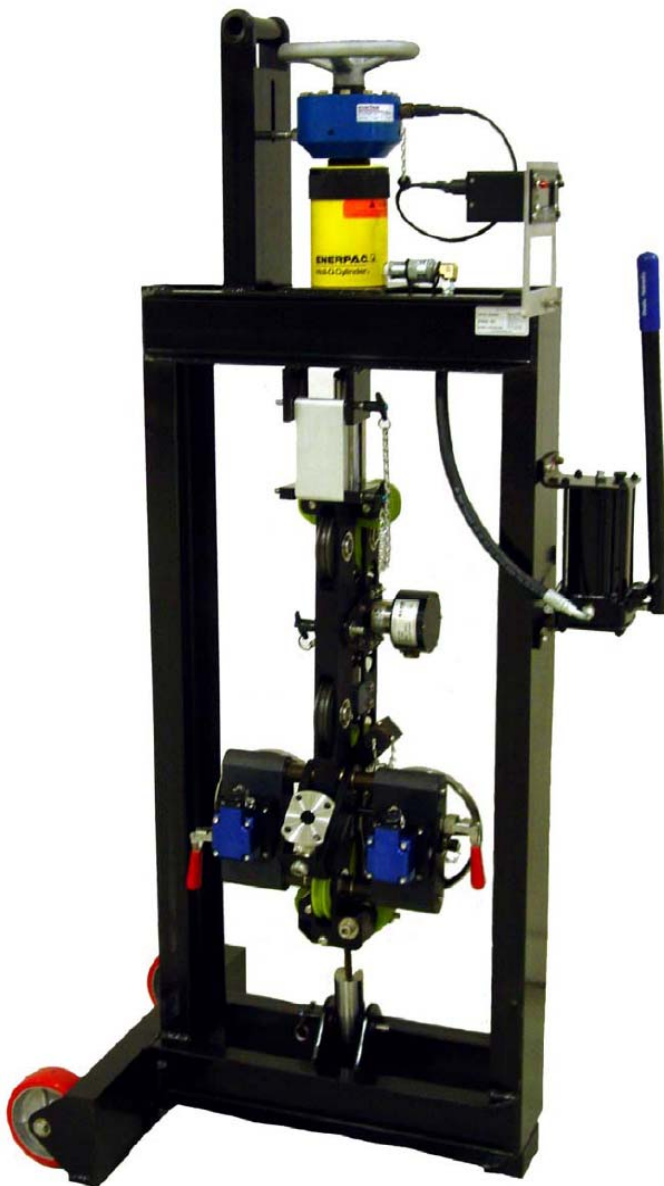


TENSION TEST STAND PRIMARY LOAD CELL CALIBRATION

FSU2A155B
FSU2A150B



TENSION TEST STAND INTRODUCTION

The FSU2A Tension Test Stand is designed to calibrate and verify the tension reading of a BenchMark AM3K or AM5K measuring head.

There are two sizes of stand. The “short” stand (FSU2A150), and the “long” stand (FSU2A155).

A short piece of actual logging cable is installed into the stand. Slip grips (or rope sockets in the “short” stand) are installed on each end of the cable to secure it to the blocks at the bottom and top of the stand. Tension is applied to the wireline to emulate the tension seen during operations. The tension is measured using a Master Calibrated load cell.

The measuring head is then installed over the test cable and the cable is tightened using a hydraulic hand pump to provide the required calibration and verification tensions.

The reading from the Master Load Cell and the measuring head in the stand are then recorded and compared.

The maximum load is hydraulically limited to 13,500 lbs.

An actual calibration and verification load of up to 12,500 lbs can be applied to the measure head.

Equipment requiring calibration loads in excess of 12,500 lbs should not be calibrated using the FSU2A stand.

The load applied to the cable is measured by the round load cell on the top of the stand, and displayed on the Master Load Cell tension display panel mounted on the front of the stand.

The measuring head is connected to the second tension display panel mounted under the Master Load Cell tension device. The type of panel used depends on the type of load pin being calibrated and/or verified.

The tension values displayed on the secondary display should closely match the actual applied tension. Any out of tolerance measurements will reflect issues that need to be corrected in the Load Pin (such as internal electronic settings) or in the measuring head (such as worn bearings, damaged or out of alignment shafts, worn wheels, etc.).

TENSION TEST STAND PRIMARY LOAD CELL CALIBRATION

Tension instruments, as per all measurement devices, require calibration and verification in order to provide limited uncertainty in the validity of the provided measurements. Validation and calibration are performed on the BenchMark Wireline FSU2A Tension Test Stand.

Instrument calibration values are provided based on a standard against which the calibration response is defined. These standards are traceable to A NIST (National Institute of Standards and Technology). The calibration standard is based on the Primary Load Cell. It is put in series with a measuring head that then has a load pin mounted for calibration.

The load pin is mounted in either a BenchMark defined calibration standard AMTKA tension device or an AM3K or AM5K measuring head. When using different size lines, adjustment to take into account differing geometric factors is then made using the panel set-up software to account for the effects of line size.

We recommend that the FSU2A Tension Test Stand Master Calibration Load Cell is recalibrated every two years based on NIST defined load values by an external calibration lab

PRIMARY LOAD CELL CALIBRATION PROCEDURE

The primary load cell can be returned to BenchMark to be recalibrated. Use BenchMark part number FSU2P125-CAL to perform this service.

Return shipment address is:

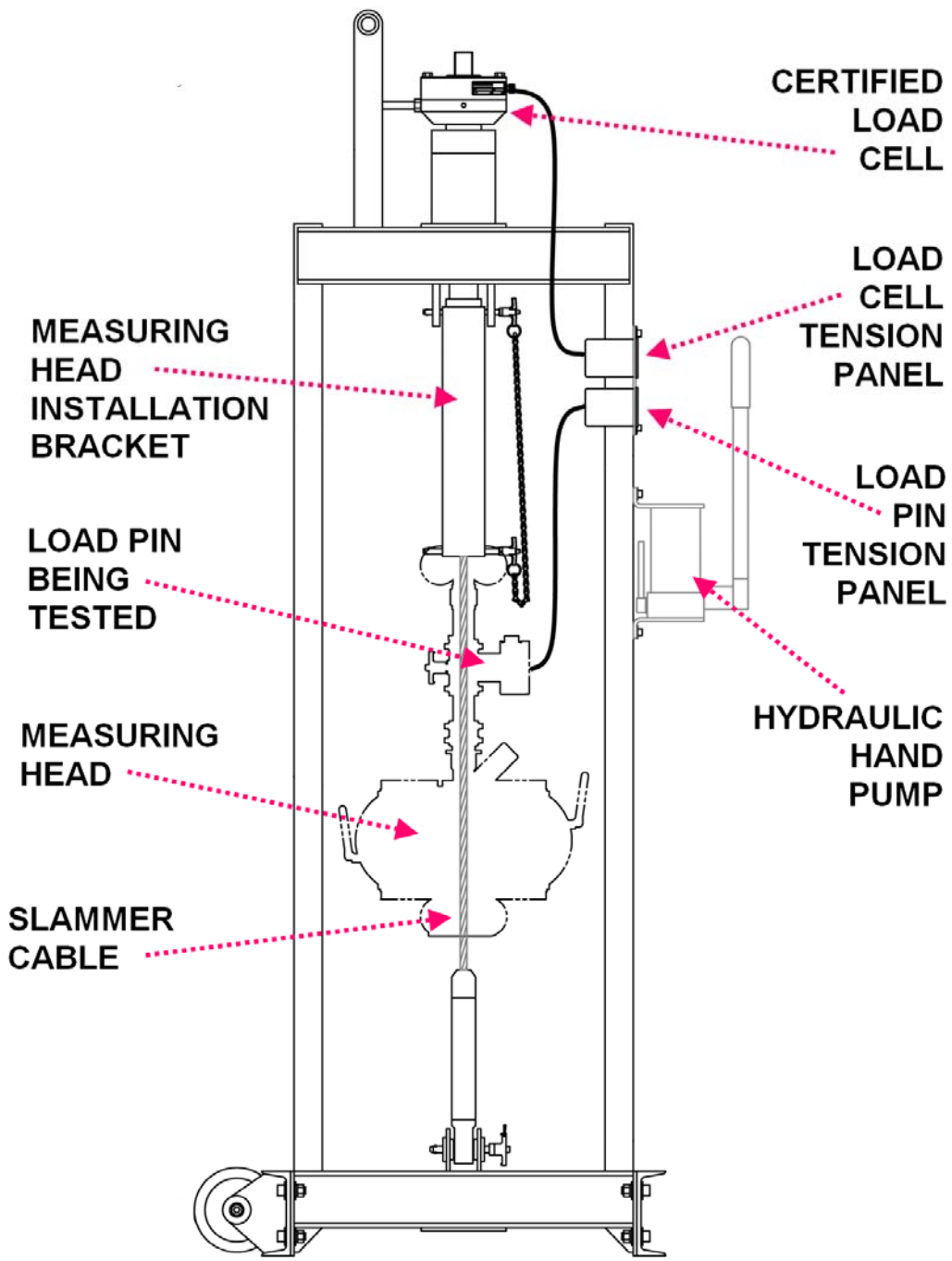
BenchMark Wireline Products
36220 FM 1093
Simonton, Texas 77476
U.S.A.

Phone +1 281-346-4300
Fax +1 281-346-4301
mail@benchmarkwireline.com

Please notify by phone, email, or fax (as above) prior to sending any equipment. Information is also available on website www.benchmarkwireline.com

A new primary load cell can be ordered from BenchMark using part number FSU2P125.

Parts can be ordered by email, phone, or fax.



FSU2A TENSION TEST STAND MAJOR COMPONENTS

Example Calibration Lab Load Cell Accreditation p.1



The American Association for Laboratory Accreditation

SCOPE OF ACCREDITATION TO ISO 17025:2005
& ANSI/NCSL Z540-1-1994

INTERFACE, INC.
 7401 E. Butherus Drive
 Scottsdale, AZ 85260
 LaVar Clegg Phone: 480 948 5555 ext 106

CALIBRATION

Valid To: November 30, 2012

Certificate Number: 1991.01


In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Electrical – DC & Low Frequency

Parameter/Equipment	Range	CMC ² (±)	Comments
DC Voltage – Measure	(0 to 0.14) V (0.14 to 1.4) V (1.4 to 14) V (14 to 140) V	0.0026 % rdg + 0.2 μV 0.0024 % rdg + 2 μV 0.0022 % rdg + 20 μV 0.0022 % rdg + 200 μV	Solartron 7071
DC Voltage Ratio	(0 to 0.1)	0.0007 % rdg + 0.1 μV/V _{ref}	Kelvin-Varley divider
Resistance – Measure	(0 to 1.4) kΩ (0.14 to 1.4) kΩ (1.4 to 14) kΩ (14 to 140) kΩ (140 to 1400) kΩ	0.0026 % rdg + 0.2 mΩ 0.0026 % rdg + 2 mΩ 0.0026 % rdg + 20 mΩ 0.0028 % rdg + 0.2 Ω 0.0036 % rdg + 2 Ω	Solartron 7071

(A2LA Cert. No. 1991.01) 09/21/2010

5301 Buckeystown Pike, Suite 350 | Frederick, Maryland 21704-8373 | Phone: 301 644 3248 | Fax: 301 662 2974 | www.A2LA.org


 Page 1 of 2

Example Calibration Lab Load Cell Accreditation p.2



The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

INTERFACE, INC.

Scottsdale, AZ

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-LAF Communiqué dated 8 January 2009).

Presented this 21st day of September 2010.



Peter M. Boyce

President & CEO
 For the Accreditation Council
 Certificate Number 1991.01
 Valid to November 30, 2012

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.

Calibration Lab Certification

LOAD CELL CALIBRATION CERTIFICATION

CONDITION: FINAL
MODEL: 1220ACK-25K SERIAL: 333910 BRIDGE: A CAPACITY: 25 K1bf
PROCEDURE: C-1257 Mounting Per Interface Installation Instruction 15-5

INPUT RESISTANCE: 351.2 OHM OUTPUT RESISTANCE: 351.1 OHM
ZERO BALANCE : 0.352 %RO

TEST CONDITIONS

TEMPERATURE: 73 °F HUMIDITY: 33 % EXCITATION: 10 VDC

TRACEABILITY

FORCE STANDARD : STD-13 NIST #: 822/275727-08 DUE: 15-NOV-11
STANDARD INDICATOR: BRD1 NIST #: 564714
TEST INDICATOR : BRD4 NIST #: 564714

SHUNT CALIBRATION

	Shunt (± 0.01%)	Output	Straight Line Conversion	Connections*
Tension	30 Kohm	2.90532 mV/V	17.154 K1bf	-Out to -Exc
Compression	30 Kohm	-2.90433 mV/V	17.131 K1bf	-Out to +Exc

*For models wired with +Sense, -Sense, or -Scale leads, resistor connections are actually to these leads in place of +Exc, -Exc, or -Out respectively.

PERFORMANCE

	RATED OUTPUT	SEB OUTPUT	NONLINEARITY	HYSTERESIS	SEB
TENSION	4.23491 mV/V	4.23408 mV/V	-.019 %FS	-.009 %FS	± .020 %FS
COMPRESSION	-4.23912 mV/V	-4.23831 mV/V	-.027 %FS	.028 %FS	± .019 %FS

STATIC ERROR BAND (SEB) - The band of maximum deviations of the ascending and descending calibration points from a best fit straight line through zero OUTPUT. It includes the effects of NONLINEARITY, HYSTERESIS, and nonreturn to MINIMUM LOAD.

TEST LOAD APPLIED (K1bf)	RECORDED READINGS (mV/V)	
	Tension	Compression
0	.00000	.00000
5	.84636	-.84707
10	1.69318	-1.69451
15	2.54064	-2.54259
20	3.38784	-3.39079
25	4.23491	-4.23912
10	1.69280	-1.69571
0	-.00028	.00016

Interface, Inc. certifies that all calibration measurements are traceable to NIST. Estimated uncertainty of measurements is 0.040%. Results relate to 333910 only. Do not reproduce this report except in full or with Interface written approval.

TECHNICIAN :  Pedro Beltran DATE :24-SEP-09

INTERFACE INC.
7401 EAST BUTHERUS DRIVE · SCOTTSDALE, ARIZONA 85260, U.S.A.
TELEPHONE (480)948-5555 · FAX (480)948-1924

Figure 1 – FSU2A Master Load Cell Calibration

DRAWINGS AND SPECIFICATIONS

FSU2A155 SPECIFICATIONS

Weight:	350 lbs	159 kg
Height:	88.4 in	2.25 m
Width:	39.1 in	0.99 m
Depth:	28.5 in	0.72 m
Relief Valve Set:	~13,000 lbs	~5,900 kg

Hydraulic Oil Enerpak HF-101, viscosity 32, 1-pint BenchMark P/N FSU2P101

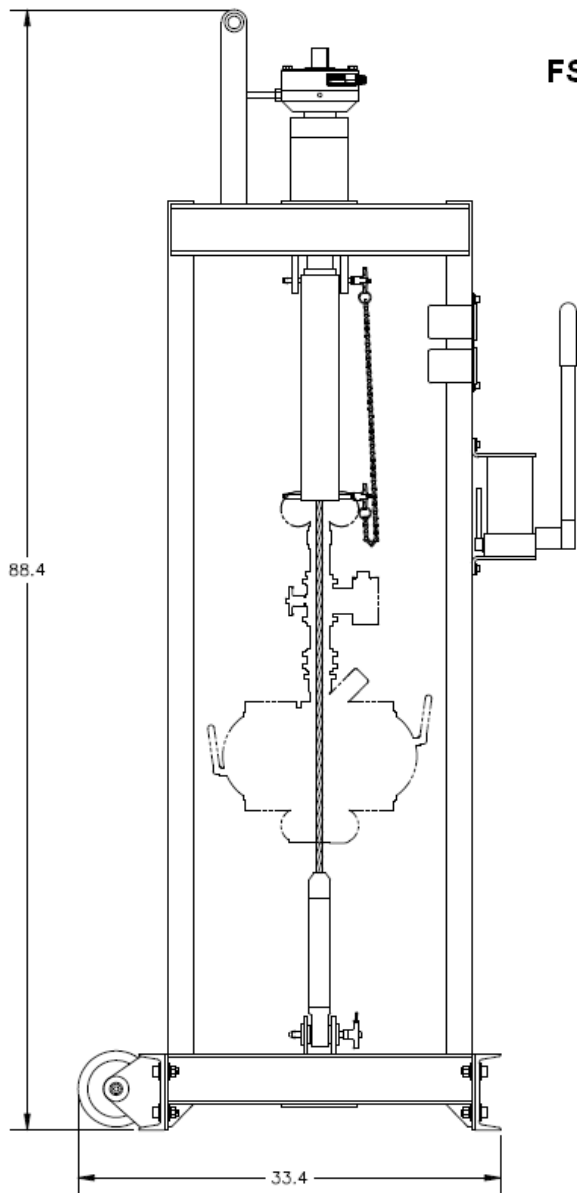
FSU2A150 SPECIFICATIONS

“Short” stand

Weight:	295 lbs	134 kg
Height:	68.4”	1.74 m
Width:	39.1”	0.99 m
Depth:	28.5”	0.72 m
Relief Valve Set:	~13,000 lbs	~5,900 kg

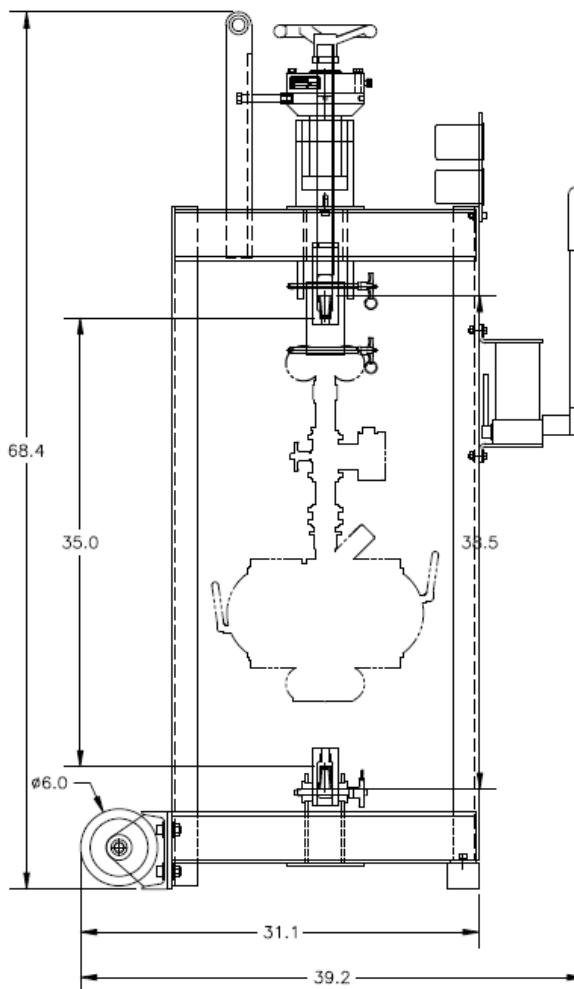
Hydraulic Oil Enerpak HF-101, viscosity 32, 1-pint BenchMark P/N FSU2P101

TENSION TEST STAND DIMENSIONAL DRAWINGS



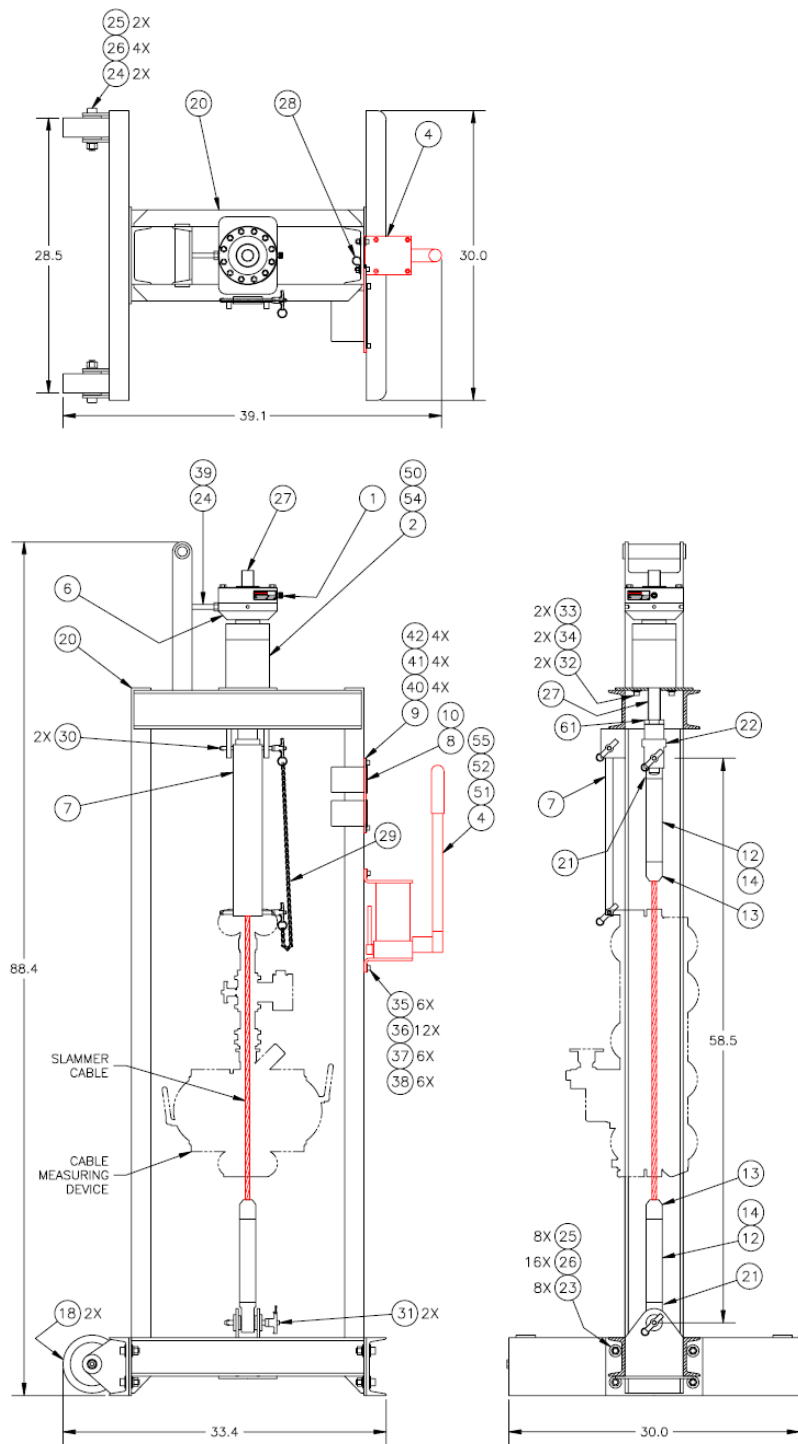
FSU2A155B TENSION TEST STAND

FSU2A150B - 20 Inches Shorter than 155B



FSU2A150B TENSION TEST STAND

TENSION TEST STAND DRAWINGS continued



FSUA155 General Arrangement Diagram

FSU2A155 TENSION TEST STAND BILL OF MATERIALS

ITEM	P/N	DESCRIPTION	QTY.	REF
1	FSU2P125	LOAD CELL 25,000 LB UNIV FLAT 4.0-mV/V 350 OHM STL 6 PIN	1	
2	FSU2P130	CYLINDER 30T 2.50" STROKE HOLLOW ROD	1	
4	FSU2P122	PUMP HYD HAND 6KPSI 50CUIN ADJ RELIEF PRESET TO 2100PSI	1	
5	FSU2M145	WHEEL HAND 8 IN DISHED 1-1/4-12 THD	1	
6	FSU2M126	BASE MOD LOAD CELL 25K	1	
7	FSU2M158	KNUCKLE UPRIGHT SLIP TENS TST	1	
8	ALS8A100	PANEL AMS TN BKUP DSP BATT mV/V FOR PANCAKE LOAD CELL	1	
9	FSU2M156	PLATE DUAL TENSION DISPLAY SLIP-TYPE TENSILE TESTER	1	
10	ALS8A010-3	CABLE ASSY BACKUP TENSION TO LOAD PIN MEAS HEAD TEST FIXTUR	1	
12	FSU2P160	BODY ROPE SOCKET 1-11/16 OD	0	REF
13	FSU2P161	CONE NOSE ROPE SOCKET 17/32	0	
13	FSU2P166	CONE NOSE ROPE SOCKET 1/4	0	OPTION
13	FSU2P167	CONE NOSE ROPE SOCKET 5/16	0	OPTION
13	FSU2P168	CONE NOSE ROPE SOCKET 3/8	0	OPTION
13	FSU2P169	CONE NOSE ROPE SOCKET 15/32	0	OPTION
14	FSU2P162	SLIP 17/32 RELIABLE .470-.531 CABLE	0	
14	FSU2P163	SLIP 15/32 RELIABLE .392-.468 CABLE	0	OPTION
14	FSU2P164	SLIP 3/8 RELIABLE .325-.392 CABLE	0	OPTION
14	FSU2P165	SLIP 5/16 RELIABLE .270-.324 CABLE	0	OPTION
14	FSU2P170	SLIP 7/32 RELIABLE .215-.270 CABLE	0	OPTION
18	FSU2P143	WHEEL 6 X 2 PU AL CORE 900# 1/2+3/4 SHAFT	2	
20	FSU2M153	FRAME TENSION TEST 5K 12.5K# SLIP-TYPE	1	
21	FSU2M159	ADAPTER SLIP-TYPE TENS TST	2	
22	FSU2M162	CLEVIS CABLE HD THD TENS TST	1	
23	C276P242	SCREW 1/2-13 X 1-1/2 HEX HD SS	8	
24	FSU2P142	SCREW 1/2-13 X 4 HEX HD SST	3	
25	C276P017	NUT 1/2-13 ELASTIC STOP SST	10	
26	C276P037	WASHER 1/2 FLAT SST	20	
27	FSU2P116	ROD ALL-THREAD 1-1/4 - 12 GRB7 STL A193	18	
28	ALS1P017	CLAMP LOOP RUBBER CUSHION 3/4" ZINC PLATED	1	
30	AM3KP073	PIN QUICK REL 3/8 OD X 5 GRIP T-HANDLE W/RING SST	2	
31	FSU2P053	PIN QUICK REL 1/2 OD X 3 GRIP W/RING T-HANDLE SST	2	

3.4.6 FSU2A155 TENSION TEST STAND BILL OF MATERIALS continued

ITEM	P/N	DESCRIPTION	QTY.	REF
32	AM5KP080	SCREW 3/8-16 X 3/4 SOC HD SST	2	
33	AMS1P058	WASHER 3/8 LOCK SS	2	
34	C276P513	WASHER 3/8 FLAT SST	2	
35	AMS1P046	SCREW 5/16-18 X 1 SHCS SST	6	
36	C276P039	WASHER 5/16 FLAT SST	12	
37	AMS1P047	WASHER 5/16 LOCK SS	6	
38	AMS8P094	NUT 5/16-18 HEX SST	6	
39	AMS1P065	NUT 1/2-13 HEX SST	1	
40	C276P334	SCREW 10-32 X 1/2 PHIL PAN SST	4	
41	C276P035	WASHER #10 LOCK SS	4	
42	AMS1P054	WASHER #10 FLAT SS	4	
50	FSU1P037	ADPTR 3/8 NPT X #6 JIC 90 STL	1	
51	FSU1P036	ADPTR #6 SAE X #6 JIC STR STL	1	
52	FSU1M096-42	HOSE #6 JIC STR X 90 4KPSI WP 42" OAL	1	
54	FSU2P141	CPLG QD M 3/8NPT ENERPAC	1	
55	FSU2P101	OIL HYD ENERPAC	1	
61	FSU2P144	NUT 1-1/4-12 JAM HEX STL PL 7/16 THICK	1	
62	FSU2M146	PLATE CLAMP BALL VALVE	2	
63	FSU1P124	VALVE BALL 2-WAY SAE-06 HYDAC	1	