

**LUDLUM MODEL 44-21  
Low Energy Beta-Gamma Detector**

**December 2012  
Serial No. PR 163027 and Succeeding  
Serial Numbers**

**LUDLUM MODEL 44-21  
Low Energy Beta-Gamma Detector**

**December 2012  
Serial No. PR 163027 and Succeeding  
Serial Numbers**



**LUDLUM MEASUREMENTS, INC**  
501 OAK STREET, P.O. BOX 810  
SWEETWATER, TEXAS 79556  
325-235-5494, FAX: 325-235-4672

## **STATEMENT OF WARRANTY**

Ludlum Measurements, Inc. warrants the products covered in this manual to be free of defects due to workmanship, material, and design for a period of twelve months from the date of delivery. The calibration of a product is warranted to be within its specified accuracy limits at the time of shipment. In the event of instrument failure, notify Ludlum Measurements to determine if repair, recalibration, or replacement is required.

This warranty excludes the replacement of photomultiplier tubes, G-M and proportional tubes, and scintillation crystals which are broken due to excessive physical abuse or used for purposes other than intended.

There are no warranties, express or implied, including without limitation any implied warranty of merchantability or fitness, which extend beyond the description of the face there of. If the product does not perform as warranted herein, purchaser's sole remedy shall be repair or replacement, at the option of Ludlum Measurements. In no event will Ludlum Measurements be liable for damages, lost revenue, lost wages, or any other incidental or consequential damages, arising from the purchase, use, or inability to use product.

## **RETURN OF GOODS TO MANUFACTURER**

If equipment needs to be returned to Ludlum Measurements, Inc. for repair or calibration, please send to the address below. All shipments should include documentation containing return shipping address, customer name, telephone number, description of service requested, and all other necessary information. Your cooperation will expedite the return of your equipment.

**LUDLUM MEASUREMENTS, INC.  
ATTN: REPAIR DEPARTMENT  
501 OAK STREET  
SWEETWATER, TX 79556**

**800-622-0828 325-235-5494  
FAX 325-235-4672**

**TABLE OF CONTENTS**

1. GENERAL .....	1
2. SPECIFICATIONS:.....	1
3. REPLACEMENT PARTS LIST .....	2
Crystal Assembly .....	2
Tube Socket Board .....	2
Gain Adjustment Board.....	2
Assembly View .....	3
DRAWINGS AND DIAGRAMS .....	3

**Model 44-21 Low Energy Beta-Gamma Detector**  
**December 2012**

**Model 44-21 Low Energy Beta-Gamma Detector**  
**December 2012**

**1. GENERAL**

---

The Ludlum Model 44-21 detector contains an NaI (T1) crystal and a plastic scintillator to detect low-energy gamma radiation and enhance detection of beta radiation. The NaI (T1) crystal is 2.5 cm (1 in.) in diameter by 1 mm (0.04 in.) thick. The plastic scintillator is 2.5 cm (1 in.) in diameter by 0.025 cm (0.010 in.) thick and is piggy-backed on the NaI (T1) crystal. The window area is approximately 5 cm<sup>2</sup>. The window entrance is covered by a 3 mg/cm<sup>2</sup> material

for light tightness and to hermetically seal the NaI (T1) crystal. Background count is approximately 40 cpm/ $\mu$ R/hr.

The Ludlum Model 44-21 may be used with any of the Ludlum instruments or other equivalent instruments that can provide up to 1200 V with a recommended input sensitivity of 2-50 mV.

**2. SPECIFICATIONS:**

---

**Voltage Requirements:** 400-1200 V

**Window Area:** 5 cm<sup>2</sup>

**Scintillator:**

- Gamma: 2.5 cm (1 in.) diameter by 1 mm (0.04 in.) thick NaI (T1)
- Beta: 2.5 cm (1 in.) diameter by 0.025 cm (0.010 in.) thick plastic

**Efficiency (4  $\pi$ ):** 38% for <sup>125</sup>I; 4% for <sup>14</sup>C

**Input Sensitivity:** typically 2 to 50 mV

**Photomultiplier Tube:** 3.8 cm (1.5 inch) diameter, 10-stage, head-on type

**Size:** 4.8 x 16.6 cm (1.9 x 6.5 in.) (Dia x L), excluding connector cap

**Construction:** Aluminum

**Connector:** Standard series "C," other types available upon request

**Weight:** 0.45 kg (1 lb)

**Finish:** polyurethane computer beige paint

**Model 44-21 Low Energy Beta-Gamma Detector  
December 2012**

**3. REPLACEMENT PARTS LIST**

---

Ref. No.	Description	Part No.
<b>Model 44-21 Detector</b>		
UNIT	Completely Assembled Model 44-21 Low Energy Beta- Gamma Detector	47-1560
<b>Crystal Assembly</b>		2002-631
*	EJ212-1.0 x 0.10	01-5171
*	MICA-1.180 inch x 2/2.3 MG	01-5198
<b>3.8 cm (1.5 in.) Tube Socket Board, Drawing 2 x 317</b>		
*	Assembled Tube Socket Board	5002-502
<b>● CAPACITORS</b>		
C1	0.01 mF, 2kV , C	04-5525
<b>● RESISTORS</b>		
R1	10 MEG, ¼ W, 2%	10-7106
R2	1 MEG, ¼ W, 1%	12-7964
R11	10 MEG, ¼ W, 2%	10-7106
R101-R104	10MEG, ¼ W, 2%	10-7106
R111	10 MEG, ¼ W, 2%	10-7106
<b>Gain Adjustment Board, Drawing 209 x 18</b>		
<b>● CAPACITORS</b>		
C1	CAP-.0047 mF, 3 kV, C	04-5547
<b>● RESISTORS</b>		
R1	TRMR-100k	09-6813

**Model 44-21 Low Energy Beta-Gamma Detector  
December 2012**

<b>Part Number</b>	<b>Description</b>	<b>Qty./Ref. No.</b>
<b>Assembly View, Drawing 2 x 156</b>		
4002-510	Tube Socket Assembly	1 ea.
2002-632	Probe Body	1 ea.
2002-631	Crystal Assembly	1 ea.
7002-029-05	Sponge	8 ea.
40-4006	Tube Shield	1 ea.
4478-011	Connector C	1 ea.
7209-001-01	Scintillator Gain Cap	1 ea.
01-5349	1.5 inch PM Tube	V001

**DRAWINGS AND DIAGRAMS**

---

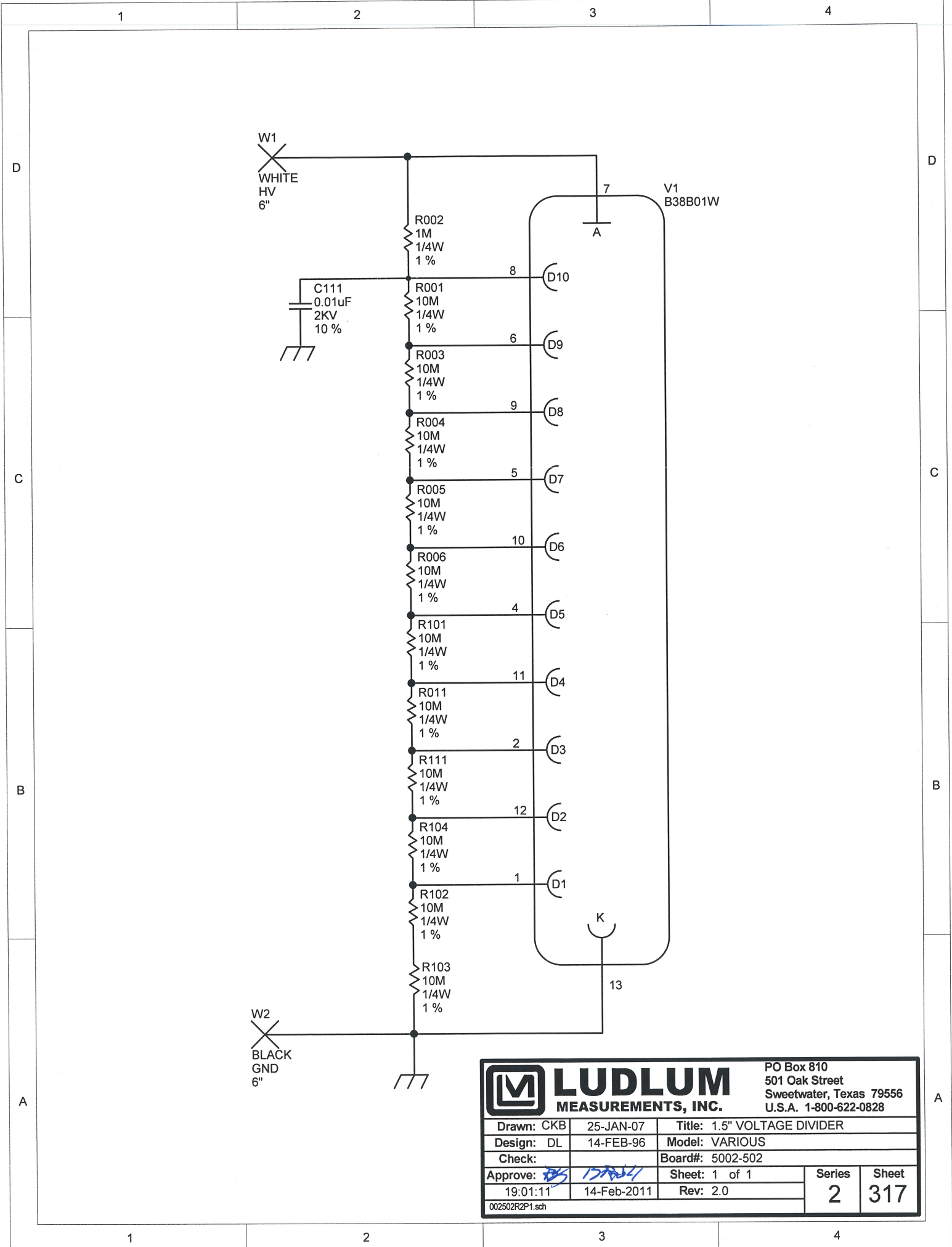
3.8 cm (1.5 in.) Tube Socket Board, Drawing 2 x 317

3.8 cm (1.5 in.) Tube Socket Component Layout, Drawing 2 x 318

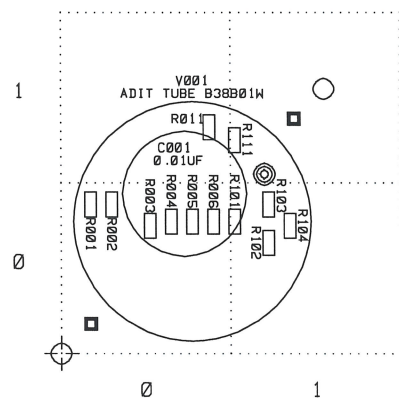
Gain Adjustment Board, Drawing 209 x 18


Model 44-12 Assembly View, Drawing 2 x 156



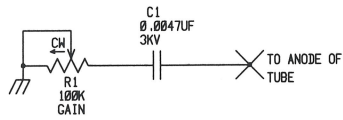


		PO Box 810 501 Oak Street Sweetwater, Texas 79556 U.S.A. 1-800-622-0828	
		Drawn: CKB Design: DL Check:	25-JAN-07 14-FEB-96 14-Feb-2011
Approve: <i>[Signature]</i> 19:01:11	Sheet: 1 of 1 Rev: 2.0	Sheet <b>317</b>	
002502R2P1.sch			



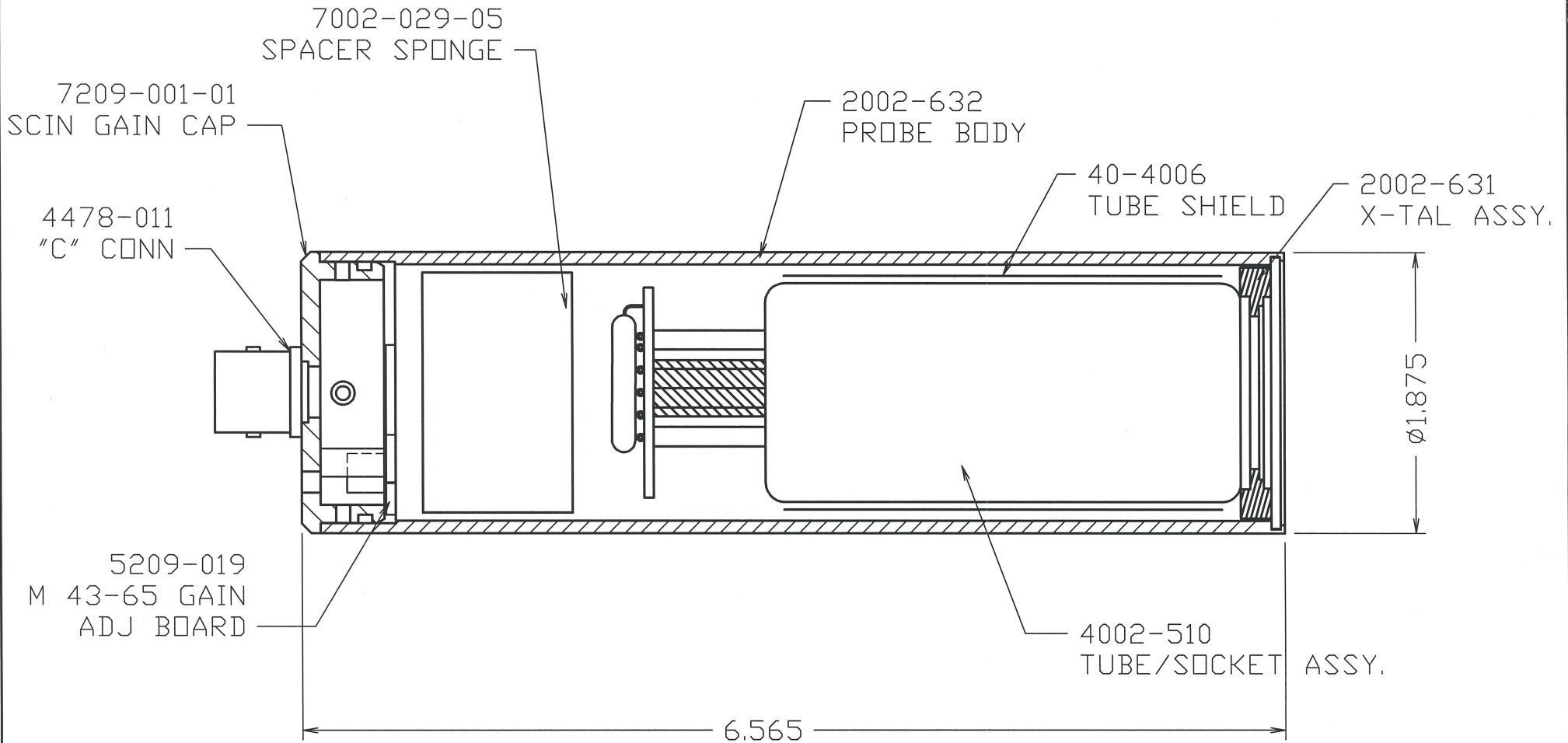
 <b>LUDLUM MEASUREMENTS INC.</b> SHEETWATER, TX.			
DR	CKB	02/14/96	TITLE: VOLTAGE DIVIDER BOARD
		BOARD: 5002-502	
DSCN	DL	02/14/96	MODEL: 1 1/2"
APP	JWS	10-24-07	FILENAME: BS002502
COMPONENT		SOLDER	11:59:05 14-Jan-04
OUTLINE		OUTLINE	1.0 2 318

REVISIONS						
EFF	AUTHORITY	ZONE	LTR	DESCRIPTION	DATE	APPROVED



UPDATED	-	LUDLUM MEASUREMENTS INC.			
DR	CKB	07-FEB-07	TITLE: MOUNTING-ADJUST GAIN/CAP BOARD		
CHK	<i>P.W.</i>	<i>2-10-97</i>	BOARD# 5209-019		
DSGN	-	-	SIZE C MODEL VARIOUS SERIES 209 SHEET 18		
APPD	<i>PBS</i>	<i>2-10-97</i>	NEXT HIGHER ASSY.		
08:33:22		10-Feb-97	S8209019	SHEET 1 OF 1	

REV #	ALTERATIONS	DATE	BY
1	VALID	10-7-96	TJR
2	ECF# 1082	7-30-05	CMC
3	ECF# 2255	12-4-07	RHS



PART NO: 4002-211			
DWN	DATE	CHECKED	APPROVED
RHS	12-4-07		Jew 12-4-07
TITLE: M 44-21 ASSEMBLY VIEW			
LUDLUM MEASUREMENTS, INC. 501 DAW STREET SWEETWATER, TEXAS 79556	SERIES	SHEET	
	2	156	