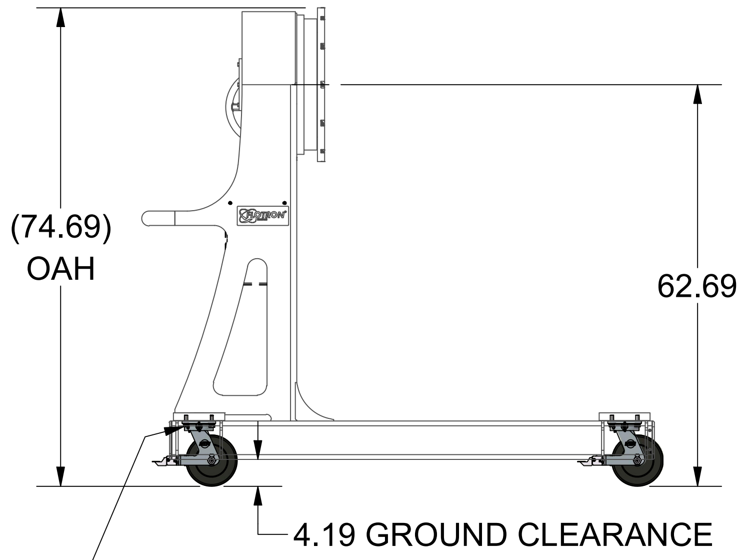


LUBRICATE BOLTS WITH KRYTOX GPL 207
TORQUE 1/2-13 BOLTS TO 30-34 FT-LB

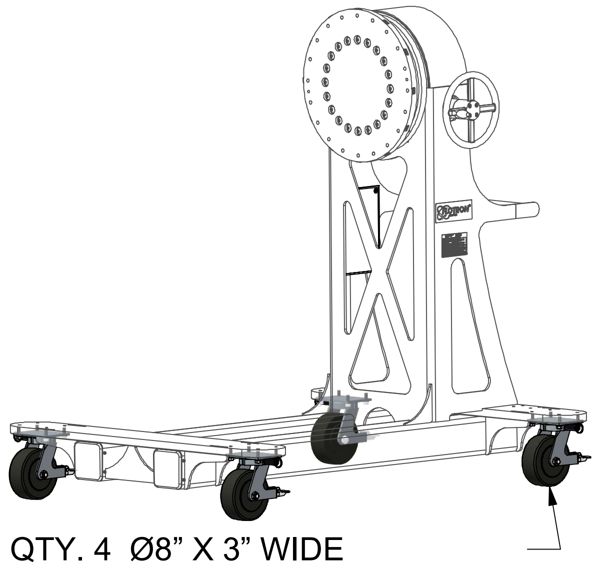


QTY. 4 Ø6” X 3” WIDE
NYLON CASTERS WITH BRAKES
& 4 POSITION SWIVEL LOCKS

Ø8" **C8** CASTERS



LUBRICATE BOLTS WITH KRYTOX GPL 207
TORQUE 1/2-13 BOLTS TO 30-34 FT-LB



QTY. 4 Ø8” X 3” WIDE
NYLON CASTERS WITH BRAKES
& 4 POSITION SWIVEL LOCKS

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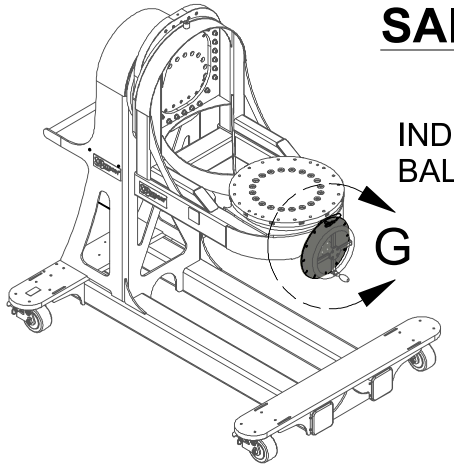
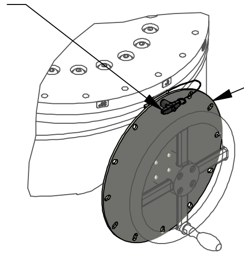
SHEET 4 OF 9

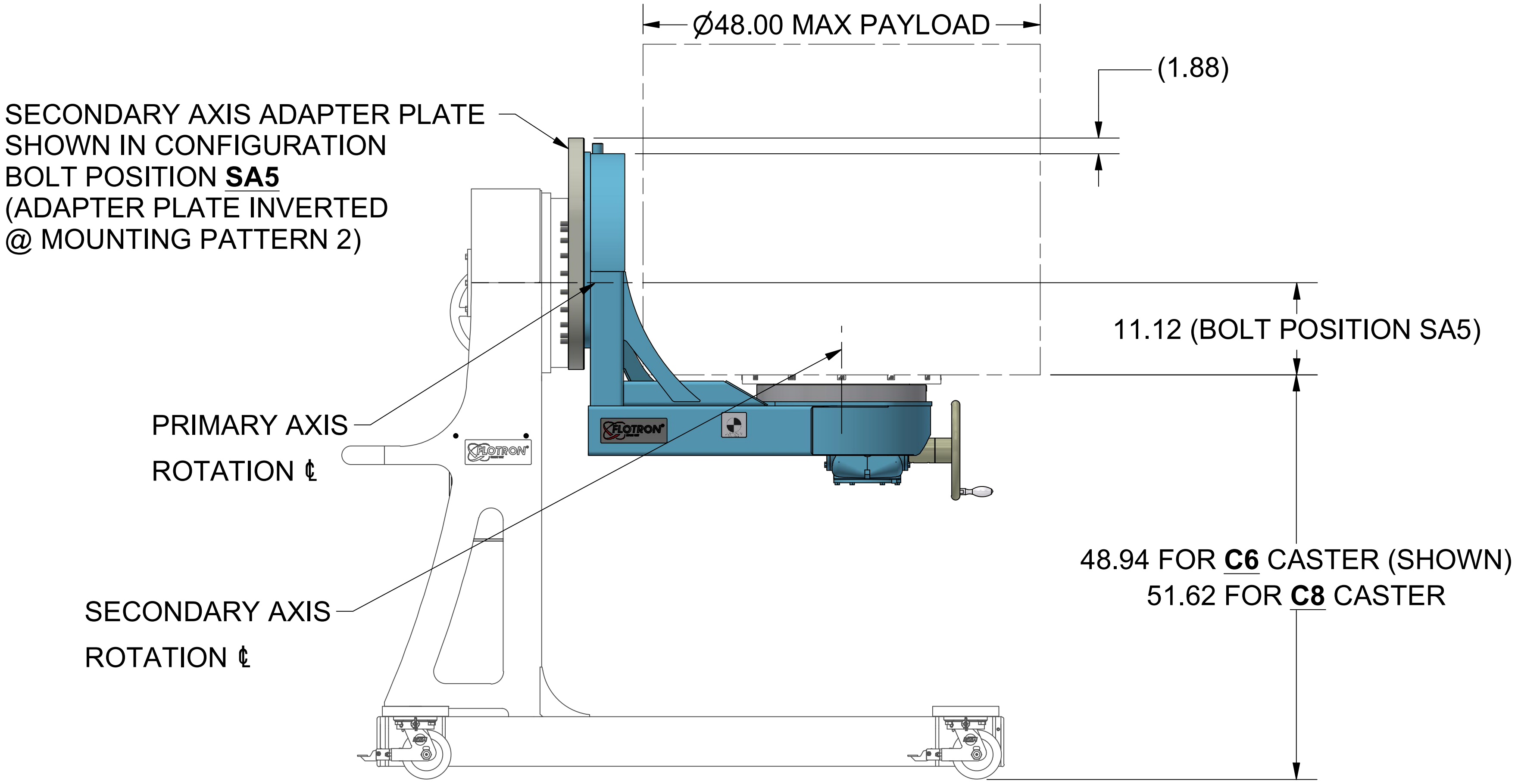
SAIND30 SECONDARY AXIS INDEX PLATE DETAIL

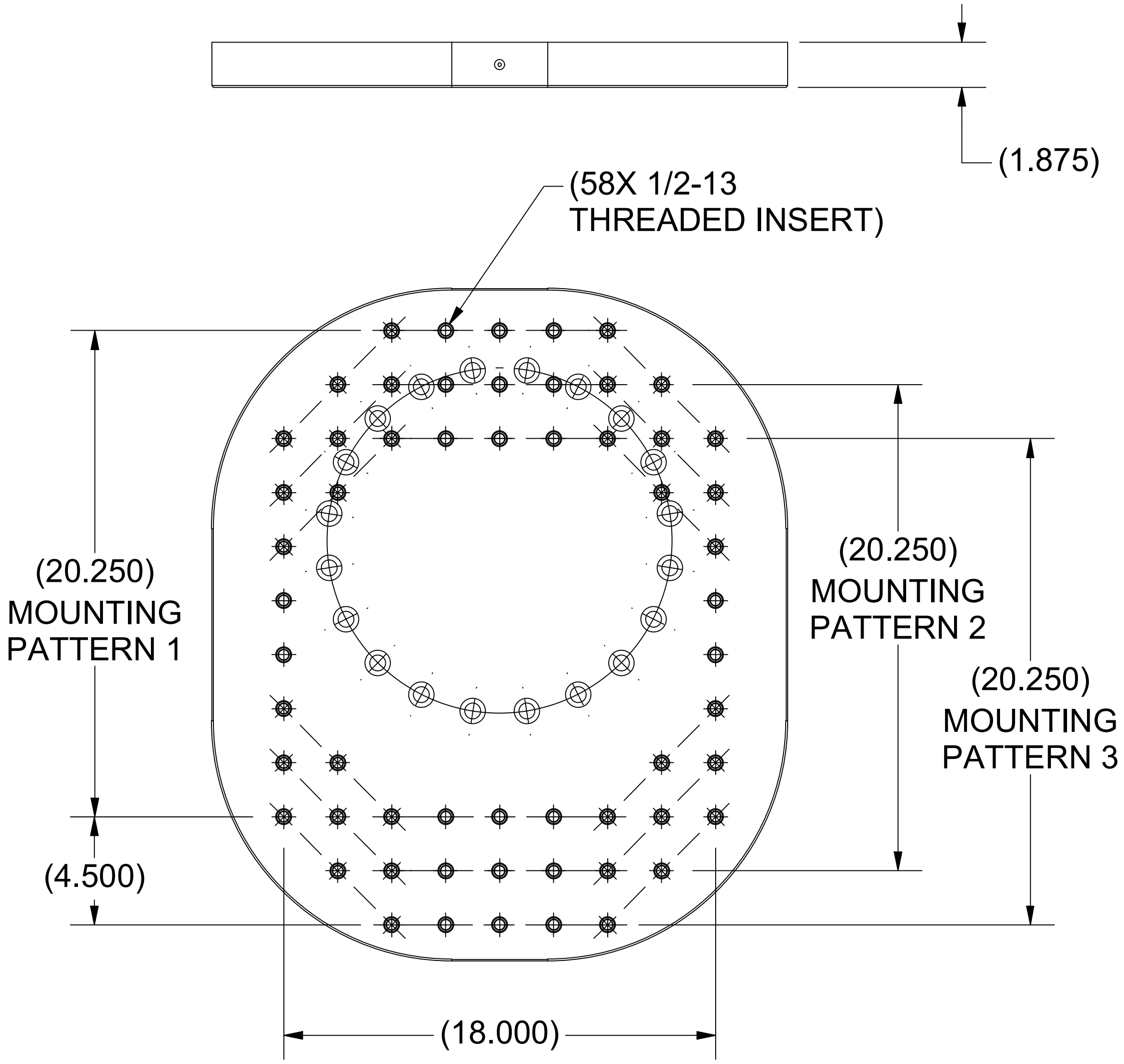




DETAIL G
SCALE 1 : 16

SA1- SA6 SECONDARY AXIS ROTATION FRAME





ADAPTER PLATE SHOWN IN "UPRIGHT" ORIENTATION IN VIEW ABOVE

Adapter Plate Installation Guide		
Configuration Bolt Position	Adapter Plate Mounting Pattern	Adapter Plate Orientation
SA1	3	UPRIGHT
SA2	2	UPRIGHT
SA3	1	UPRIGHT
SA4	1	INVERTED
SA5	2	INVERTED
SA6	3	INVERTED

5. SEE SHEETS 7-9 FOR LOAD CURVES AND DIMENSIONAL DATA OF ALL BOLT POSITIONS (SA1-SA6)
4. CONFIGURATION SHOWN ON THIS SHEET: CTL-60-P24-C6-SA5. TO DETERMINE ACTUAL BOLT POSITION TO SET ADAPTER PLATE AT, SEE CONFIGURATION REQUIREMENTS (SA1-SA6)
3. WHEN SECONDARY AXIS OF ROTATION FRAME IS EMPTY IT MUST BE IN POSITION VERTICAL ORIENTATION AS SHOWN.
2. LOAD RATING WHEN USING SECONDARY AXIS OF ROTATION: 1,200 LBS WITH A 6.6" MAX ECCENTRICITY FROM PRIMARY AND SECONDARY AXIS. ASSEMBLED AS SHOWN ON THIS SHEET CONSIDERING A SIMULTANEOUS 1/2G SIDE LOAD (WORST CASE DIRECTION) AND A 1G VERTICAL LOAD. SFy=3 & SFult=5. MAX TORQUE ON PRIMARY AND SECONDARY AXIS GEARBOX 8,000 IN-LBS (7,000 IN-LBS MAX EASY CRANK FOR SECONDARY AXIS GEARBOX)
1. CONFIGURATION ON THIS SHEET HAS A UNIT WEIGHT OF 2,070 LBS INCLUDES BASE AND 765 LB SECONDARY AXIS (WITH INTERFACE)

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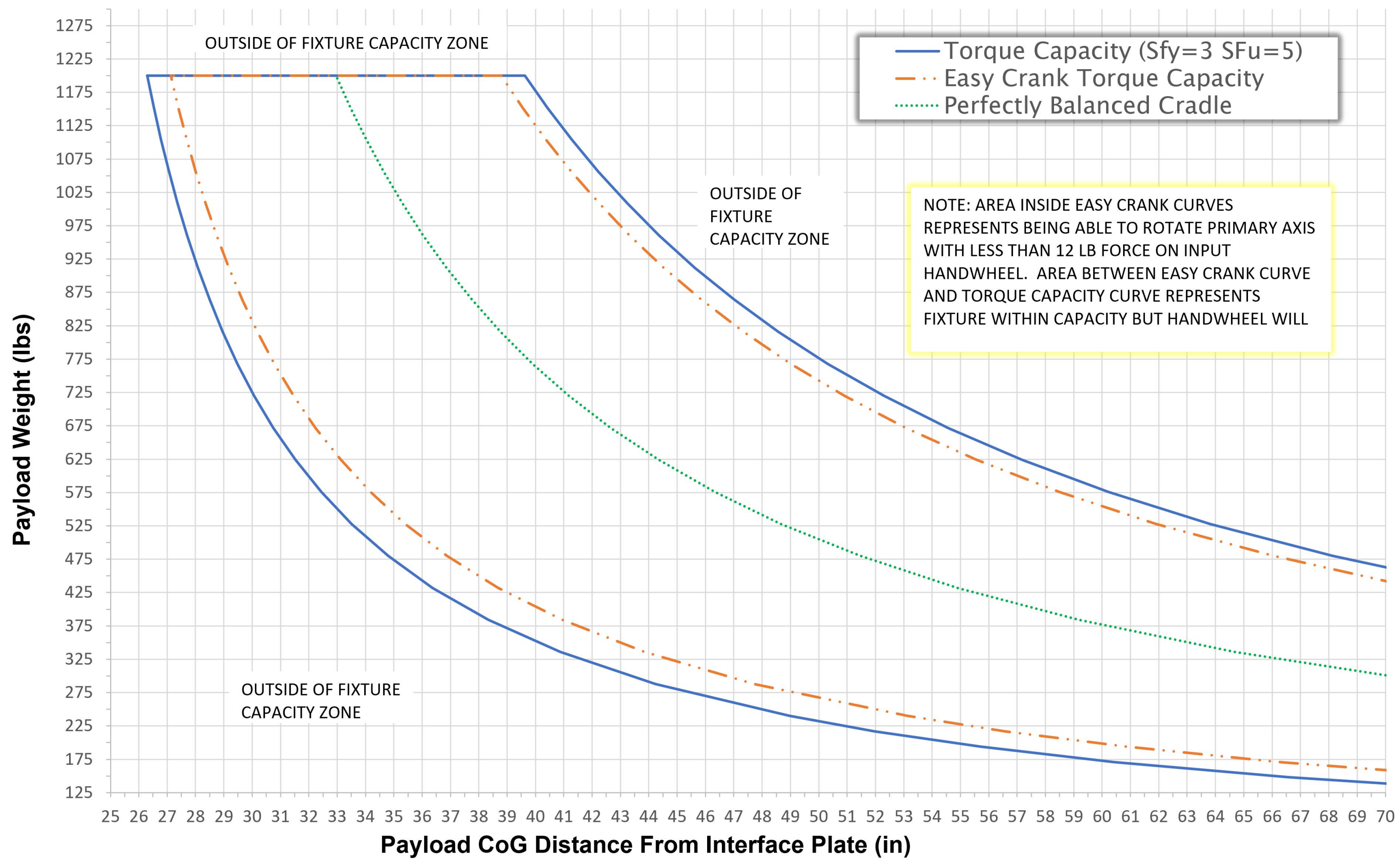
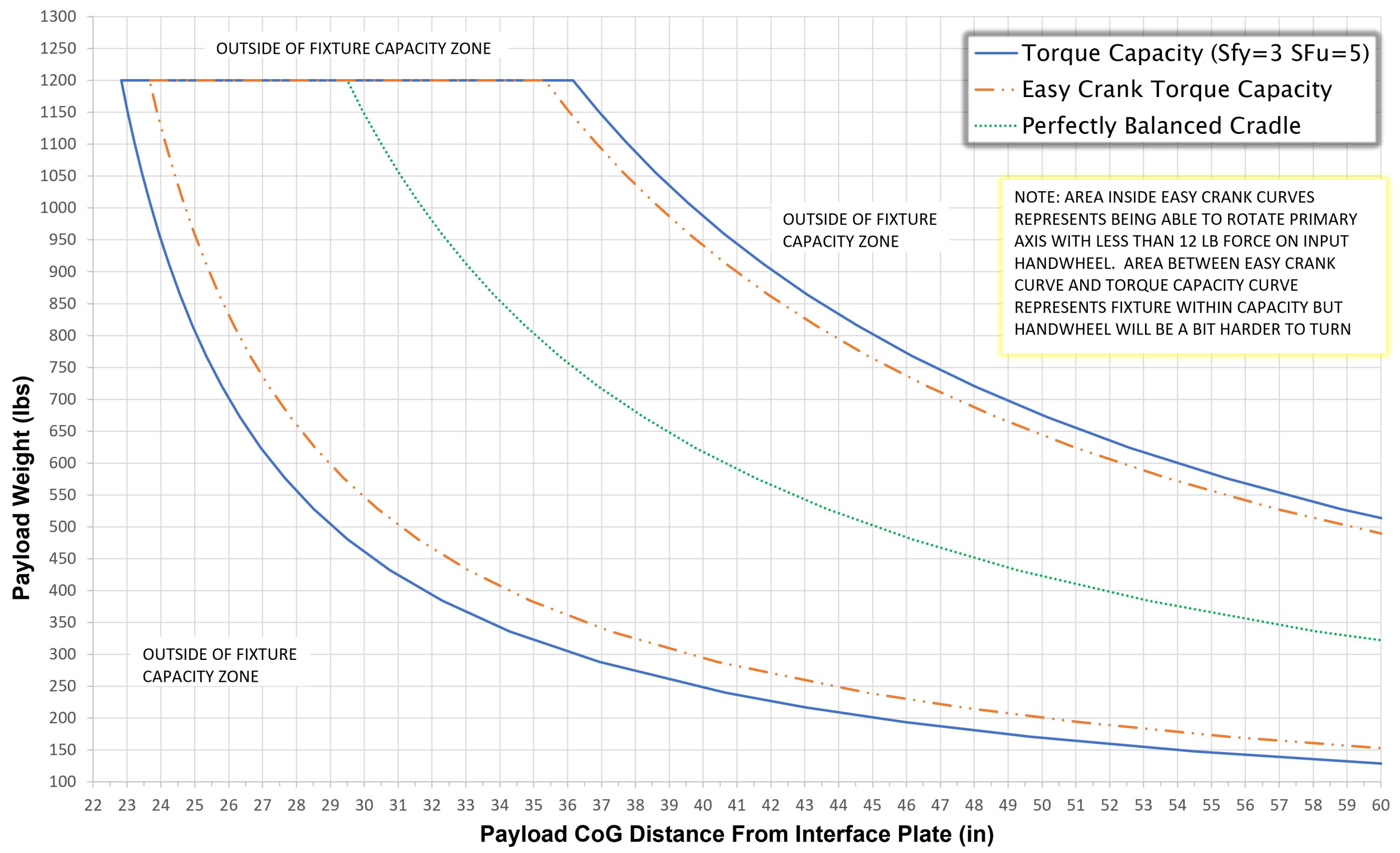
		SHEET 5 OF 9

CTL-60 With Secondary Axis or Rotation Dynamic Loading For Cradle **Bolt Position 1**

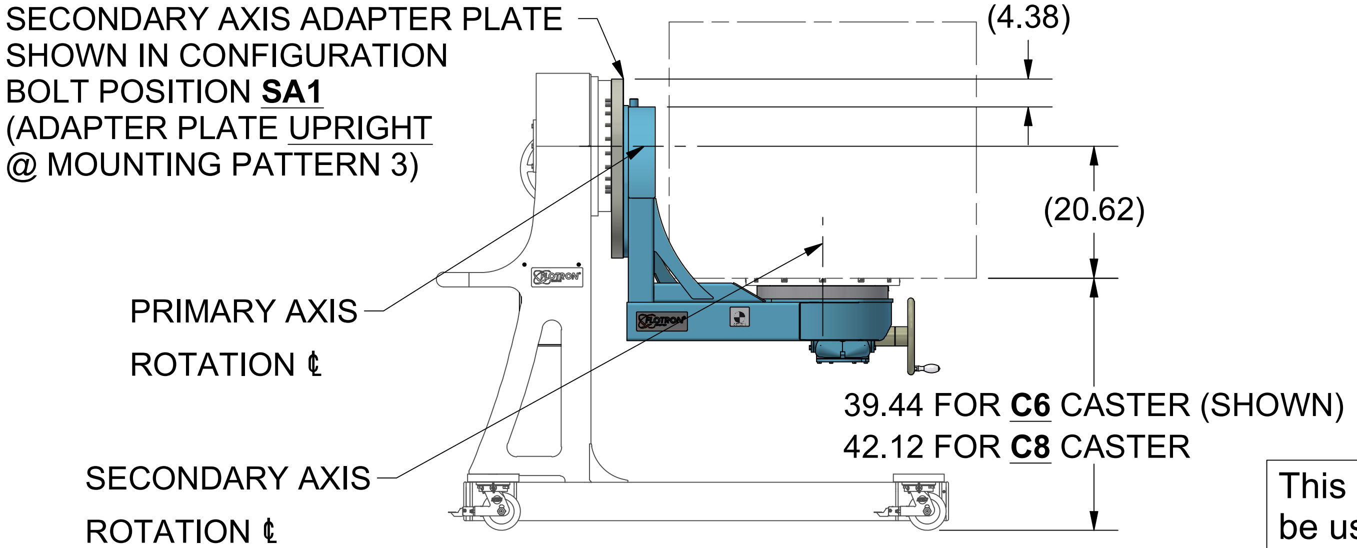


NOTE: AREA INSIDE EASY CRANK CURVES REPRESENTS BEING ABLE TO ROTATE PRIMARY AXIS WITH LESS THAN 12 LB FORCE ON INPUT HANDWHEEL. AREA BETWEEN EASY CRANK CURVE AND TORQUE CAPACITY CURVE REPRESENTS FIXTURE WITHIN CAPACITY BUT HANDWHEEL WILL

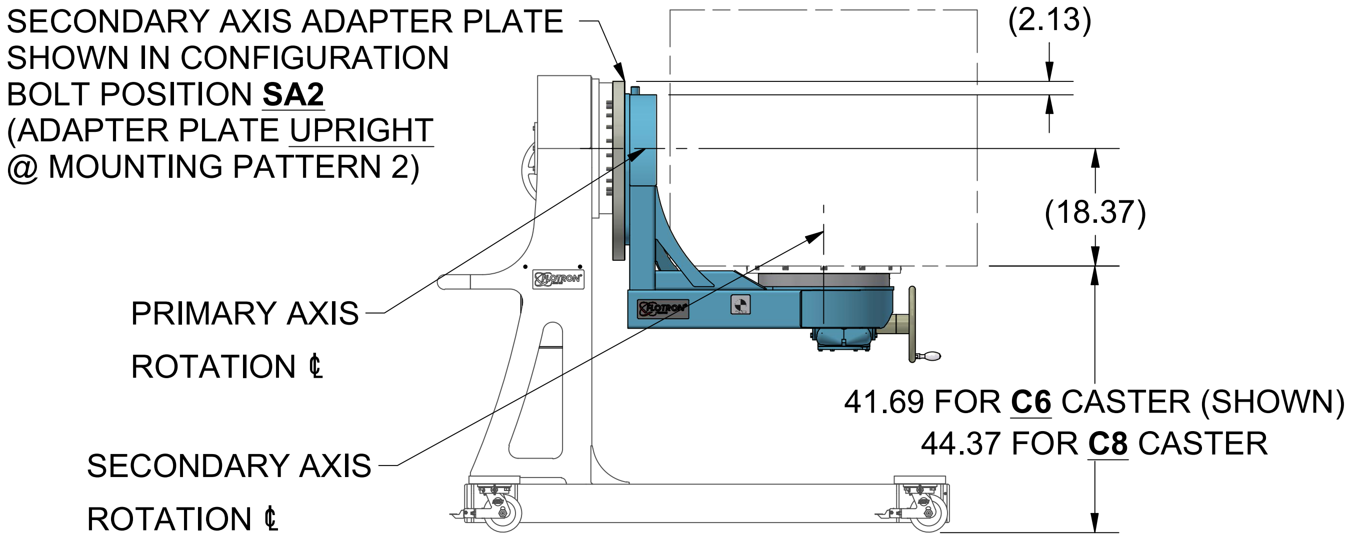
CTL-60 With Secondary Axis or Rotaion Dynamic Loading For Cradle **Bolt Position 2**



NOTE: AREA INSIDE EASY CRANK CURVES REPRESENTS BEING ABLE TO ROTATE PRIMARY AXIS WITH LESS THAN 12 LB FORCE ON INPUT HANDWHEEL. AREA BETWEEN EASY CRANK CURVE AND TORQUE CAPACITY CURVE REPRESENTS FIXTURE WITHIN CAPACITY BUT HANDWHEEL WILL BE A BIT HARDER TO TURN



SA1 SECONDARY AXIS OF ROTATION STRUCTURE



SA2 SECONDARY AXIS OF ROTATION STRUCTURE

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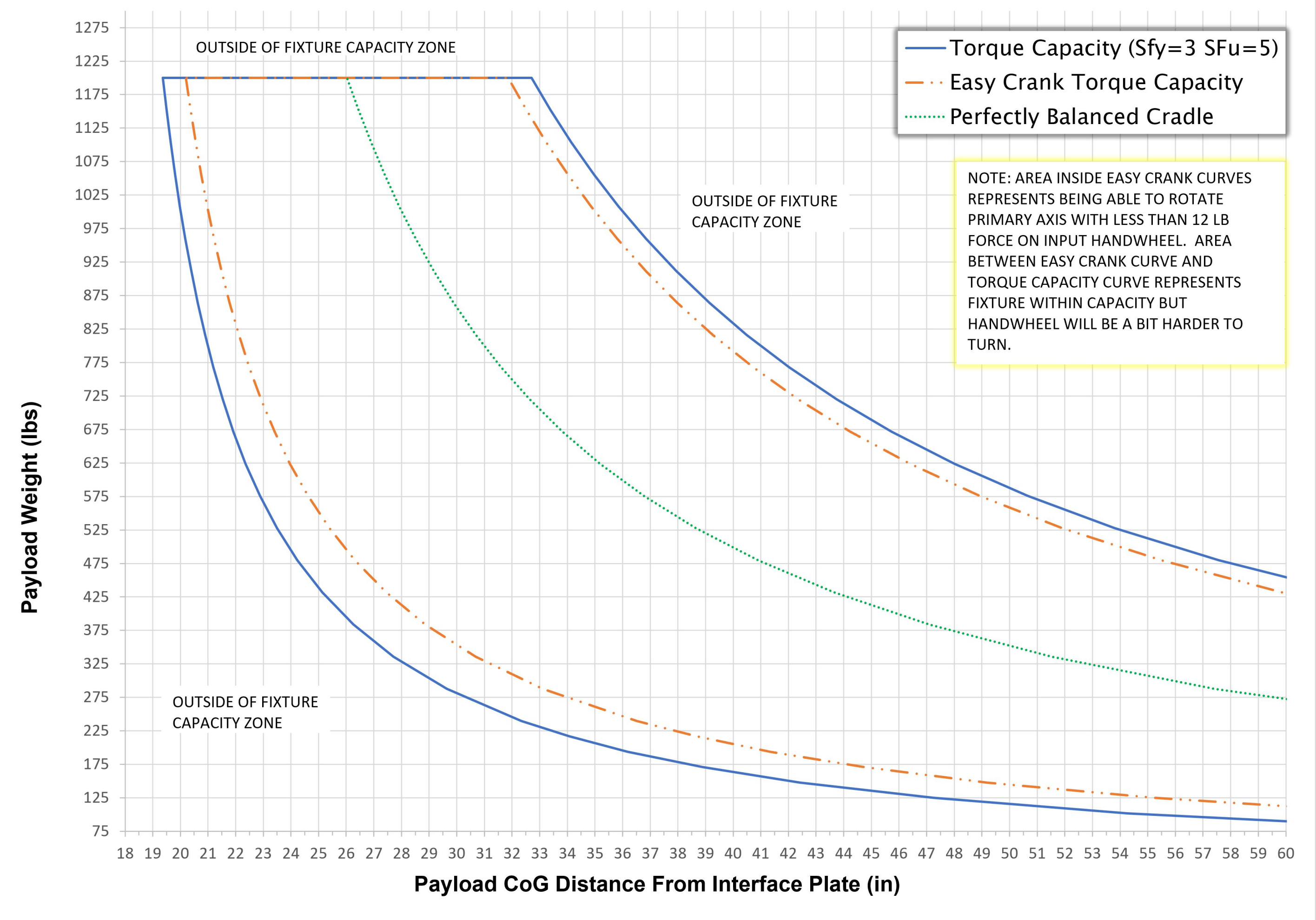
SCALE	SIZE	DRAWING NO.
VARIES	B	8024-000PROP

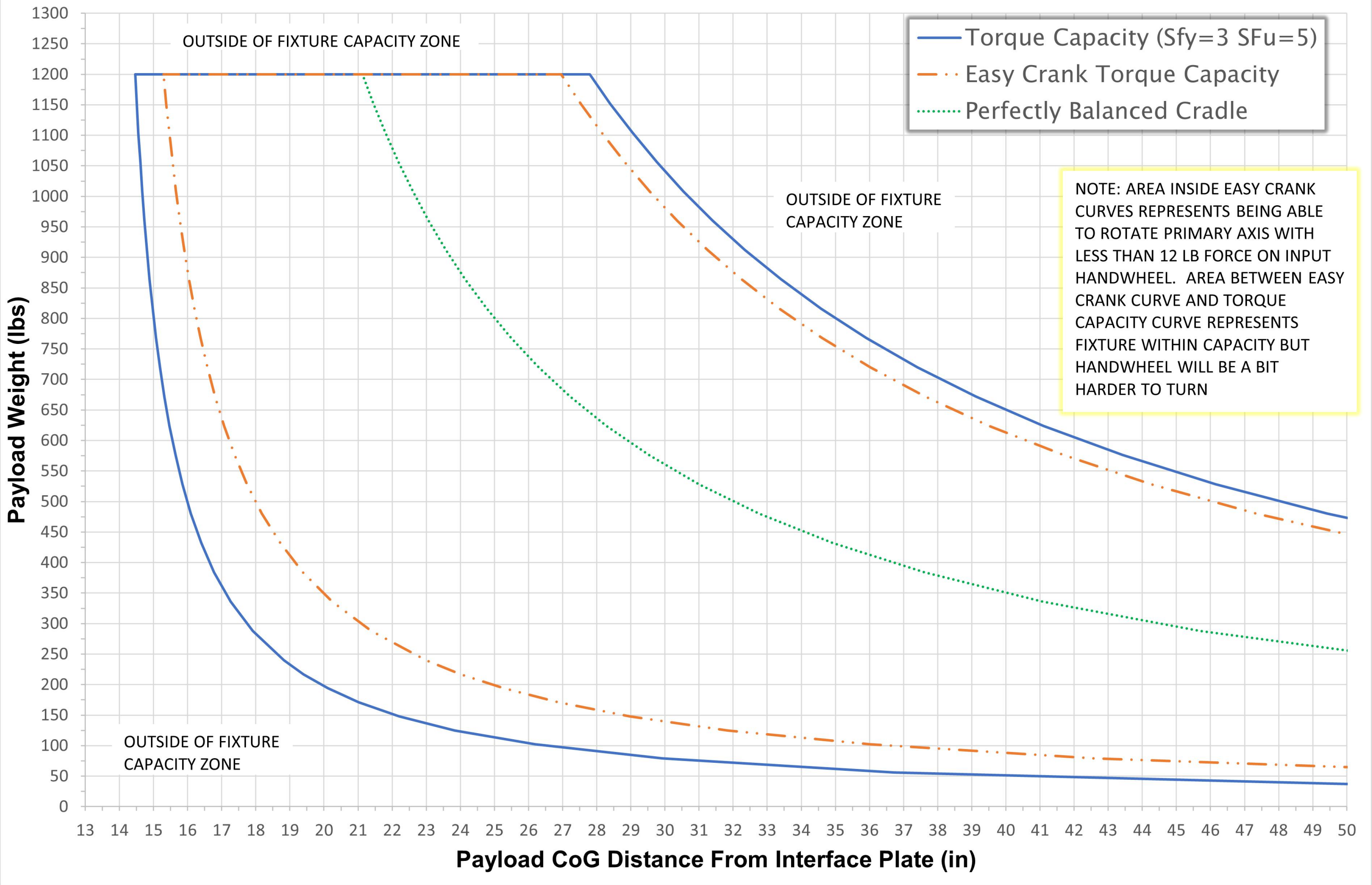
SHEET 6 OF 9

CTL-60 With Secondary Axis or Rotaion Dynamic Loading For Cradle **Bolt Position 3**

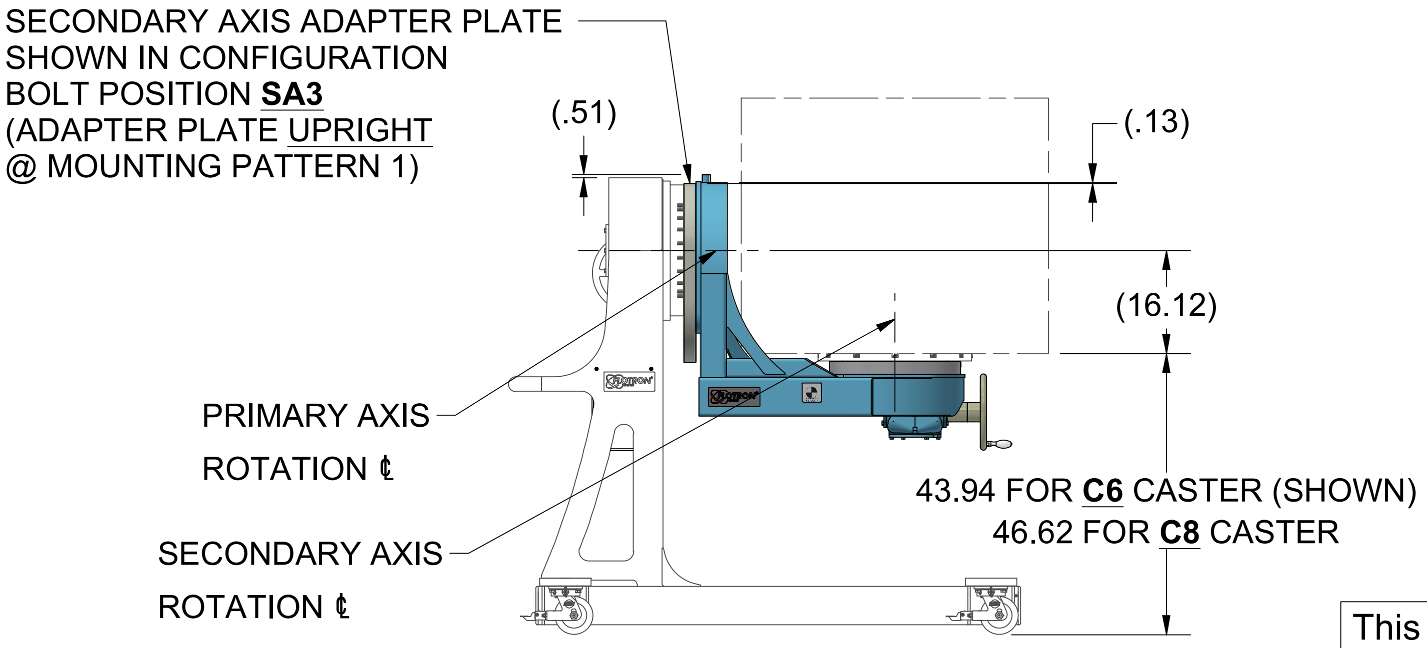


NOTE: AREA INSIDE EASY CRANK CURVES REPRESENTS BEING ABLE TO ROTATE PRIMARY AXIS WITH LESS THAN 12 LB FORCE ON INPUT HANDWHEEL. AREA BETWEEN EASY CRANK CURVE AND TORQUE CAPACITY CURVE REPRESENTS FIXTURE WITHIN CAPACITY BUT HANDWHEEL WILL BE A BIT HARDER TO TURN.

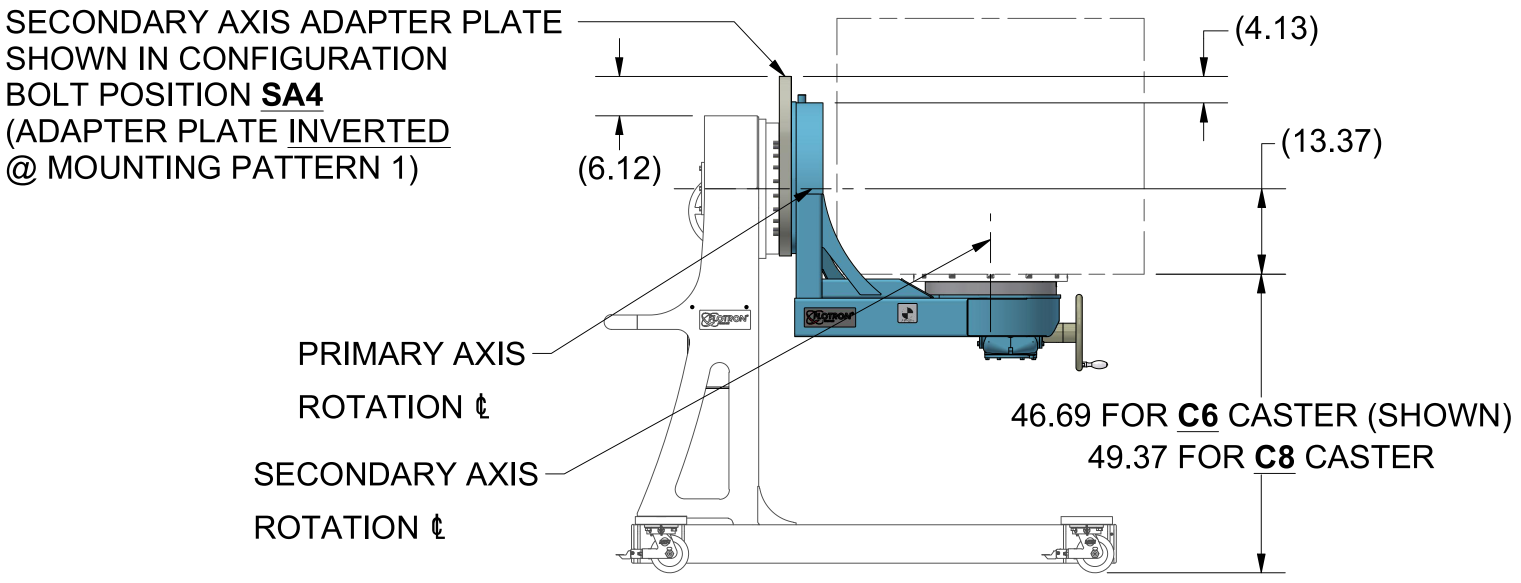
CTL-60 With Secondary Axis or Rotation Dynamic Loading For Cradle **Bolt Position 4**



NOTE: AREA INSIDE EASY CRANK CURVES REPRESENTS BEING ABLE TO ROTATE PRIMARY AXIS WITH LESS THAN 12 LB FORCE ON INPUT HANDWHEEL. AREA BETWEEN EASY CRANK CURVE AND TORQUE CAPACITY CURVE REPRESENTS FIXTURE WITHIN CAPACITY BUT HANDWHEEL WILL BE A BIT HARDER TO TURN



SA3 SECONDARY AXIS OF ROTATION STRUCTURE



SA4 SECONDARY AXIS OF ROTATION STRUCTURE

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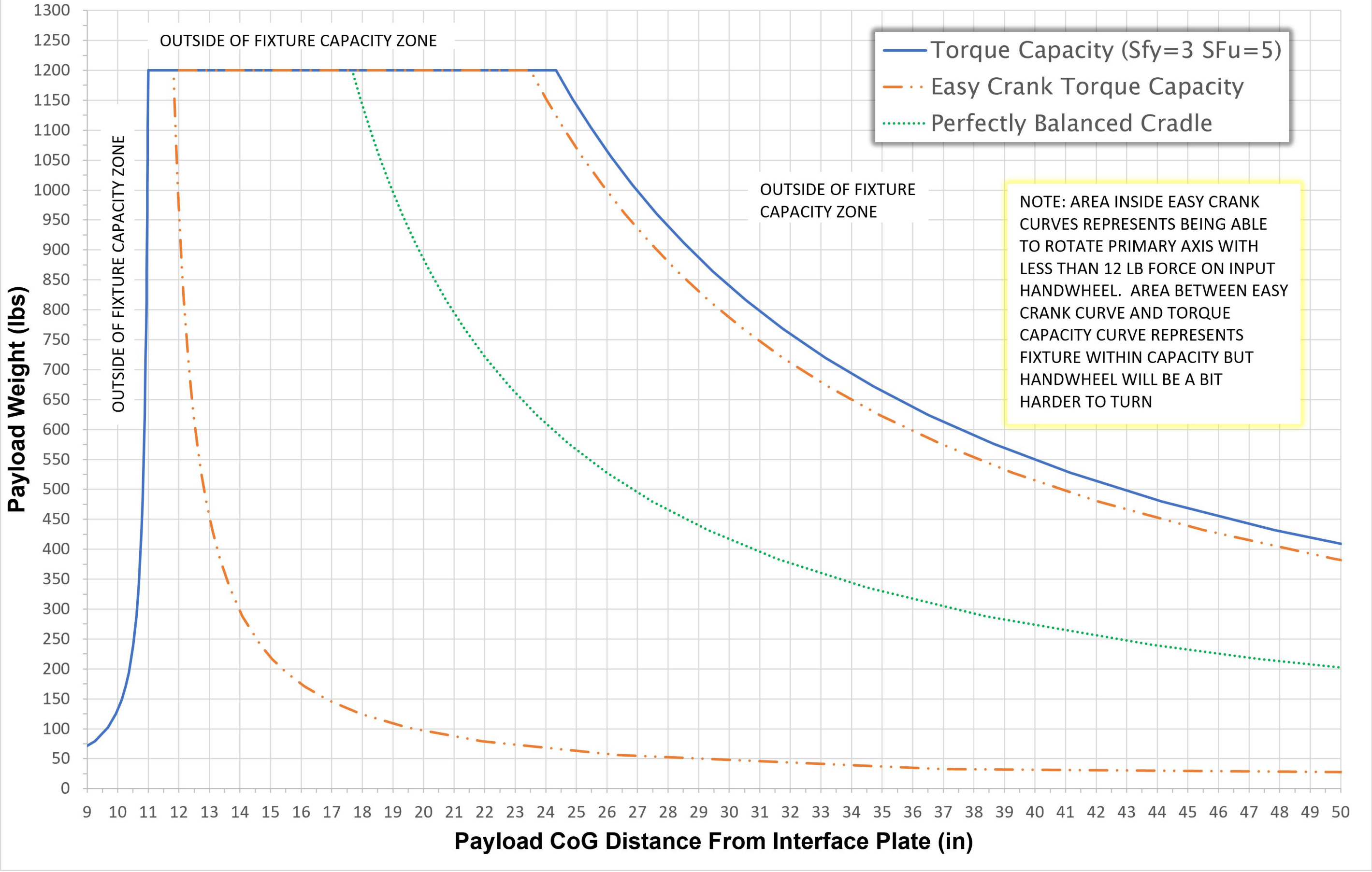
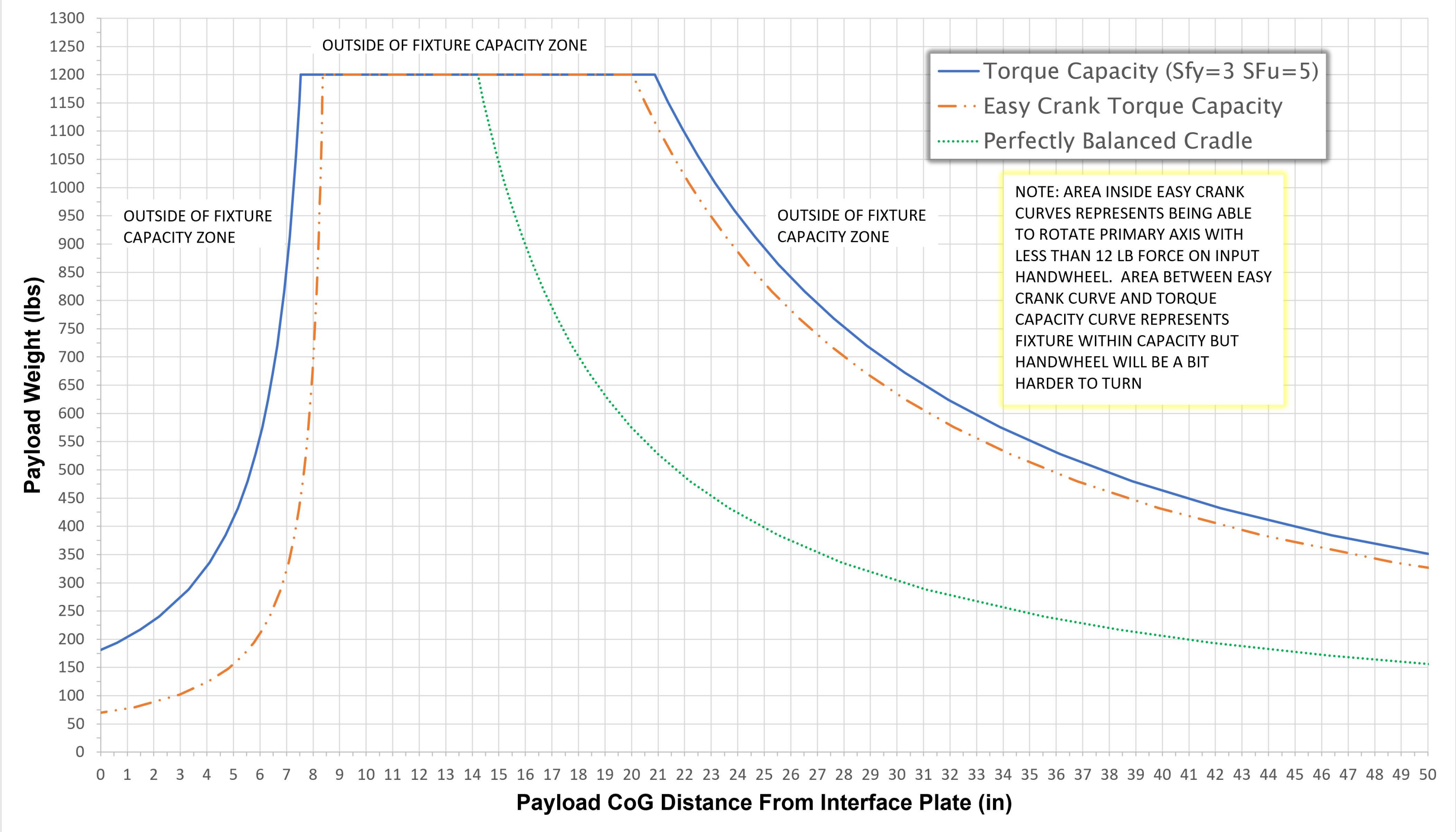
SCALE VARIES
SIZE B
DRAWING NO. 8024-000PROP
SHEET 7 OF 9

CTL-60 With Secondary Axis or Rotation Dynamic Loading For Cradle **Bolt Position 5**

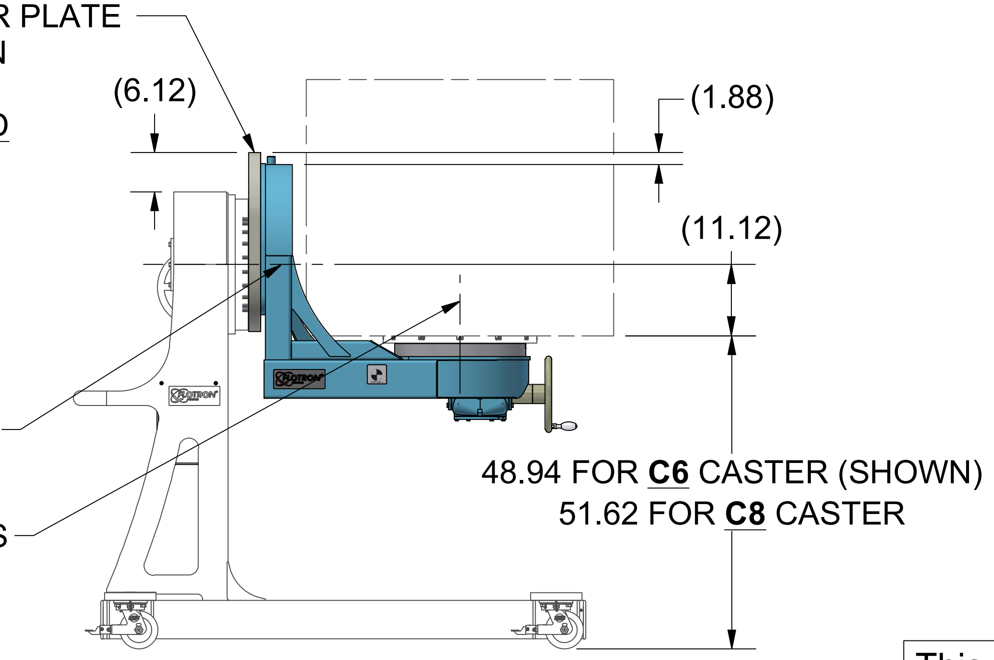


NOTE: AREA INSIDE EASY CRANK CURVES REPRESENTS BEING ABLE TO ROTATE PRIMARY AXIS WITH LESS THAN 12 LB FORCE ON INPUT HANDWHEEL. AREA BETWEEN EASY CRANK CURVE AND TORQUE CAPACITY CURVE REPRESENTS FIXTURE WITHIN CAPACITY BUT HANDWHEEL WILL BE A BIT HARDER TO TURN

CTL-60 With Secondary Axis or Rotation Dynamic Loading For Cradle **Bolt Position 6**



NOTE: AREA INSIDE EASY CRANK CURVES REPRESENTS BEING ABLE TO ROTATE PRIMARY AXIS WITH LESS THAN 12 LB FORCE ON INPUT HANDWHEEL. AREA BETWEEN EASY CRANK CURVE AND TORQUE CAPACITY CURVE REPRESENTS FIXTURE WITHIN CAPACITY BUT HANDWHEEL WILL BE A BIT HARDER TO TURN

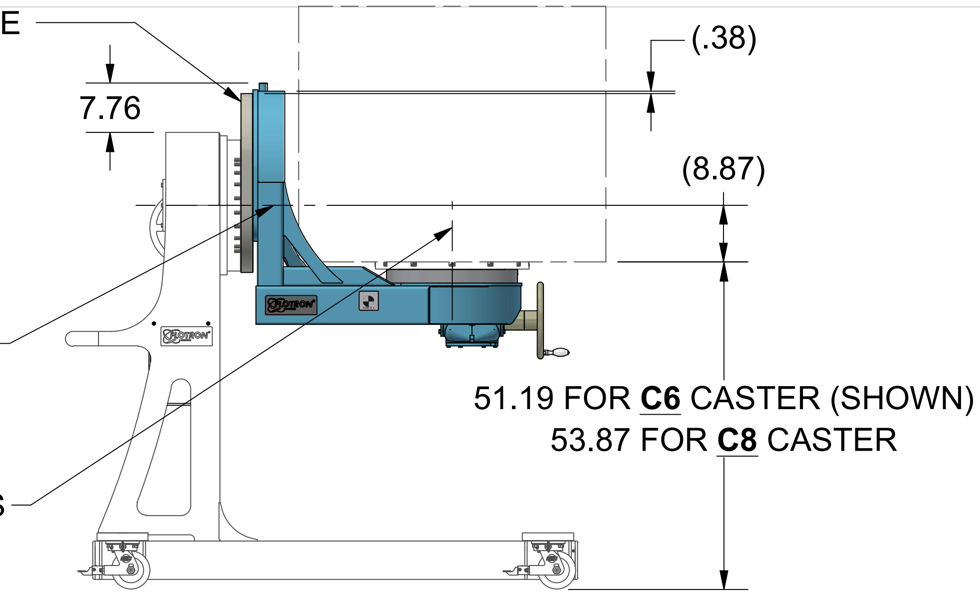


SECONDARY AXIS ADAPTER PLATE
SHOWN IN CONFIGURATION
BOLT POSITION **SA5**
(ADAPTER PLATE INVERTED
@ MOUNTING PATTERN 2)

PRIMARY AXIS
ROTATION ℄

SECONDARY AXIS
ROTATION ℄

SA5 SECONDARY AXIS OF ROTATION STRUCTURE



SECONDARY AXIS ADAPTER PLATE
SHOWN IN CONFIGURATION
BOLT POSITION **SA6**
(ADAPTER PLATE INVERTED
@ MOUNTING PATTERN 3)

PRIMARY AXIS
ROTATION ℄

SECONDARY AXIS
ROTATION ℄

SA6 SECONDARY AXIS OF ROTATION STRUCTURE

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SCALE	SIZE	DRAWING NO.
VARIES	B	8024-000PROP

SHEET 8 OF 9

PLT PROOF LOAD TEST WITH SECONDARY AXIS CRADLE (SA OPTION)

FOR REQUIRED PARTS, SEE ASSEMBLY DRAWING **TBD**

PROOF LOAD REQUIREMENTS:
REQUIRED PROOF LOAD: 2,400 LBS REQUIRED (2X LOAD CAPACITY)
TORQUE PROOF LOAD: 8,000 IN-LBS REQUIRED (1X PRIMARY AND SECONDARY AXIS RATED TORQUE)

CALCULATED PROOF LOAD:
ESTIMATED ACTUAL PROOF LOAD WEIGHT: TBD LBS
ESTIMATED ACTUAL APPLIED PRIMARY AXIS TORQUE: TBD IN-LBS (TBD LB X TBD")
ESTIMATED ACTUAL APPLIED SECOND AXIS TORQUE: TBD IN-LBS (TBD LB X TBD")

PROOF LOAD PROCEDURE WITH SA OPTION (SECONDARY AXIS CRADLE)

1. WEIGH PROOF LOAD AND TAKE A PICTURE OF SCALE WITH LOAD VALUE VISIBLE FOR PROOF LOAD REPORT.
2. INSTALL PROOF LOAD ONTO FIXTURE. TORQUE FASTENERS TO VALUE SHOWN.
3. STOP AS REQUIRED TO REVIEW AND INSPECT ANY UNEXPECTED NOISES OR MOVEMENTS.
4. START TIMER, TAKE A PICTURE OF CLOCK ON FIXTURE, AND HOLD FOR (5) FIVE MINUTES.
   AFTER 5 MINUTES, TAKE A SECOND PICTURE OF CLOCK ON FIXTURE AND VISUALLY INSPECT FOR CRACKS, DEFORMATION, ETC.
5. ROTATE SECONDARY AXIS FULL 360°.
   ROTATE PRIMARY AXIS CRADLE ±90°, HOLD AT EITHER END FOR 5 MINUTES. TAKE PHOTO FOR EACH POSITION.

DELIVERABLE REPORT REQUIRED. IT MUST INCLUDE:
A) A SUMMARY OF THE TEST PROCEDURE
B) A PICTURE OF THE ACTUAL MEASURED WEIGHT OF PROOF LOAD ON SCALE. WEIGHT MUST BE EQUAL TO OR HIGHER THAN REQUIRED WEIGHT.
C) PICTURE OF TIMER WITH PROOF LOAD THAT SHOWS 5 MINUTES OR LONGER FOR EACH TEST.
D) VISUAL INSPECTION RESULTS

PLT PROOF LOAD TEST FOR PRIMARY AXIS (NO SA OPTION)

FOR REQUIRED PARTS, SEE ASSEMBLY DRAWING **TBD**

PROOF LOAD REQUIREMENTS:
REQUIRED PROOF LOAD: 4,400 LBS REQUIRED (2X LOAD CAPACITY)
TORQUE PROOF LOAD: 8,000 IN-LBS REQUIRED (1X PRIMARY AXIS RATED TORQUE)

CALCULATED PROOF LOAD:
ESTIMATED ACTUAL PROOF LOAD WEIGHT: TBD LBS
ESTIMATED ACTUAL APPLIED PRIMARY AXIS TORQUE: TBD IN-LBS (TBD LB X TBD")
ESTIMATED ACTUAL APPLIED SECOND AXIS TORQUE: TBD IN-LBS (TBD LB X TBD")

PROOF LOAD PROCEDURE FOR PRIMARY AXIS (NO SA OPTION)

1. WEIGH PROOF LOAD AND TAKE A PICTURE OF SCALE WITH LOAD VALUE VISIBLE FOR PROOF LOAD REPORT.
2. INSTALL PROOF LOAD ONTO FIXTURE. TORQUE FASTENERS TO VALUE SHOWN.
3. STOP AS REQUIRED TO REVIEW AND INSPECT ANY UNEXPECTED NOISES OR MOVEMENTS.
4. START TIMER, TAKE A PICTURE OF CLOCK ON FIXTURE, AND HOLD FOR (5) FIVE MINUTES.
   AFTER 5 MINUTES, TAKE A SECOND PICTURE OF CLOCK ON FIXTURE AND VISUALLY INSPECT FOR CRACKS, DEFORMATION, ETC.

DELIVERABLE REPORT REQUIRED. IT MUST INCLUDE:
A) A SUMMARY OF THE TEST PROCEDURE
B) A PICTURE OF THE ACTUAL MEASURED WEIGHT OF PROOF LOAD ON SCALE. WEIGHT MUST BE EQUAL TO OR HIGHER THAN REQUIRED WEIGHT.
C) PICTURE OF TIMER WITH PROOF LOAD THAT SHOWS 5 MINUTES OR LONGER FOR EACH TEST.
D) VISUAL INSPECTION RESULTS

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SCALE	SIZE	DRAWING NO.	SHEET
VARIES	B	8024-000PROP	9 OF 9