



**SPC 300 AND SPC 3000  
ANTENNA TUNER  
UNIT  
MATCHING NETWORK**

**OPERATORS  
MANUAL**

ATU'S UK  
OF  
  
ELECTRONICS LTD  
Skelmersdale (0695) 27948

ATU'S UK.  
OF  
  
ELECTRONICS LTD.

# OTHER PRODUCTS

OUR RANGE OF INDOOR AND OUTDOOR  
1 TO 1 AND 4 TO 1 HIGH AND LOW POWER  
BALUNS.

OUR UNIQUE CLIP ON OPEN WIRE FEEDER  
KIT COMPRISING 20 PATENTED CLIP  
ON SPREADERS (ENOUGH TO MAKE OVER 100  
FEET OF 600 OHM FEEDER.)

ROBUST CENTRE DIPOLE TEE PIECE  
AND TWO CERAMIC EGG INSULATORS.  
CAPACITORS MADE TO ORDER.

TURNS COUNTERS.  
ROLLER COASTERS.

REMOTE AND SPECIAL A.T.U.s BUILT  
TO YOURS OR OUR SPECIFICATION.  
PLEASE ENQUIRE, WE ARE DEVELOPING  
NEW PRODUCTS ALL THE TIME.

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## INTRODUCTION

### GENERAL DESCRIPTION

Both the SPC-300 and SPC-3000 are undoubtedly the finest A.T.U.'s to be found in the world today.

Our A.T.U. is based on that devised by Doug De Maw (WIPB) but, unlike his using very hard to find capacitors and roller coasters, we have manufactured our own in a very clever unique composite mainframe which ensures a very high Q with just two links of wire for the total connections.

The series parallel capacitance, (SPC) format, substantially improves harmonic rejection and also ensures a virtual true impedance match from 50 to 75 ohms into aeriels of only a few ohms to aeriels of several thousand ohms. By virtue of being infinitely variable, it cleans up the outgoing and incoming signal very dramatically, also cutting down the amount of QRN encountered on the bands.

### WHY USE AN A.T.U.?

An aerial tuning unit should be able to match a 50 ohm output from any transmitter to a very wide range of impedances, and, tune out any capacitive or inductive reactance. Even when an antenna system is correctly matched, a good A.T.U. helps by providing a very sharply tuned circuit which cleans up the transmitted signal and affords the receiver better protection from overloading by strong out of band signals. The latter function is particularly important with modern solid state rigs which are very broad band in the front end.

## WARRANTY

Careful handling and correct use of all our equipment, in accordance with our instructions is important to obtain correct performance.

It is therefore necessary to carefully read and assimilate our instructions to ensure proper and considerate usage.

We, at CAP.CO.ELECTRONICS LTD, will, on inspection at our premises, replace any mechanical part that we think has broken through fair wear and tear.

Carriage to and from us will be paid for by the customer.

A.T.U.'s U.K. of  
CAP.CO.ELECTRONICS LTD.

## SPECIFICATION

<u>FREQUENCY COVERAGE</u>	<u>INPUT IMPEADANCE</u>	<u>OUTPUT IMPEADANCE</u>	<u>POWER CAPABILITY</u>
<u>SPC-300</u>			
500Kcs - 29.9Mcs	50-75 ohms	2 to 2.5Kohms	400 watts 1Kw pep
<u>SPC-3000</u>			
500kcs - 29.7mcs	50-75 ohms	2 to 2.5Kohms	1.5Kw 3 Kw pep

## COMPONENTS

	<u>CAPACITOR C1</u>	<u>SPLIT STATOR</u>	<u>ROLLER COASTER</u>
SPC-300	200pfd 3kv Spacing	200+200 3Kv Spacing	28 micro henries
SPC-3000	200pfd 5Kv Spacing	200+200 5Kv Spacing	28 micro henries

## CONSTRUCTION AND MATERIALS

Mainframe Endplates and Roller Coaster - Phenolic Resin bonded laminate BS1137.

Mainframe Tie Bars - Acetal Rod.

Stator and Rotor Blades are of high grade NS4 alloy. All other metal components are of solid brass.

## CABINET DIMENSIONS

SPC-300 - 12"D x 3 1/2"H x 10"W

SPC-3000 - 15"D x 5 1/2"H x 12 1/2"W

PAINT electrostatically applied epoxy polyester, baked on.

COLOURS for both A.T.U.'s - Dark Grey, Light Grey, Black. This range of colours to correspond with most of today's rig colour schemes.

## MAINTENANCE

All our A.T.U.'s are virtually maintenance free, since they are passive devices and if properly handled should give a lifetime of satisfactory service.

The composite SPC A.T.U. Mainframes are virtually undestructable and are very robust.

By itself, the A.T.U. can tolerate very high powers and has been tested under laboratory conditions. The SPC-3000 for instance, was run up to 7Kv before flash-over on the capacitor plates took place, and in the case of the SPC-300, flash-over occurred at over 4.6Kv.

## A.T.U. MAINFRAME ADJUSTMENTS - CAUTION

Should you need to adjust your unit, disconnect all input and output connections. The recommended access is to remove the top lid by unscrewing the six pozi-drive screws.

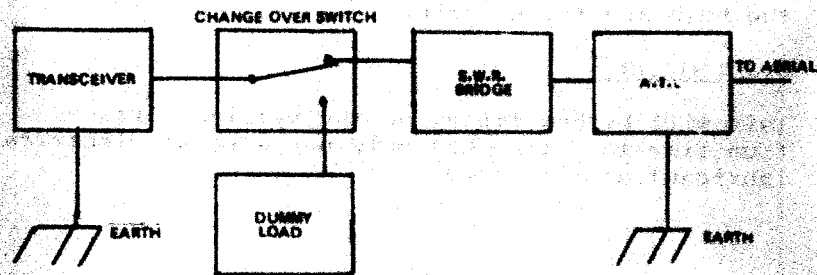
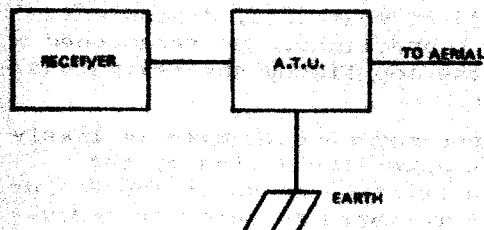
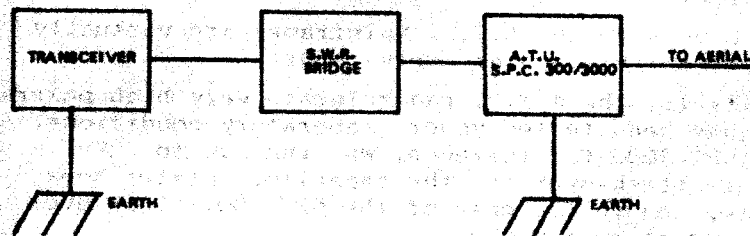
The only adjustment you may need to make is likely to be to tighten or slacken the action of the Rotor Spindles or the friction drive of the Roller Coaster, which can be tailored to suit the individual.

DO NOT over loosen as then arcing can occur between the bush and the spindle.

## LIGHT OILING

This will be beneficial on the bearing surfaces from time to time, but only use special electrical lubricant at all times.

## CONNECTION LAYOUT



## THE VOLTAGES INVOLVED

A popular competitive A.T.U. rated at say a Kilo-watt will arc over on just 50 watts if used on a voltage fed long wire. There would appear to be little point in making an A.T.U. which will match a wide range of impedances if it will not handle the high voltages that occur when it is doing its job by correcting for a mismatch.

Suppose the impedance at the end of the aerial feeder is 1000 ohms and you are running 400 watts,  $E W \times R = 632$  volts. The peak voltage will be 1.414 times this and you are likely to exceed 400 watts on the odd syllable, on some bands you may well meet reactive impedance of several thousand ohms. This means that a real A.T.U. that will meet all eventualities demands capacitors that will take a few thousand volts.

Outside Government surplus equipment, all other A.T.U.'s previously have had one weak point, the capacitor plates limited spacing. Not so the CAP.CO. equipment.

## OLD FASHIONED QUALITY

Progress to a lot of people is to find a more complex way of doing a job almost as well. CAP.CO. have turned the clock back and offer solid workmanship, quality and reliability to those who appreciate good engineering. Our design excellence combines these qualities with modern practices.

The latest ideas are not always the best and it may surprise the more recently licenced hams to know that the type of multiband antennas fed with open wire feeders which were common place in the early thirties, are still unbeatable for efficiency. Trap dipoles and the 5RV are only compromise aeriels and for those who want to break away from this into good old fashioned low loss engineering, CAP.CO.'s range of A.T.U.'s, Open wire feeder spreaders and Baluns, provide the way to sure fire success.

WHY AN A.T.U. BETWEEN TRANSCEIVER AND AERIAL ?

Of course there are the sceptics who will tell you not to use an A.T.U., well there has not been an aerial made that when it has been erected will give a true 1 to 1 S.W.R. other than on the resonante centre frequency it was cut for. No aerial installed at varying heights and locations, let alone the perfect or imperfect earth, will ever achieve this exaggerated claim. This also goes for so called balanced arrays.

With the power levels amateurs are restricted to on some bands, it is important that every ounce of energy from the P.A. to the antenna gets into the aerial. If one is using a solid state transceiver with transistorised P.A., then not to use the best A.T.U. is not only foolhardy but bordering on insanity. They will not give full power output unless a perfect 50 ohm match.

OPERATION

Having ascertained that the transceiver has been tuned correctly into a dummy load, place an S.W.R. bridge in between transceiver and A.T.U.

1. Tune transmitter to frequency required in receive mode.
2. Place both C1 and C2 to mid scale No.5 on both scales.
3. Rotate Roller Coaster clockwise to hear a definite increase in received signal strength. This is best achieved by listening for another station and tuning to that station, alternately moving C1 and C2 to achieve even a further increase in background noise. This will and should be near enough tuned, apart from tuning out the reactive component.

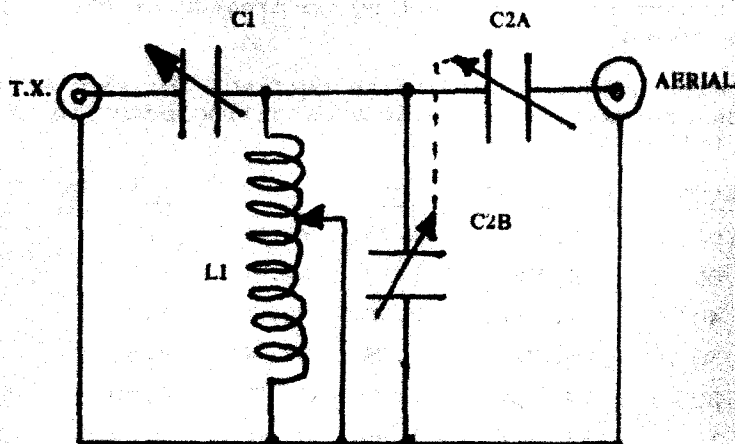
4. Moving to a free space on the band, inject a small amount of R.F. into the band, and quickly rock backwards and forward C1 and C2 alternatively until a minimum dip has been achieved. This should be done in steps of no more than eight to tens seconds, as quickly as possible. I cannot stress the importance of this too much.

After practice and writing down the various settings for each band, you will become very adept. You may find slight repositioning of the Roller Coaster may achieve a better S.W.R., either way a 1 to 1 match should always be possible if sufficient notice of setting up procedures has been taken.

To help further, approximate settings for various bands are written down as a starting point in the following table:

<u>BAND</u>	<u>FREQUENCY</u>	<u>C1</u>	<u>L1</u>	<u>C2A+B</u>
160	1.900	2.75	31.00	7.25
80	3.790	3.25	14.710	5.00
40	7.099	2.50	06.51	3.75
30	10.200	1.75	04.40	4.65
20	14.234	1.00	02.75	6.50
17	18.200	1.95	02.00	2.25
15	21.200	2.00	01.74	1.00
12	24.600	1.45	00.85	0.75
10	29.250	1.15	<del>00.07</del>	0.25 0070

A.T.U. CIRCUIT DIAGRAM.  
S.P.C. 300/3000



C1 - 200 PFD  
C2 A&B 200&200 PFD  
L1 - ROLLER COASTER 28 MICRO HENRIES

INSTALLATION - PLEASE READ CAREFULLY

CAUTION

We strongly recommend that a dummy load be used in conjunction with the A.T.U. via use of an aerial change over relay or switch, to enable that you may tune the transmitter before using the A.T.U.

WARNING

Always ensure that a good heavy braid earth wire be attached to the earth tag on rear of the A.T.U.

CONNECTION TO ANTENNA

For unbalanced dipole or beam, connect direct to PL239 socket on rear of A.T.U.

For balanced fed aerials, we suggest connection via our balun - 4 to 1 Indoor or Outdoor.

For use with long wire, end fed and vertical aeri-als, we suggest using a bannana plug and place this into the centre of the PL239 socket.

AERIAL EARTHING

There are no safety measures for a direct lightning strike but it is advisable when you close your station down that the aerial or aeri-als be removed from the A.T.U. and shorted to ground via the thick braid on the earth tag at the rear of the unit. This should then go to a good outside earth stake, the mains earth is not always good enough

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15	21.200	2.00	01.74	1.00
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