

# *Antenna Tuning Unit*

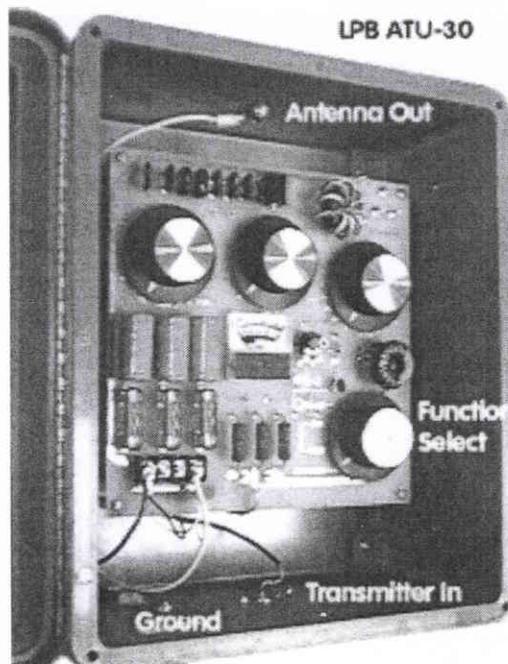
## *Manual*

*Model: ATU-30  
30 Watt Capacity*



**LPB COMMUNICATIONS, INC.  
960 BROOK RD. UNIT 5  
CONSHOHOCKEN PA 19428  
610 825-4100 PH  
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# ATU *Antenna Tuning Unit for SF-Series Antenna*



The ATU Series is designed for use with LPB's SF-Series antennas, typically used for Travelers Information Station/Highway Advisory Radio. Common alternate applications include emergency backup sites for commercial radio stations and regional emergency services.

The ATU Series is designed in a NEMA rated fiberglass enclosure with locking hasp(s) and is designed for mounting to the support pole of the SF-series antenna.

Easy connections for RF In, RF Out and Ground are made on the outside of the enclosure. The internal metering and simple adjustments allow for fine tuning to match any installation. Direct read metering for VSWR ensures the ease of operation and future monitoring.

LPB ATU units have been field proven in extreme weather conditions from freezing mountains to coastal hurricanes.

**LPB**

Instruction Manual  
LPB Model ATU-30  
Antenna Tuning Unit

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## Instruction Manual

### LPB Model ATU-30 Antenna Tuning Unit

#### 1.0 INTRODUCTION

LPB has manufactured low power AM transmitters and associated devices since 1960, and has well over 17,000 units in service worldwide. The LPB ATU-30 is specifically designed and manufactured to serve as an antenna tuning unit to match an LPB AM-30 series 30-watt transmitter into several types of antenna.

The LPB ATU-30 is housed in a weatherproof fiberglass enclosure, with two stainless steel hinge and latch, and padlock hasps. The outer dimensions of the enclosure in inches are 13-1/4 high (including the mounting flanges) by 11-1/2 wide by 5-1/2 deep.

#### 2.0 LIMITED WARRANTY

LPB guarantees that you will find the appearance, workmanship, and standards of material and construction of this equipment in keeping with the application, and with good commercial practice.

For a period of one year from date of delivery, we guarantee this equipment against any form of failure, provided that, in the opinion of the manufacturer, no improper use or modification of this equipment is at fault, the equipment is properly installed, and it is operated within stated parameters. During the warranty period we will furnish materials and labor in our shop to correct any failure.

After the warranty period, service will continue to be available from LPB.

#### 3.0 SERVICE INFORMATION

The LPB ATU-30 was designed and constructed for optimum results and long service. If any problem or question should arise, please call or write LPB Customer Service immediately. Identification information which you should provide when calling or writing includes model number, serial number, and date of purchase. This information is found on the identification label on the bottom of the enclosure.

In general, this equipment is not "user-serviceable"; we do NOT recommend user repair. If a malfunction is suspected, we urge you to return the equipment to the factory for proper repair.

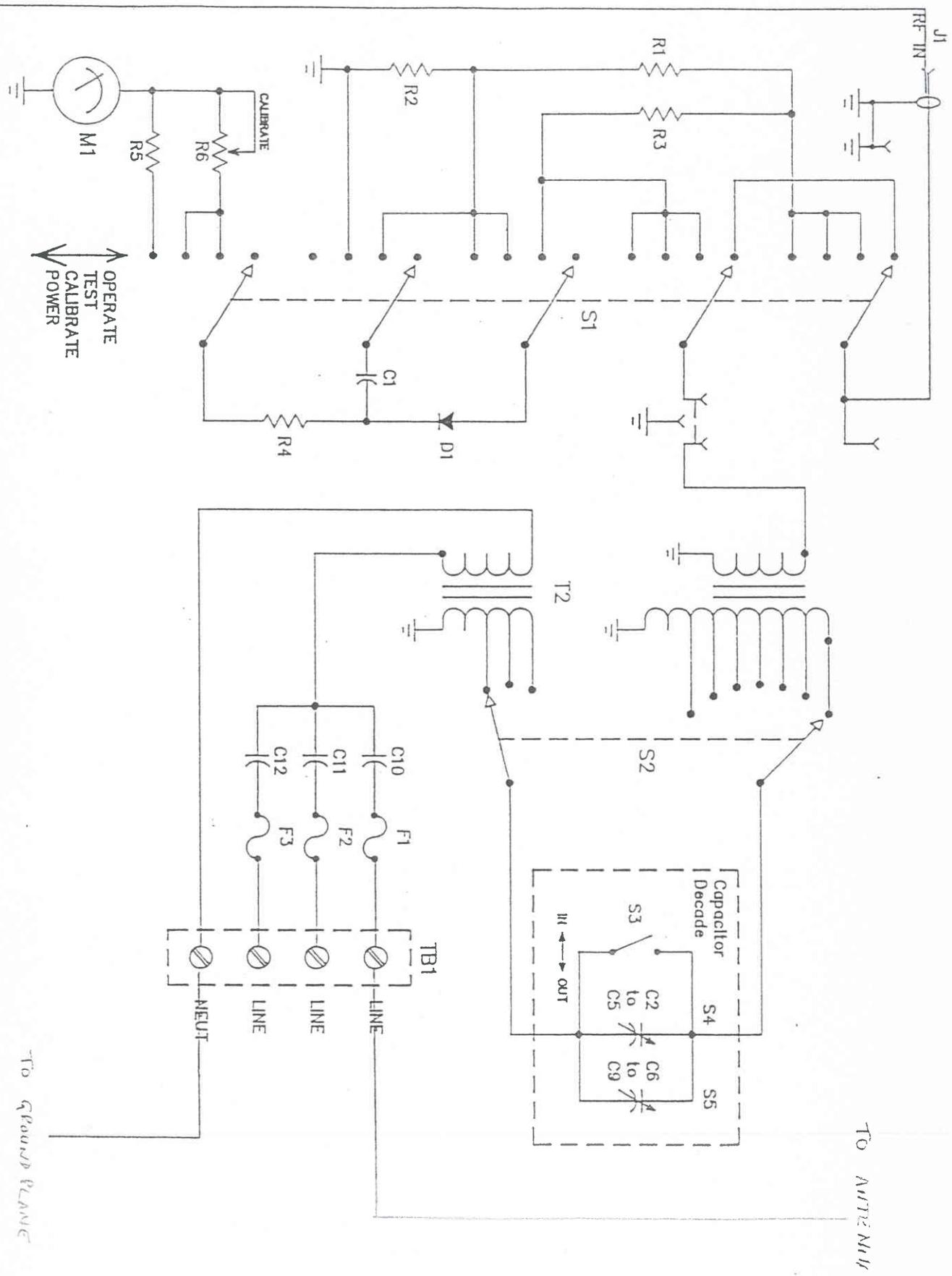
If need arises, contact LPB for a Material Return Authorization (MRA) and shipping instructions before shipment. The MRA number must be on the shipping label.

The services and experience of LPB engineers and technicians are always available to customers for assistance in the proper application of this and other equipment.

#### 4.0 CIRCUIT DESCRIPTION

The schematic diagram in Figure 1 will assist in isolating any problem. The LPB ATU-30 includes a gas tube surge arrestor, self-resetting. The surge arrestor closes in the presence of high voltage, such as a lightning strike on the antenna. This surge is thus shorted from the antenna directly to the ground plane, protecting the ATU-30 circuitry, and preventing the surge from reaching the Transmitter. It should be noted that severe and/or persistent lightning may cause damage despite these precautions.

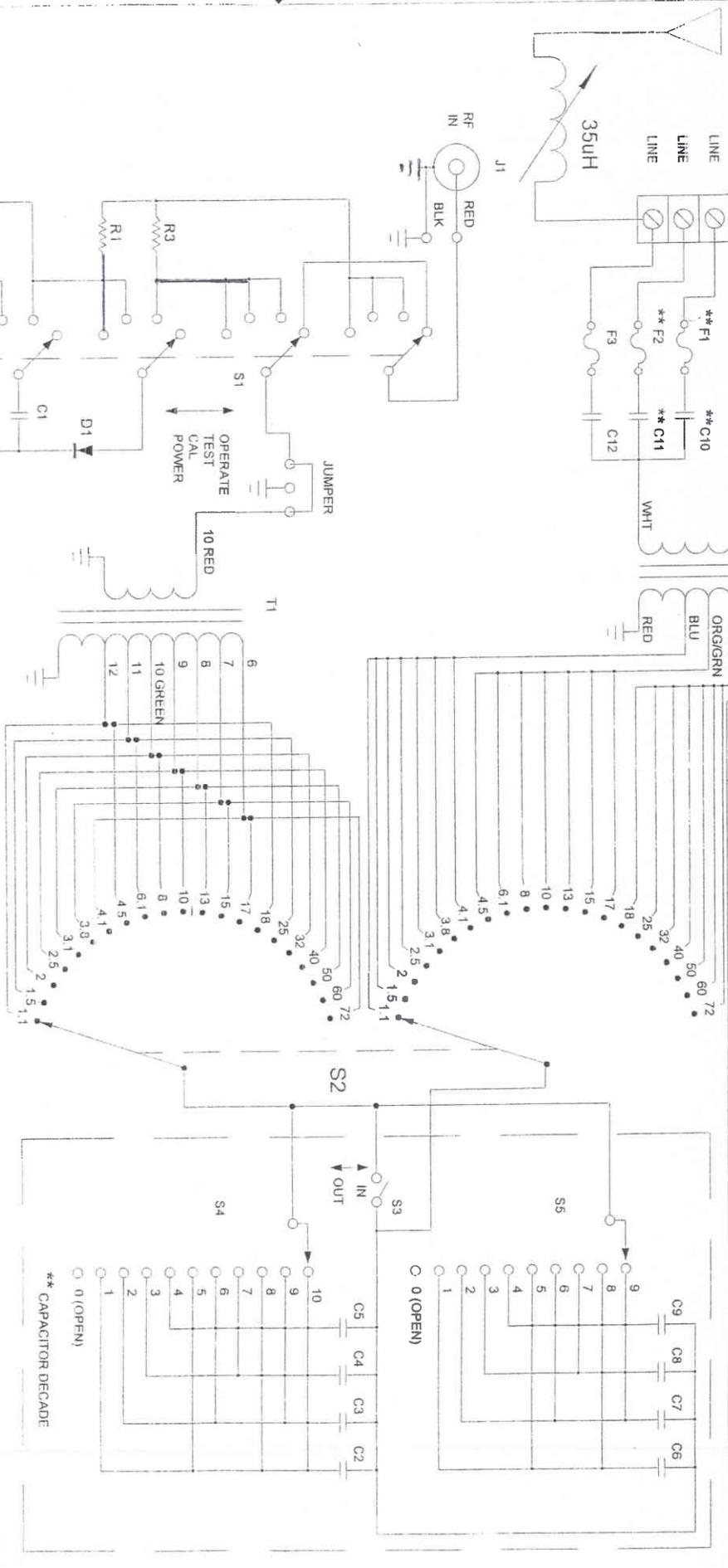
TO RF INPUT



# SCHEMATIC DIAGRAM

FIGURE 1

REVISIONS			DATE	APPROVED
ZONE	REV	DESCRIPTION		



Components marked with \*\* may appear on pcb but are not used in ATU-30V unit.

DRAWN BY: JB  
CHECKED: -

SIZE  
A

DWG NO.  
6058

SHEET 1

REV  
A

**LPB**  
LFB COMMUNICATIONS INC.  
FRAZER PA 19355  
Antenna Tuning Unit 30 Watt for Vertical Antenna  
Model ATU-30V

The information contained herein is proprietary and supplied for the sole purpose of fabrication exclusively for LFB Communications Inc.

## 5.0 INSTALLATION

The LPB ATU-30 is intended to be mounted to the same pole as a Morad antenna, if that is used. The mounting holes (two at top and two at bottom), are 8 inches apart horizontally and 12-3/4 inches apart vertically.

All required connection points are on the outside of the LPB ATU-30:

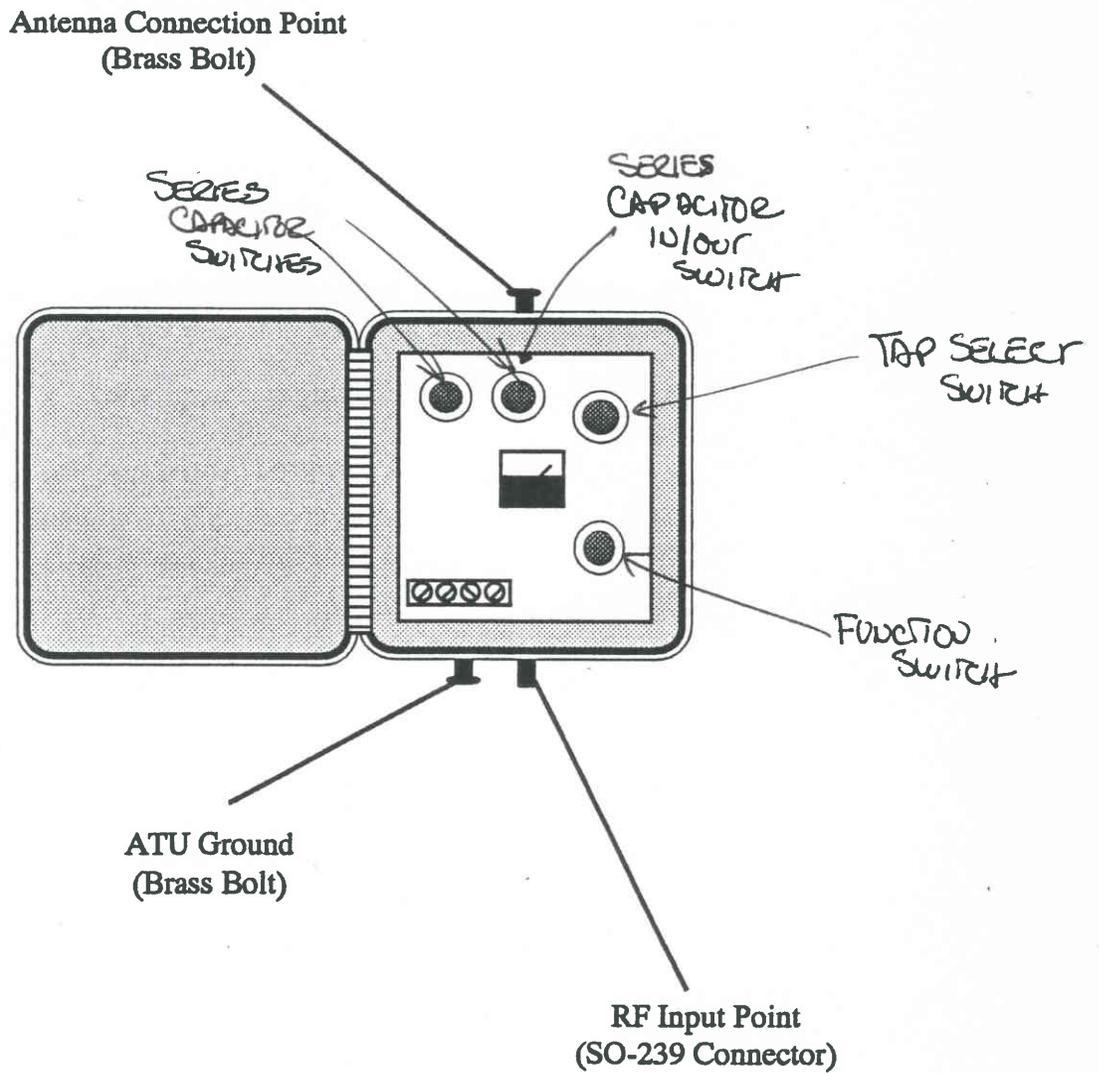
- Antenna connection brass bolt at the top
- Ground Plane connection brass bolt at the bottom
- RF input connection (from transmitter) SO-239 at the bottom.

The LPB AM-30 series transmitter output connection is an SO-239 female UHF connector. The transmitter RF output is to be connected to the ATU RF input via RG-8/U 50 ohm coaxial cable with PL-259 male UHF connectors.

All connections to the LPB ATU-30 must be thoroughly weatherproofed.

# LPB Model ATU-100/SF External Connections

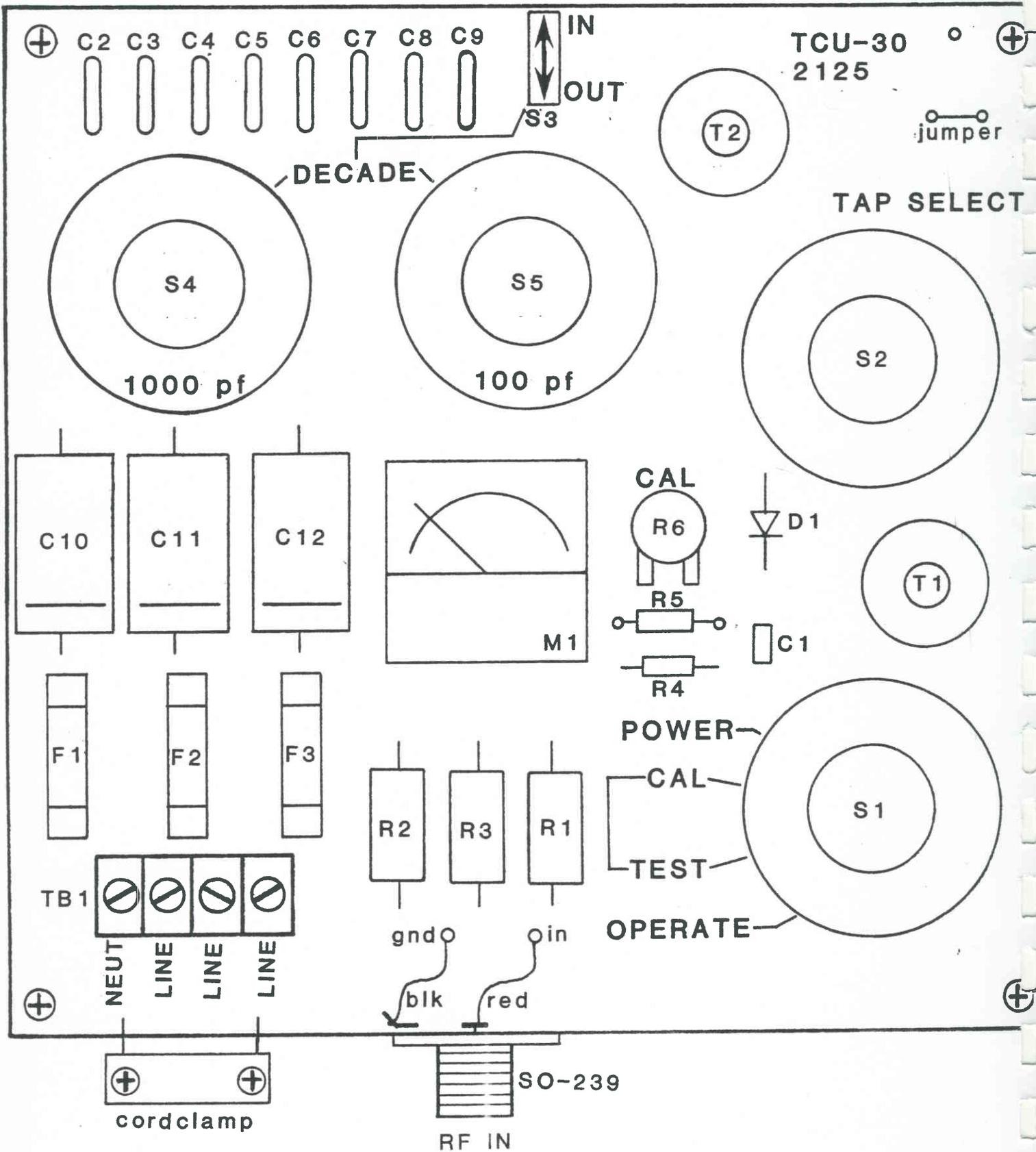
(Figure 2)



**LPB**

28 Bacton Hill Rd., Frazer, PA 19355. P: 610-644-1123, F: 610-644-8651, E: [lpbsales@lpbinc.com](mailto:lpbsales@lpbinc.com)

# TCU-30 Transmitter Coupling Unit



## 6.0 OPERATING INSTRUCTIONS

### CAUTION

To prevent possible damage to the ATU:

- A. The transmitter must be set at no more than 7.5 watts on the ATU-30 meter until matching is complete.
  - B. The ATU Function Switch must not be left in POWER, CAL, or TEST for more than 5 minutes.
1. Turn the transmitter OFF, and insure that the transmitter and ATU are properly connected with RG-8/U 50 ohm coaxial cable, and that the ATU is properly connected to the antenna at the top connection and the antenna ground plane at the bottom connection.
  2. Initial ATU control positions:

Function Switch	POWER
Tap Select Switch	72 OHMS
Decade Slide Switch	OUT
Cal Potentiometer	FULL COUNTERCLOCKWISE
  3. Turn the transmitter ON; set the transmitter to NO MORE THAN 7.5 WATTS on the meter.
  4. Turn the ATU Function Switch to CAL. Adjust the CAL Potentiometer until the meter needle is at the CAL mark at full scale on the meter.
  5. Turn the ATU Function Switch to TEST.
  6. Rotate the TAP SELECT Switch for minimum meter reading.
  7. Move the Decade Slide Switch to the IN position.
  8. Rotate the 1000pf Capacitor Switch as a rough control, then the 100pf switch as a fine control, while watching the meter for a lower reading than in Step 6. (NOTE: Do not operate the ATU-30 with both Capacitor Switches in the zero position.)
  9. Repeat step 6 and step 8 in sequence trying for the lowest possible meter reading (VSWR).
  10. After you have the best possible match, with the VSWR in the green (2:1 or below), turn the ATU Function Switch to POWER. Adjust the transmitter to full intended output power. Turn the ATU Function Switch to CAL, and adjust the CAL Potentiometer to full scale if necessary. Turn the ATU Function Switch to TEST and verify that the VSWR hasn't changed.
  11. Matching is now complete. Turn the ATU Function Switch to OPERATE.

LIST 1 LPB ATU-30 PARTS LIST

ATU-30: COMPONENTS

DATE: 1/23/95

<u>NOTE</u>	<u>QTY</u>	<u>PART NUMBER</u>	<u>SYMBOL</u>	<u>DESCRIPTION</u>
	1	671-2128-D	NONE	TCU-30 P C BOARD, BLANK
	3	766-1248	R1, R2, R3	50 OHM, 7 WATT, 5% RESISTOR
	1	764-1469	R4	51.1 K OHM, 0.5 WATT, 1% RESISTOR
1	2	775-1185	R5, R6	100 K OHM TRIMPOT, HORIZONTAL MOUNT
	1	545-2173	M1	1" DC AMMETER 300 $\mu$ A SPECIAL
	1	781-1001	D1	1N34A SIGNAL DIODE
	1	174-1217	C1	0.01 $\mu$ F, 100V, CERAMIC DISC CAPACITOR
	1	171-1176	C2	1000pF, 500V, 5% DM CAPACITOR
	1	171-1197	C3	2000pF, 500V, 5% DM CAPACITOR
	1	171-1212	C4	3000pF, 500V, 5% DM CAPACITOR
	1	171-1221	C5	3900pF, 500V, 5% DM CAPACITOR
	1	171-1095	C6	100pF, 500V, 5% DM CAPACITOR
	1	171-1117	C7	200pF, 500V, 5% DM CAPACITOR
	1	171-1132	C8	300pF, 500V, 5% DM CAPACITOR
	1	171-1140	C9	390pF, 500V, 5% DM CAPACITOR
	3	175-1075	C10, C11, C12	0.1 $\mu$ F, 1000V, 10% PAP CAPACITOR
	1	824-2175-A	S1	5 POLE, 4 POS ROTARY SWITCH
	1	824-2176-A	S2	2 POLE, 21 POS ROTARY SWITCH
	1	823-1005	S3	SPDT SLIDE SWITCH, PC MOUNT
	2	824-2177-A	S4, S5	11 POSITION ROTARY DECADE SWITCH
	3	411-1004	NONE	2" SKIRTED KNOB W/ALUMINUM CAP
	4	201-1006	T1, T2	1.1" FERRITE TOROIDS, GLUED PAIR
	1	191-1007	TB1	4 POSITION TERMINAL BOCK, PC MOUNT
	1	175-1075	C10	0.1 $\mu$ F, 1000V, 10%, PAP CAPACITOR
	3	692-1021	F1, F2, F3	4 AMP, 250V, NO-DELAY FUSE
	1	191-1007	TB1	4 POSITION TERMINAL BLOCK, PC MOUNT
	1	697-1015	NONE	TII SURGE ARRESTOR

NOTES:

1. R5 IS MOUNTED ON THE BACK OF THE PC BOARD.



## TII 317 MAXIMUM DUTY THREE-ELECTRODE GAS TUBE SURGE ARRESTER

### DESCRIPTION

The TII 317 is an encapsulated module containing a TII Maximum Duty three-electrode gas tube surge arrester, engineered to protect equipment from lightning and induced surges. It is applicable for use in control circuits or other specialized communications services using open wire, above ground cable, or buried cable. It is also recommended for use on AC circuits in conjunction with line fuses, circuit breakers or circuit limiting resistors. The TII 317 provides superior protection due to the rapid recovery of the three-electrode gas tube, which returns the protected line to service as the transient subsides.

Installation is straightforward for both existing and new applications. The unit's three spade tip leads facilitate connection to binding post terminals with up to No. 10 screws. The two outer leads are connected across the two-wire circuit being protected, and the center lead to ground. The grounding termination point should provide a low resistance path to earth ground in order to optimize protection.

### FEATURES

- Provides Maximum Duty three-electrode gas tube protection
- Self-restoring
- Prevents dangerous metallic voltages
- Reduces costly maintenance
- Recommended for use on control circuits buried cable and other specialized communication links

F A X M E M O

DATE: 12/27/96  
FROM: Dick Burden FAX 818-884-8840  
BURDEN ASSOCIATES VOICE 818-340-4590  
TO: Ed Devecka  
LPB Inc.  
FAX # 610-644-8951 -- TOTAL PAGES 01  
SUBJECT: Tuning the Morad Antenna

- 1) Set the top section at the factory mark.
- 2) Set the series cap for 7700pf and the tap select for 75 but leave the cap switch OUT.
- 3) Set the ATU for 10 watts and adjust the calibration.
- 4) MAKE SURE THAT THE BUCKET TRUCK IS AWAY FROM THE ANTENNA WHEN YOU MAKE THE TEST.
- 5) Go to the TEST position and adjust the tap select for the best null. Next put the cap switch IN and adjust for the best null. You may have to experiment with both the Tap Select and the Series Capacitor. If the null does not improve with the Cap Sw IN, the antenna is capacitive and the antenna must be lengthened. Move from the reference mark one inch at a time or less and keep track of the distance from the mark for your records. Reset the ATU as in 2 & 3 above, and proceed as above until there is a good null with the Tap Select with 30 to 50 ohms and the Series Cap at approximately 5000 to 9000pf.
- 6) Record all your readings for future reference.

Good Luck

F A X M E M O

DATE: 06/01/00  
FROM: Dick Burden FAX 818-884-8840  
BURDEN ASSOCIATES VOICE 818-340-4590  
TO: ALLAN MENDELSON -- TOTAL PAGES 03  
FAX # 714-526-3556  
SUBJECT: LPB ATU-60

Allan,

The schematic and layout drawings follow.

Suggestions for tuning the antenna

- 1) Initial ATU Positions

Function Switch	Power
Tap Select	72
Decade In/Out	Out
Calibrate Pot	Full Counterclockwise
- 3) Apply transmitter power (approximately 10 watts)
- 4) Turn FUNCTION Switch to CAL and adjust CAL pot for full scale.
- 5) Turn Function Switch to TEST
- 6) Adjust TAP SELECT switch for minimum meter reading
- 7) Set the Series "CAPACITOR" switches to 7500pf
- 8) Adjust TAP SELECT and "CAPACITOR" switches for minimum meter deflection
- 9) If the meter deflects upward when the "DECADE" switch is in the IN position, the series capacitor is detuning the system. Thus, increase the length of the antenna from the mark and repeat steps 6 thru 9 until you get a good null. You should be able to go thru the null with the capacitor switches. When you can do so, you will have a good match.
- 10) Place the FUNCTION SWITCH in the OPERATE position to operate the system.

**Richard Burden**

---

**From:** "Richard Burden" <rwburden@pacbell.net>  
**To:** <officerferguson@townofduck.com>  
**Sent:** Monday, November 27, 2006 5:01 PM  
**Attach:** PhotoStudio - acu-30 cont.pdf  
**Subject:** Antenna Tuning Unit - Readings

Philip,

I have attached a line drawing of the Antennna Tuning Unit to this Email as an aid to locating the switches for the requested information needed to complete the required notification of completion of your installation to the FCC.

Please open the tuning unit and check for the position of the following switches.

S4 \_\_\_\_\_

S5 \_\_\_\_\_

S3    IN    OUT    (Please Circle)

S2 \_\_\_\_\_

Place S1 in the POWER position. Read Power (top Scale) on meter (M1). Enter POWER reading here: \_\_\_\_\_

Place S1 in the CAL position. Adjust R6 to the right of the meter (Marked as CAL) so that the meter reads "full scale" or 100%

Place S1 in the TEST position. Meter should be in the green. Read the VSWR (bottom scale) Enter TEST reading here \_\_\_\_\_

**PLACE "S1" IN THE "OPERATE" POSITION BEFORE SECURING THE UNIT.**

Thanks,

Dick Burden  
 rwburden@pacbell.net  
 818-340-4590