Durham Geo-Enterprises, Inc.
2175 West Park Court, Stone Mountain, GA 30087
770-465-7557, 1-800-837-0864, FAX: 770-465-7447

Durham Geo-Enterprises Inc.

S-600
Triaxial Load Frame

Operator's Manual

All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. We reserve the right to make changes at any time without notice and without incurring any obligation.

CONTENTS

INTRODUCTION

You have just purchased a Durham Geo Enterprises, Inc. S-600 Load Frame. This frame has been designed for a wide range of needs in the soils laboratory, including performing measurements of soil bearing strengths (CBR and LBR) and Triaxial Compressive testing.

The S-600 Load Frame has a built in micro-processor based control board capable of providing consistent load rates between the speeds of .0001"/min and .200"/min up to a maximum load of 10,000 lbs.

The S-600 Load Frame has been assembled by Durham Geo Enterprises, Inc. with the highest quality standards in mind. However, occasionally circumstances beyond our control may result in damage during packing or shipping. Please inspect all packages received and note any missing or damaged parts as soon as possible. If you find any problems, please contact Durham Geo Enterprises, Inc. immediately.

General Specifications

Load control:	Micro-processor based solid state electronic controller
Speed range:	From 0.0001" per minute to 0.2" per minute.
Bottom platen:	6.25" dia. (made in such a way to receive different adaptors.)
Platen travel:	3" maximum
Distance between columns:	11-3/4"
Daylight (without load measurements device):	35"
Strain measurement:	Optional: clockwise or counterclockwise dial indicators. Electronic LDT or digital dial indicators. (see separate manual)
Load measurement:	Optional: proving ring or load cell with digital transducer readout (see separate manual).
Overall dimensions:	19" W x 15" D x 35" H
Weight:	160 pounds (approximately)

SET UP PROCEDURES FOR THE TRIAXIAL LOAD FRAME

CAUTION:DO NOT plug the unit into 120V AC until instructed to do so

1. Remove the S-600 and accessories from the packing crate. Check the contents you have received against the enclosed packing slip. Check all components for shipping damage and/or shortages, notify Durham Geo Enterprises, Inc. immediately if damages or shortages are found.

2. Place the Load Frame on a sturdy, level surface. It is important that the machine be as level as possible.

3. Using a bubble level, verify that the cross head is parallel with the bottom platen.

4. Plug the black power cord (female plug) into the back of the controller unit. This cord extends from the back of the load frame. The cord will not have power unless the load frames is on.

5. Plug the gray signal cable into the back of the controller unit. This cord also extends from the back of the load frame. Next, secure the connector to the controller by screwing the 2 screws into the self contained nuts on the controller unit.

6. Place the on/off button on the front panel in the off position. This is when the red inner piece is flush on top with the gray base of the switch (button is extended out). Plug the black power cord (male plug) into the 120V AC outlet. This cord extends from the back of the load frame.

7. After all connections are securely fastened and with no load present on the platen, push the on/off button to the "on" position (red inner piece is down inside the gray base). This applies power to the load frame and the controller box.

Note: The motor will run for approximately 2 to 5 seconds on power up. On a cold power up (the first time power is on after a 6-12 hour off period). the display may take 5 to 10 seconds to appear.

8. Two switched auxiliary outlets have been placed in the rear of the load frame for your use and convenience. (DO NOT exceed 1A of total current in the two outlets). Excessive loading may cause damage to the load frame and/or blow the fuse.

SAFETY FEATURES

Limit Switches:
If either the upper or lower limit of platen travel is reached, the display will show the current position, the limit switch reached (upper or lower), and the phrase 'PRESS F6 TO ACKNOWLEDGE (upper or lower) LIMIT". This will notify you that a limit has been reached and that the test that was running will not be completed.

After pressing F^, the display will return to the original display awaiting another command. Keys F1, F4 and F5 will move the platen away from the limit switch. The F2 key will not function until after the platen has moved away from the limit switch.

NOTE: The limit switches were installed as a safety feature to prevent over travel. Use the HOME key to return the platen back to its original starting position rather than using the limit switches.

Fuses:
The load frame is fused at the power cord. If the fuse is blown, replace it with a 250V 6A, slow blow fuse.

Auxiliary Outlets:

Two switched auxiliary outlets have been placed in the rear of the load frame for your use and convenience. DO NOT exceed 1A of total current in the two outlets. Excessive loading may cause damage to the load frame and/or blow the fuse.

OPERATING COMMANDS

MOVE (F1)
All movement is referenced from the position indicated on the first line of the controller display (actual position: = +X.XXXX inches). The indicated position does not necessarily reflect the current position of the platen in reference to the upper and lower limits.

Example: If the indicated position on the display is 0.0000, the platen could be up 1 inch from the lower limit, leaving a maximum of approximately 2 inches of upward movement. Indicated positions range from -3 inches to 3 inches.

1. Press F1:
   Press the move key (F1 in the upper left hand corner). The display will then move to the third line awaiting the commanded position.

2. ENTER THE COMMANDED POSITION, PRESS ENTER:
   The third line will have 1.0000 or the last commanded position displayed. Press enter to accept the present position displayed or enter the desired position. If you press the wrong key (s), use the DEL key to remove the last entered digit(s). After entering the correct amount, press the ENTER key at the bottom right hand corner. Possible positions range from -3.0000 to 3.0000.

3. ENTER THE COMMANDED VELOCITY, PRESS ENTER:
   The fourth line will have 0.0001 or the last commanded velocity displayed. Press enter to accept the present velocity displayed or enter the desired velocity. If you press the wrong key(s), use the DEL key to remove the last entered digit(s). After entering the correct amount, press the ENTER key at the bottom right hand corner. The velocity ranges from 0.0001 to 0.2000.

4. PRESS F5 OR F6:
   Finally, press F5 or F6. The continue key, F5 (CONT) will start to perform the move at the rate and distance previously entered. The stop key F6 (STOP) will prevent any movement of the platen and will cause the screen to go back to the original screen. F6 is necessary of you made an error in the rate or distance entered.

NOTE: The F1 Key (CLSC) will clear the screen and rewrite the previous contents back onto the screen. This key should only be used if the display becomes scrambled.

HOME (F2):

1. PRESS F2:
   This key will move the platen back to its original starting position. If the indicated position is positive, the platen will move downward until the indicated position is 0.0000. If the indicated position is negative, the platen will move upward until the indicated position is 0.0000. As the platen approaches 0.0010, the load frame will slow down and take 3 to 10 seconds to complete its travel.

Maximum travel speed is .2 inches per minute. 3 inches of travel will take approximately 15 minutes.

ZERO (F3)

1. PRESS F3:
   This key will force the indicated position display to 0.0000, regardless of the platen position. This position will be the new origin for the platen. Upon pressing F3, the display will show "RESETTING COUNTER AND MOTOR DRIFT". Once the internal counter has been reset, the display will return to the original display.

F-UP (F4)

1. PRESS F4:
   This is the fast up key. This key will move the platen upward until the upper limit switch is reached or until the STOP key (F6) is pressed. Maximum travel speed is .2 inches per minute. Maximum travel distance is 3 inches.

F-DN (F5)

1. PRESS F5:
   This is the fast down key. This key will move the platen downward until the lower limit switch is reached or until the STOP key (F6) is pressed. Maximum travel speed is .2 inches per minute. Maximum travel distance is 3 inches.

STOP (F6)

1. PRESS F6:
   This key will stop the chosen command and return back to the original starting screen.

MACHINE MAINTENANCE

Due to the nature if the test performed on this machine, proper lubrication is essential for the long term life of the load frame. We recommend weekly lubrication of the spindle with a medium weight gearlube. This is accomplished by removing the socket head in the center of the platen and dripping 2 or 3 drops of oil into the spindle assembly. REMEMBER to always have the socket head screw in place when testing. This prevents water from dripping into the spindle assembly and destroying the bearings. We also recommend weekly lubrication of the chain and sprocket with a chain oil. The best way to enjoy a trouble-free machine is to keep it relatively dry, clean and lubricated. Following these guidelines should result in years of trouble-free testing.

Your comments and observations on this manual and its associated machinery are welcome. Please call us with any corrections or improvements you feel would improve the quality of this product. Your feedback as the end user of the device is important to our business. If you experience any problems, please contact us at:

Durham Geo Enterprises, Inc
Stone Mountain, GA
1-800-837-0864 or 770-465-7557

TROUBLE SHOOTING TIPS

TOTAL POWER FAILURE:
Total power failure has occurred if the power light on the front panel is off and the controller display is not active.

1. Check the connections to see if they are fastened tightly.
2. Check the fuse located in the rear of the load frame. If the fuse is blown, replace it with a 250V, 6A, slow blow fuse.

CAUTION: NEVER touch exposed wire or remove the fuse without unplugging the load frame from the outlet.

POWER FAILURE IN THE CONTROLLER:
Power failure has occurred in the controller when the screen is totally blank.

1. Check the power cord plug at the back of the controller for a good connection. Apply power.
2. Check the fuse inside the controller box.

NOTE: Be sure to check the warranty restrictions before removing any screws or covers.

CONTROLLER OPERATING IMPROPERLY:
On power up, the controller display does not come up into the starting display.

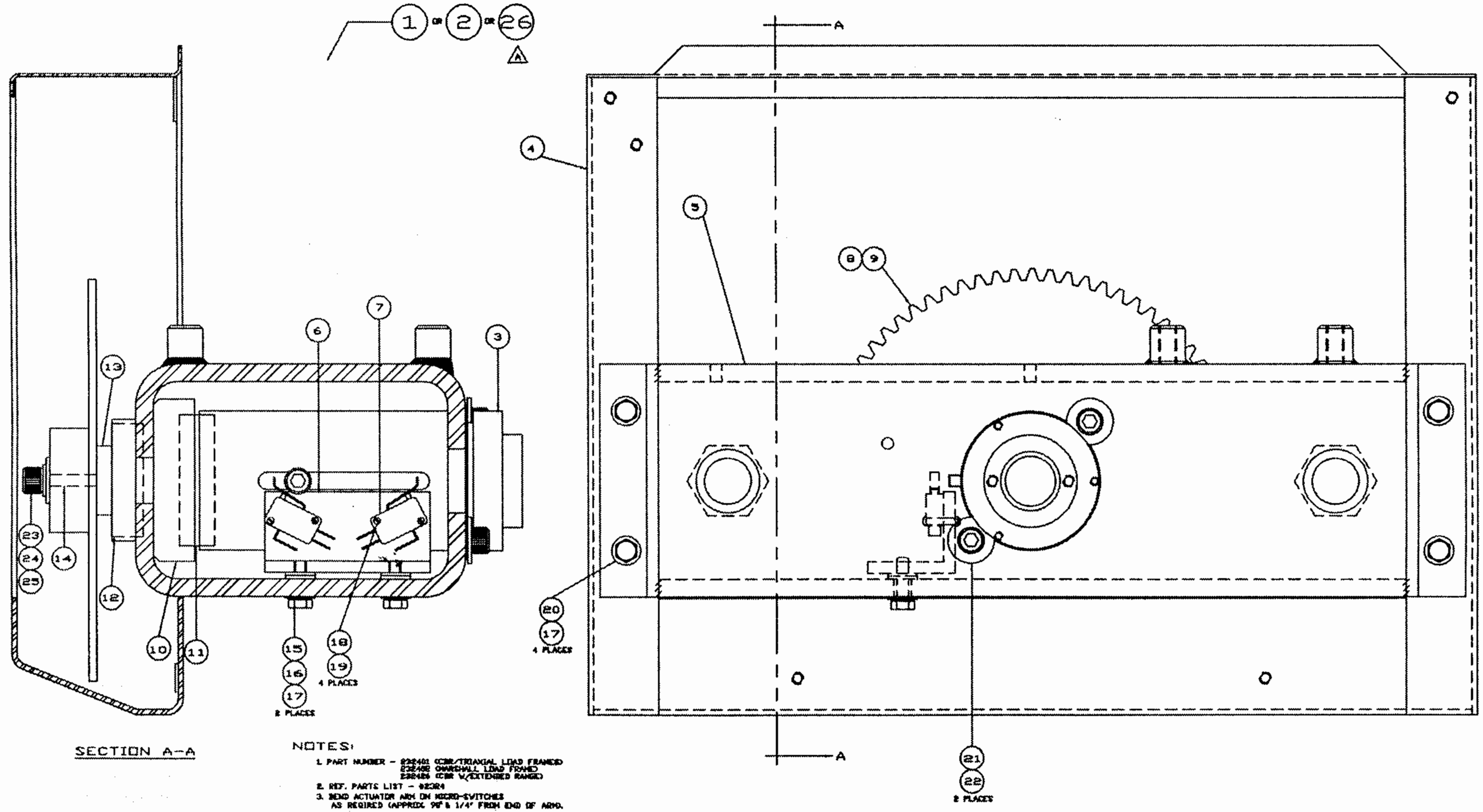
1. The controller display shows a few blue lines, but is not running the program. First try turning the load frame off then back on. If this does not fix the display, return the controller for service.
2. The controller display shows: RUN LIST REMOT CONT AUTO EDIT: at the bottom of the screen. First press the (F1 key). This should start the basic program at the start and display the starting display. If this does not work, return the controller for service.

STARTING (POWER UP) DISPLAY

Actual Position:	0.0000 inches
Commanded Position:	inches
Commanded Velocity:	inches/min

Press a function key for selection

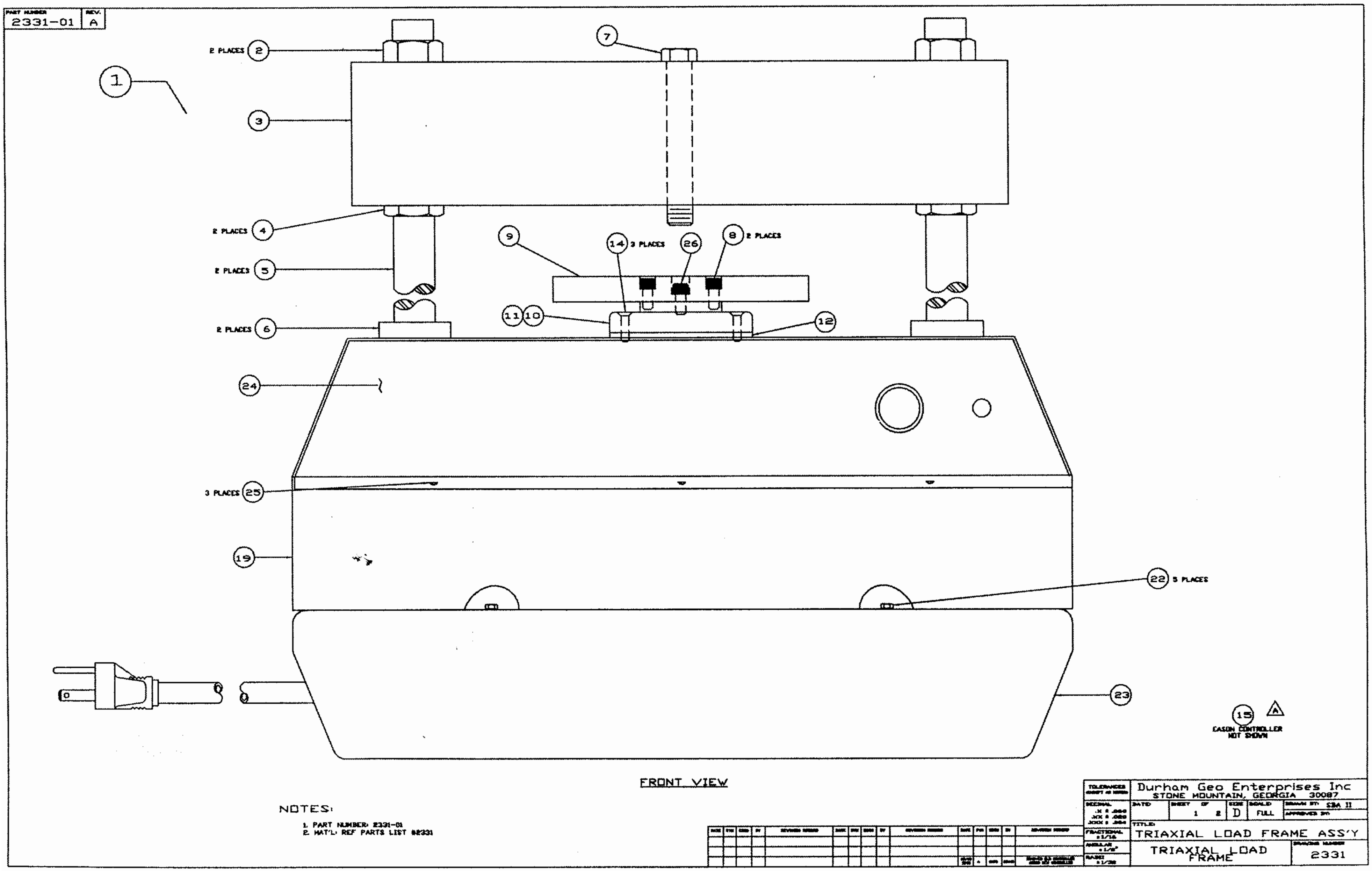
MOVE	HOME	ZERO	F-UP	F-DN	STOP
F1	F2	F3	F4	F5	F6



NOTES:

1. PART NUMBER – 232401 (CBR/TRIAXIAL LOAD FRAMES)
   232402 (MARSHALL LOAD FRAME)
   232406 (CBR W/EXTENDED RANGE)
2. REF. PARTS LIST – #2324
3. BEND ACTUATOR ARM ON MICRO-SWITCHES AS REQUIRED (APPROX. 90° & 1/4" FROM END OF ARM.

Durham Geo Enterprises Inc. STONE MOUNTAIN, GEORGIA 30087	
SHEET 1 OF 1	SIZE D
SCALE FULL	
TITLE	MECHANICAL DRIVE ASS'Y
MARSHALL/CBR/ TRIAXIAL	DRAWING NUMBER 2324


PART NUMBER 2331-01
REV. A
1
2 PLACES 2
3
2 PLACES 4
2 PLACES 5
2 PLACES 6
7
9
14 3 PLACES
26
8 2 PLACES
11 10
12
24
3 PLACES 25
19
22 5 PLACES
23
15 EASON CONTROLLER NOT SHOWN
FRONT VIEW
NOTES:
1. PART NUMBER: 2331-01
2. MAT'L: REF PARTS LIST #2331
Durham Geo Enterprises Inc
STONE MOUNTAIN, GEORGIA 30087
SHEET 1 OF 2
SIZE D
SCALE FULL
TITLE: TRIAXIAL LOAD FRAME ASS'Y
TRIAXIAL LOAD FRAME
2331

ITEM	QTY	QTY	QTY	QTY	PART NUMBER	DESCRIPTION	SUPPLIER / MANUFACTURER
1	X				2331-01	TRIAXIAL ASS'Y	
2	2				1577-02	1 1/4" ACME WHOLE NUT	
3	1				1574-01	UPPER CROSS BEAM ASS'Y	
4	2				1577-03	1 1/4" ACME HALF NUT	
5	2				1948-01	STRAIN ROD, TRIAXIAL	
6	2				1951-01	DUST COVER, STRAIN ROD, TRIAXIAL LOAD FRAME	
7	1					3/4" - 16 X 4" LONG PLTD HEX HEAD CAP SCREW	
8	2					1/4" - 20 X 3/4" LONG S.S. SOCKET HEAD CAP SCREW	
9	1				1571-01	PLATEN	
10	1				1578-01	PISTON SEAL COVER	
11	1				2331-11	WIPER SEAL, 2" ID X 2 1/2" OD	
12	1				1829-01	NEOPRENE GASKET	

QUANTITY FOR PART NO. 2331-01

Durham Geo Enterprises Inc.
2175 WEST PARK COURT
STONE MOUNTAIN, GEORGIA 30087

PROJECT	TRIAXIAL LOAD FRAME				TITLE	TRIAXIAL ASSEMBLY
REVISION	A	B				
DATE						
DATE					SHEET 1 OF 3	DRAWING NO. 2331

ITEM	QTY	QTY	QTY	QTY	PART NUMBER	DESCRIPTION	SUPPLIER / MANUFACTURER
13	1				2153-108	CONNECTOR, FEMALE, 3-PIN	
14	3					10 - 24 X 5/8" LONG FLAT HEAD CAP SCREW	
15	1				2577-01	EASON CONTROLLER ASS'Y	
16	1				2153-111	CONNECTOR, FEMALE, 9-PIN	
17	1				2153-112	CONNECTOR, MALE, 9-PIN	
18	11				2153-110	PIN, FEMALE, 20 - 14 AWG	
19	1				1600-01	COVER	
20	1				1814-01	REAR COVER PANEL	
21	5					1/2" LONG #8 SHEET METAL SCREW	
22	5					1/4" - 20 X 1/2" LONG HEX HEAD CAP SCREW	
23	1				2328-01	TRIAXIAL SUB ASS'Y	
24	1				2332-01	FRONT PANEL ASS'Y, TRIAXIAL	

QUANTITY FOR PART NO. 2331-01

Durham Geo Enterprises Inc.
2175 WEST PARK COURT
STONE MOUNTAIN, GEORGIA 30087

PROJECT	TRIAXIAL LOAD FRAME				TITLE	TRIAXIAL ASSEMBLY
REVISION	A	B				
DATE						
DATE					SHEET 2 OF 3	DRAWING NO. 2331

ITEM	QTY	QTY	QTY	QTY	PART NUMBER	DESCRIPTION	SUPPLIER / MANUFACTURER
25	3					10 - 24 X 3/8" LONG BUTTON HEAD CAP SCREW	
26	1					1/4" - 20 X 1/2" LONG S.S. SOCKET HEAD CAP SCREW	
27	REF				2246-01	WIRING DIAGRAM, TRIAXIAL LOAD FRAME	
28	1					3 PIN MOLEX CONN, FEMALE	
29	1					9 PIN MOLEX CONN, FEMALE	
30	1					3 PIN MOLEX CONN, MALE	
31	1					9 PIN MOLEX CONN, MALE	
32	11					PINS, MOLEX MALE	
33	11					PINS, MOLEX FEMALE	
34							
35							
36							
QUANTITY FOR PART NO.	2331-01						

Durham Geo Enterprises Inc.
2175 WEST PARK COURT
STONE MOUNTAIN, GEORGIA 30087

PROJECT	TRIAXIAL LOAD FRAME			
REVISION	A	B		
DATE				
DATE				

TITLE: TRIAXIAL ASSEMBLY

SHEET 3 OF 3

DRAWING NO. 2331

ITEM	QTY	QTY	QTY	QTY	PART NUMBER	DESCRIPTION	SUPPLIER / MANUFACTURER
1	-	1	-		232401	MECHANICAL DRIVE ASS'Y (CBR & TRIAXIAL)	
2	1	-	-		232402	MECHANICAL DRIVE ASS'Y (MARSHALL)	
3	1	1	1		232001	FEED SCREW ASS'Y	
4	1	1	1		159901	SUB-FRAME	
5	1	1	1		180201	LOWER BEAM WELDMENT ASSEMBLY	
6	1	1	1		158601	LIMIT SWITCH BRACKET	
7	2	2	2		2153046	LIMIT SWITCH	
8	1	-	1		159504	70 TOOTH DRIVEN SPROCKET	
9	-	1	-		159502	54 TOOTH DRIVEN SPROCKET	
10	1	1	1		156801	BEARING THRUST HOUSING	
11	1	1	1		159813	UPPER BEARING	
12	1	1	1		159814	LOWER BEARING	

QUANTITY FOR PART NO.	232401	232402	232426

Durham Geo Enterprises Inc.
2175 WEST PARK COURT
STONE MOUNTAIN, GEORGIA 30087

PROJECT	MARSHALL/CBR/ TRIAXIAL	TITLE	MECHANICAL DRIVE ASS'Y
REVISION	A		
DATE	04/09/98		
DATE		SHEET 1 OF 3	DRAWING NO. 2324

ITEM	QTY	QTY	QTY	QTY	PART NUMBER	DESCRIPTION	SUPPLIER / MANUFACTURER
13	1	1	1		157901	LOWER BEARING SPACER	
14	1	1	1			KEY, .25" X .25" X 1" LONG	
15	2	2	2			1/4" - 20 X 7/8" LONG HEX HEAD CAP SCREW	
16	2	2	2			1/4" LOCK WASHER	
17	8	8	8			1/4" FLAT WASHER	
18	4	4	4			#4 - 40 X 3/4" LONG BUTTON HEAD CAP SCREW	
19	4	4	4			#4 - 40 HEX NUT	
20	4	4	4			1/4" - 20 X 5/8" LONG HEX HEAD CAP SCREW	
21	2	2	2			3/8" - 16 X 1/2" LONG SOCKET HEAD CAP SCREW	
22	2	2	2			3/8" SERRATED FLAT WASHER	
23	1	1	1			3/8" - 16 X 1" LONG SOCKET HEAD CAP SCREW	
24	1	1	1			3/8" LOCK WASHER	

QUANTITY FOR PART NO.	232401	232402	232426

Durham Geo Enterprises Inc.
2175 WEST PARK COURT
STONE MOUNTAIN, GEORGIA 30087

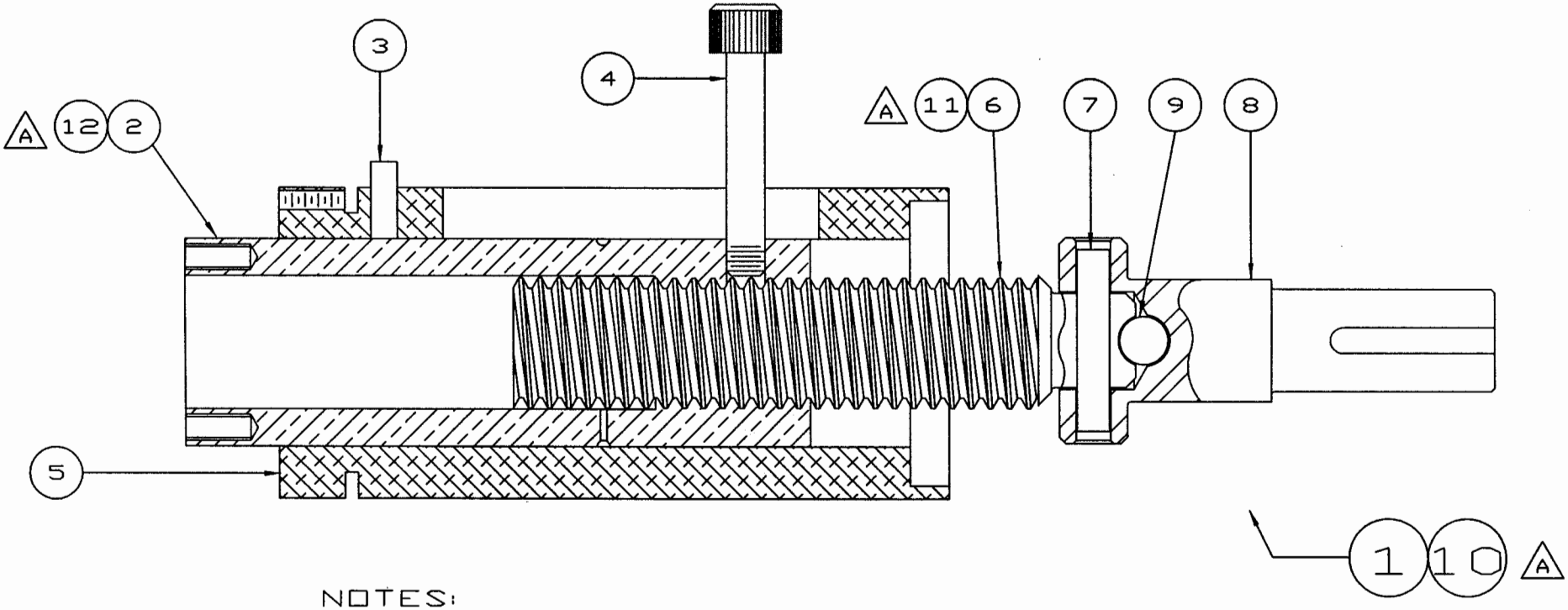
PROJECT	MARSHALL/CBR/ TRIAXIAL	TITLE	MECHANICAL DRIVE ASS'Y
REVISION	A		
DATE	04/09/98		
DATE		SHEET 2 OF 3	DRAWING NO. 2324

ITEM	QTY	QTY	QTY	QTY	PART NUMBER	DESCRIPTION	SUPPLIER / MANUFACTURER
25	1	1	1		195401	RETAINING WASHER	
26	-	-	X		2324-26	MECHANICAL DRIVE ASS'Y CBR EXTENDED RANGE	
27	-	-	1		2320-13	FEED SCREW ASS'Y	
QUANTITY FOR PART NO.	232401	232402	232426				

Durham Geo Enterprises Inc.
2175 WEST PARK COURT
STONE MOUNTAIN, GEORGIA 30087

PROJECT	MARSHALL/CBR/ TRIAXIAL				TITLE: MECHANICAL DRIVE ASS'Y
REVISION	A				
DATE	04/09/92				
DATE					SHEET 3 OF 3
					DRAWING NO. 2324

PART NUMBER	REV.
2320-01	A



NOTES:

1. PART NUMBER: 2320-01 (MARSHALL & CBR LOAD FRAMES)
   2320-10 (TRIAXIAL LOAD FRAME)
2. MAT'L: REF PARTS LIST #2320
3. LUBRICATE BEARING SEAT ON ITEMS
   6 AND 8 BEFORE ASSEMBLY
4. LUBRICATE THREADS ON ITEMS 6 & 11 BEFORE ASS'Y
   WITH DRYDENE SFG-1 EP GREASE
5. USE LOC-TITE SERVICE REMOVABLE THREAD
   LOCKER TO ASSEMBLE ITEM 4

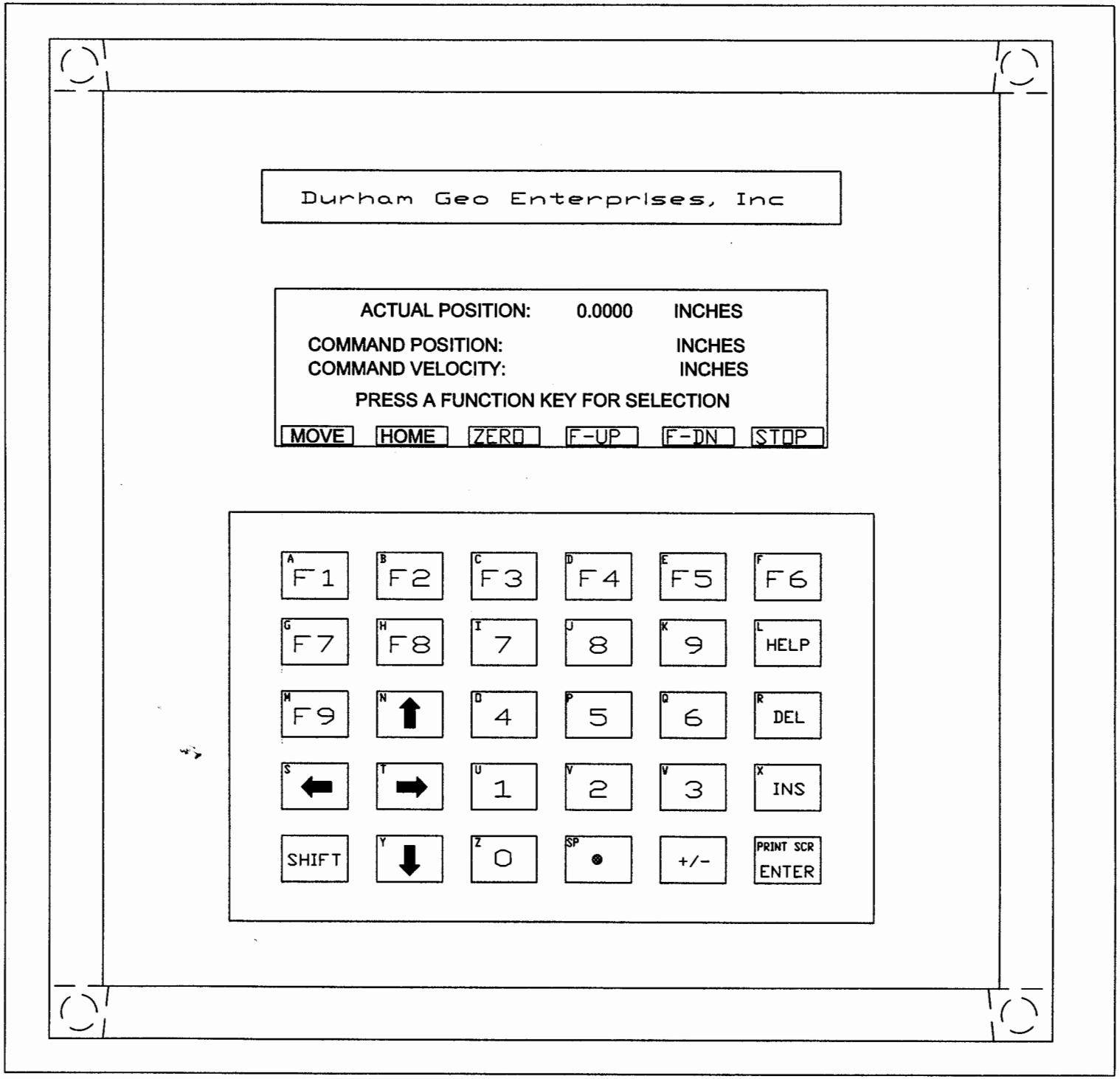
DATE	SYM	ECO#	BY	REVISION RECORD	DATE	SYM	ECO#	BY	REVISION RECORD	DATE	SYM	ECO#	BY	REVISION RECORD
										08/21/1991	A	0198	SBA	ADDED TRIAXIAL SPINDLE & PISTON

TOLERANCES (EXCEPT AS NOTED)	Durham Geo Enterprises Inc. STONE MOUNTAIN, GEORGIA 30087				
DECIMAL .X ± .060 .XX ± .020 .XXX ± .004	DATE:	SHEET 1 OF 1	SIZE: B	SCALE: FULL	DRAWN BY: SBA II
FRACTIONAL ± 1/16	TITLE: FEED SCREW ASSEMBLY				APPROVED BY:
ANGULAR ± 1/2°	MARSHALL/CBR/ TRIAXIAL				DRAWING NUMBER 2320
RADII ± 1/32					

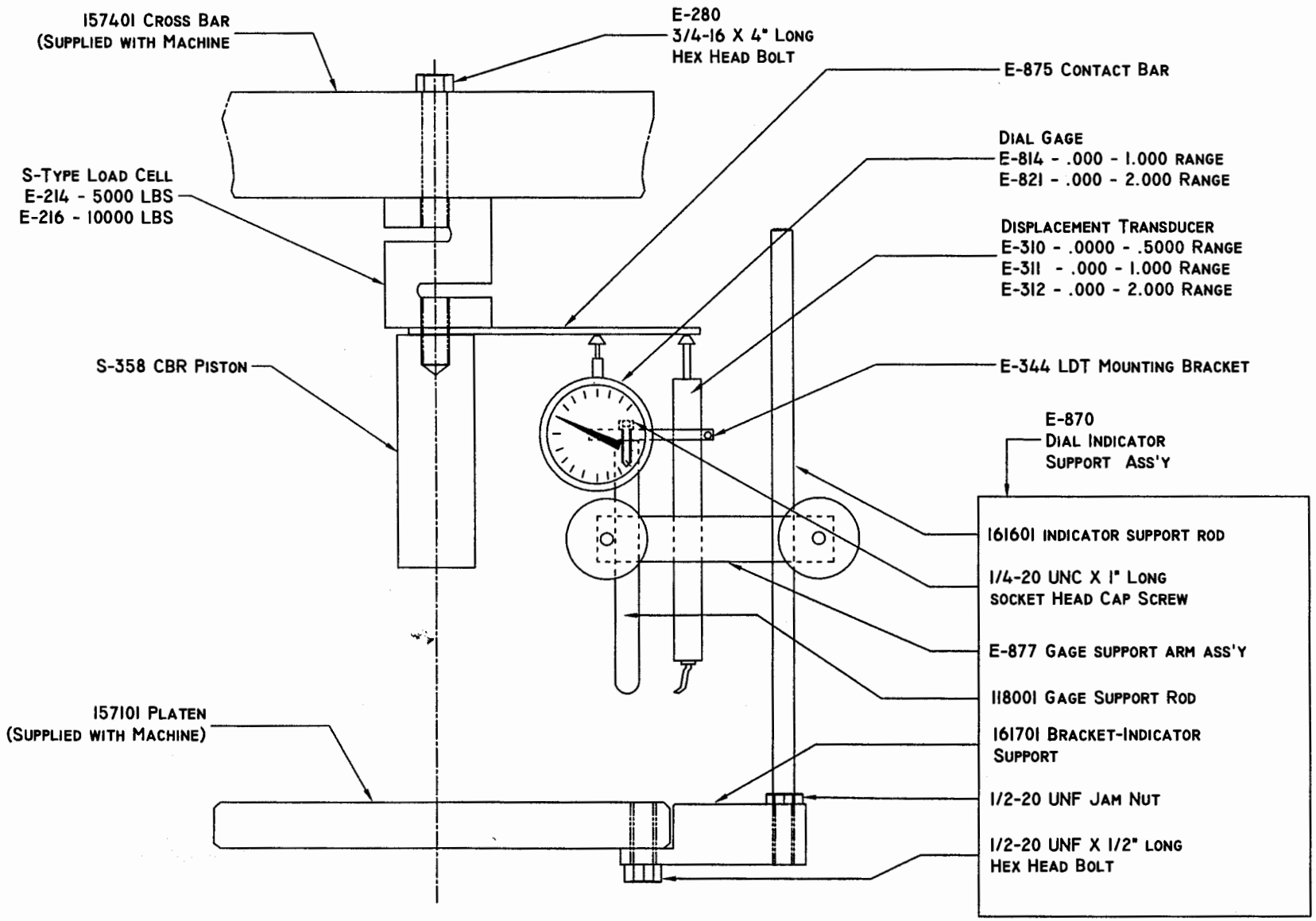
ITEM	QTY	QTY	QTY	QTY	PART NUMBER	DESCRIPTION	SUPPLIER / MANUFACTURER
1	X	–			2320-01	FEED SCREW ASS'Y (MARSHALL & CBR)	
2	1	–			1570-01	ACME SCREWED PISTON 5 TPI	
3	1	1				ROLL PIN, 1/4" X 3/4" LONG	
4	1	1			1953-01	PISTON KEY GUIDE	
5	1	1			1569-01	PISTON HOUSING	
6	1	–			1589-01	ACME FEED SPINDLE 5 TPI	
7	1	1				ROLL PIN, 5/16" X 1 3/4" LONG	
8	1	1			1594-01	DRIVE SPINDLE	
9	1	1			1598-29	1/2" STAINLESS STEEL BALL BEARING	
10	–	X			2320-10	FEED SCREW ASS'Y (TRIAXIAL)	
11	–	1			2529-01	ACME FEE SPINDLE 8 TPI	
12	–	1			2528-01	ACME SCREWED PISTON 8 TPI	
QUANTITY FOR PART NO.	2320-01	2320-10					

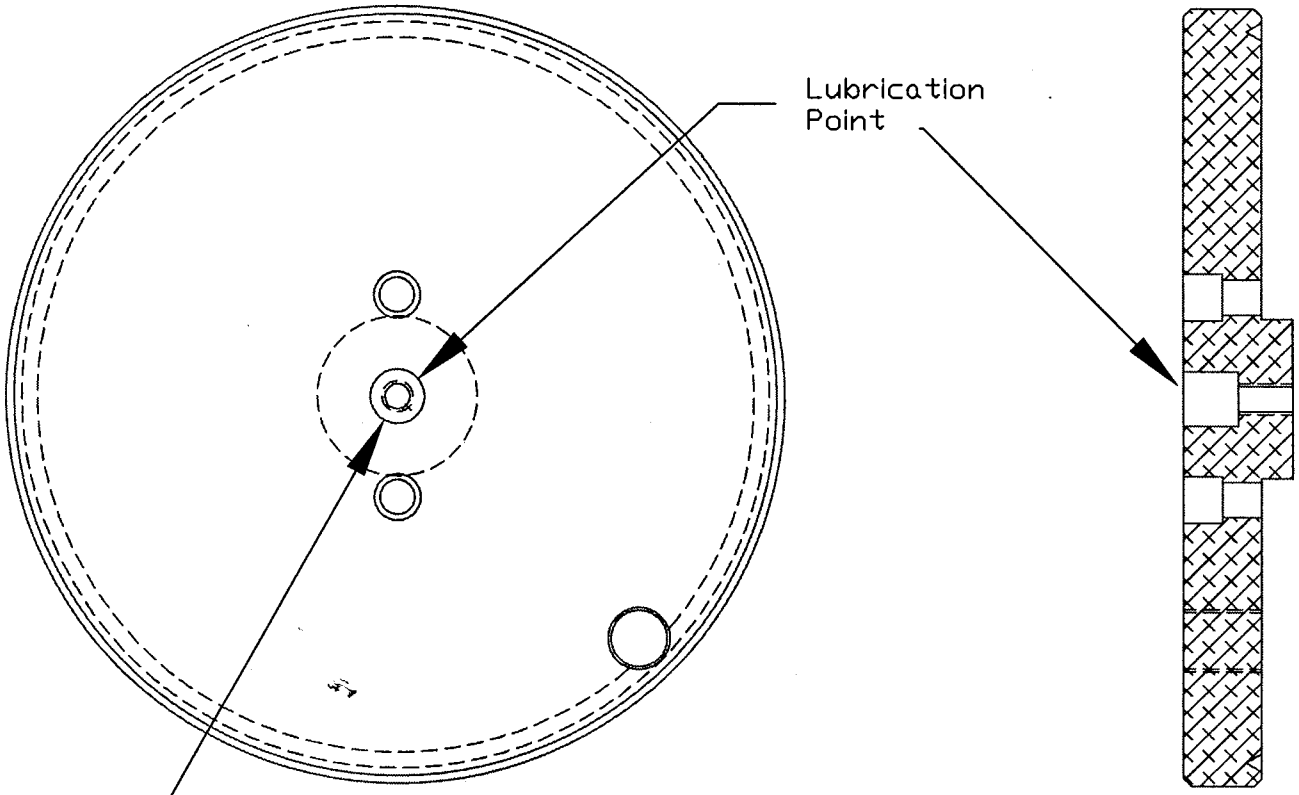
Durham Geo Enterprises Inc.
2175 WEST PARK COURT
STONE MOUNTAIN, GEORGIA 30087

PROJECT	MARSHALL/CBR/ TRIAXIAL				TITLE: FEED SCREW ASSEMBLY
REVISION	A				
DATE	08/21/91				
DATE	10/22/90				SHEET 1 OF 1
DRAWING NO.	2320				


Durham Geo Enterprises, Inc
ACTUAL POSITION: 0.0000 INCHES
COMMAND POSITION: INCHES
COMMAND VELOCITY: INCHES
PRESS A FUNCTION KEY FOR SELECTION
MOVE
HOME
ZERO
F-UP
F-DN
STOP
A F1
B F2
C F3
D F4
E F5
F F6
G F7
H F8
I 7
J 8
K 9
L HELP
M F9
N
O 4
P 5
Q 6
R DEL
S
T
U 1
V 2
W 3
X INS
SHIFT
Y
Z 0
SP
+/-
PRINT SCR
ENTER

CBR \ LBR
"S" TYPE LOAD CELL





Remove socket head cap screw
lubricate
replace socket head cap screw

DATE	SYM	ECO#	BY	REVISION RECORD	DATE	SYM	ECO#	BY	REVISION RECORD	DATE	SYM	ECO#	BY	REVISION RECORD

Durham Geo Enterprises, Inc.
STONE MOUNTAIN, GEORGIA 30086

SHEET	OF	SIZE	SCALE:	DRAWN BY:
1	1	B	FULL	APPROVED BY:

TITLE: PLATEN, 6 1/4"

MARSHALL/CBR/
TRIAXIAL

DRAWING NUMBER
1571

WARRANTY STATEMENT

Durham Geo-Enterprises warrants that equipment shall be free from defects in material and workmanship for a period of **90 days** from the time the equipment is put into service. In any event, the warranty period will not exceed **6 months** from the date of shipment.

Durham Geo liability shall be limited to replacement of components or equipment (at the manufacturer's discretion) that has been determined by the manufacturer to be faulty. No claims in excess of component replacement value will be recognized. Durham Geo will not be held liable for damages or lost business relating to a warranty claim.

Specifically excluded from this warranty are claims deemed by the manufacturer to have resulted from normal wear and tear, improper use, or abuse of the equipment.

For complete warranty disclosure, please call 1-800-837-0864 (outside GA) or 770-465-7557 (inside GA).