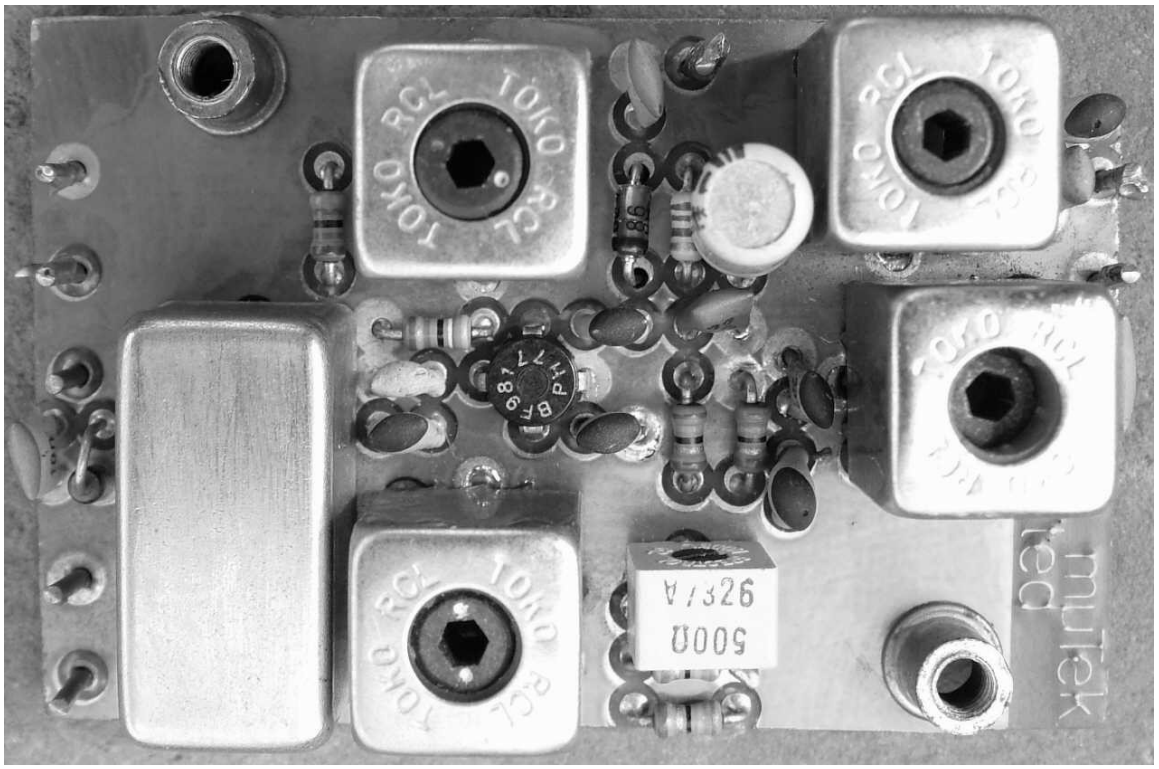
A VHF Preamplifier Kit SLNA145ub

a product produced by Mutek (circa 1991)



Manual compiled by Clive Smith, GM4FZH for general circulation

Table of Contents

Compilers Note

This manual has been put together and designated Edition 1. The information has been obtained from various sources, including past owners and the Internet; **I cannot vouch for the accuracy of this information.** It is not intended to produce an updated version of this manual, if additional information becomes available it maybe provided as an addendum.

The products produced by Mutek were of high quality and many are still in service. However, please remember that this product came on to the market some 20-30 years ago and must now be regarded as obsolete.

It appears that the successor to this unit is the SLNA290s1 which, hopefully, will be dealt with in its own manual and available if the information required is forthcoming. See History of PCB below.

This manual has no copyright but I would be grateful that if it is used the source is acknowledged. Please let me know if you have further details that would help with this or any other Mutek product.

****** PLEASE NOTE: ******

The information contained herein is provided in good faith and I will not be responsible for any outcomes arising from the use of it. I have put it together for use by the amateur radio fraternity.

The list of other manuals can be found on my website www.gm4fzh.co.uk (as they become available) where there are also details of how to contact me. I have no association with the firm Mutek and this manual has been produced at my own expense and without any payment.

Clive Smith, GM4FZH, Spring 2020

The filename of this document is ***preamp slna145ub.pdf***.

Specification

Gain	up to 23dB
Noise Figure	<1dB
Power	12V @ 10mA
Size	0.9” x 1.9” X 0.75”

History of the PCB

After some research, the history of this pcb (in bold) appears to be as follows, EOE.

PCB Type	**Notes**	**Approx. date of issue**
*144MHz preamplifier	**Not Covered by this manual.** Very early pcbs. Standard components, hand layout.	1979-1983
*SLNA145sb *PA00065	Through hole components. Produced as a preamplifier for the FT290 Mk1.	Circa 1983 onwards
SLNA145ub	**Through hole components. Produced as a build yourself kit - no changeover relay included.**	**1991**
*SLNA145s	Stand-alone preamplifier but part could be cut to form a pcb similar to SLNA290s1. Uses SMD	1995
*SLNA290s1	Uses SMD and produced as a preamplifier for the FT290 Mk1.	1995

* Denotes not covered by this manual.

Introduction

The SLNA145ub is a low noise preamplifier for the 2m band. Supplied as a kit, aimed primarily at the novice, it is of high performance and simple to build and tune. No special equipment is needed - any 2m receiver can be used.

It is modelled on the successful SLNA145sb preamplifier for the Yaesu FT290R, the two main differences are that there is no transmit change-over relay, and there is no band pass filter. The latter has been omitted as it requires specialist test equipment to set up.

Circuit Description

The preamplifier has been matched for a low noise figure and a stable configuration. The overall gain is adjustable by means of a fixed output attenuator (R4, R5 and R6). The typical gain as supplied is 23 dB. The noise figure of the amplifier is less than 1dB, hence it will increase the sensitivity of most VHF receivers. The circuit is given in Fig.1. and requires a nominal 12V supply.

The components C1, L1 and C2 form the input matching circuit to gate 1 of the MOSFET (Q1); these components raise the 50 ohm input impedance to about 600 ohms which is close to the optimum for the best noise figure for the amplifier. R1 and R2 set the bias for gate 2 of Q1,the gate is decoupled at R.F. by C3, preventing injection of noise and stray signals at this point. L2, C5 and C6 form the output tuned circuit and also match the drain of the MOSFET to the 50 ohm output attenuator. The components R4, R5 and R6 form an output Pi section attenuator. R3 is used to limit the 'Q' of the output circuit, giving a flatter frequency response. C4 decouples the supply end of L2, ensuring correct operation of the output circuit.

NOTE: The values provided give 2dB attenuation, component values for other values of attenuation are given in Table 1.

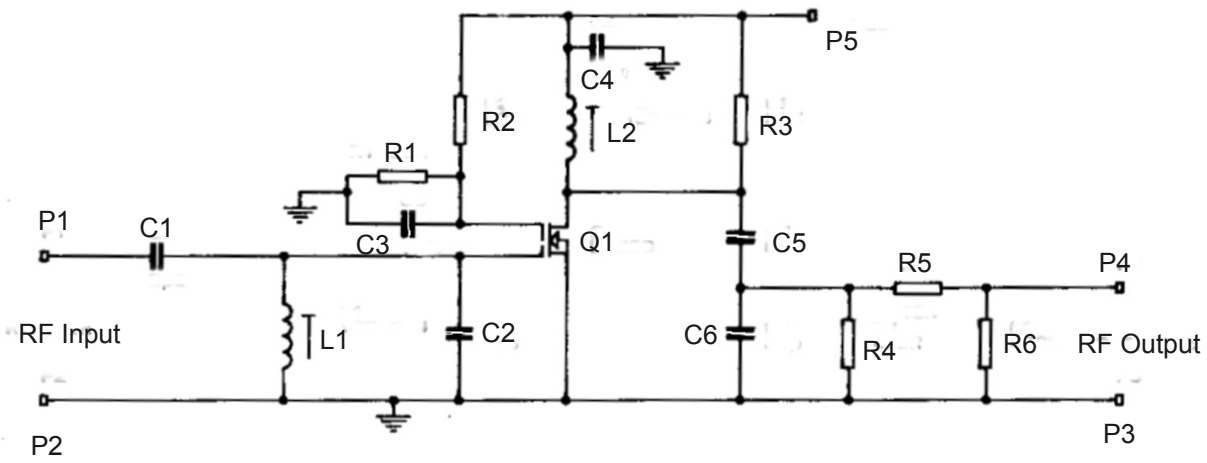


Figure 1: Circuit Diagram

Please make sure that your kit contains the following items. If there are any components missing, please get in touch with us.

Item	Quantity	Reference	Part
1	1	Q1	BF988 *Note 1
2	5	P1, P2, P3, P4, P5	Vero Pin
3	1	C1	5p6
4	2	L1, L2	100-074
5	1	C2	1p8
6	1	C3	1n0
7	1	R1	39k
8	1	R2	82k
9	1	C4	10n
10	1	R3	2k2
11	1	C5	8p2
12	1	C6	22p
13	2	R4, R6	470R
14	1	R5	10R
15	1	-	Printed Cct Board
16	1	-	Coil Adjusting Tool

* Note 1: The BF988 is a dual gate MOS FET, this type of device is easily damaged by static electricity. Leave it in its foil wrapper until you are ready to solder it in. Follow the instructions carefully.

Table 1: Component Values (Contents of Kit)

Assembly Instructions

Assembly of this preamplifier should take about 30 minutes. Please read these instructions carefully BEFORE you start, and relate the component placement on the PCB to the schematic diagram to ensure the correct placement of the components (see Figs. 2 and 3). All of the capacitors have their values written on them and the resistors are colour coded.

1) Carefully press the 5 Vero pins into the board. A small hammer may be used to gently tap them into their holes. These are fitted in the locations marked with small squares on the layout, and are labelled P1 to P5. These should be soldered to the tracks.

2) Fit the six miniature resistors in the correct locations. The resistor references screen printed onto the printed circuit board. Solder the resistors in place.

3) Identify the six capacitors and solder these in the correct locations. 4) Fit the two variable coils in place - solder both the pins and the tags of the cans to the board.

5) Solder the ground plane side the earthy end of R1, R4 and R6. The earthy ends of

capacitors C2, C3, C4, and C6 should also be soldered to the ground plane. This is because the boards supplied do not have plated through holes.

The final step is to fit the MOSFET to the board. This should be done with the soldering iron hot, plugged into an earth, but turned off. This will ensure that the tip is at earth potential and will minimise the risk of switching spikes from thermostatically controlled irons. The BF988 should be carefully unwrapped from its foil, and the legs of the device must be folded through 90 degrees to fit the hole in the PCB. The MOSFET must have its lettering facing the board when fitted - see Fig 3. Solder the source of the MOSFET to the ground plane, then turn the board over and solder all four connections.

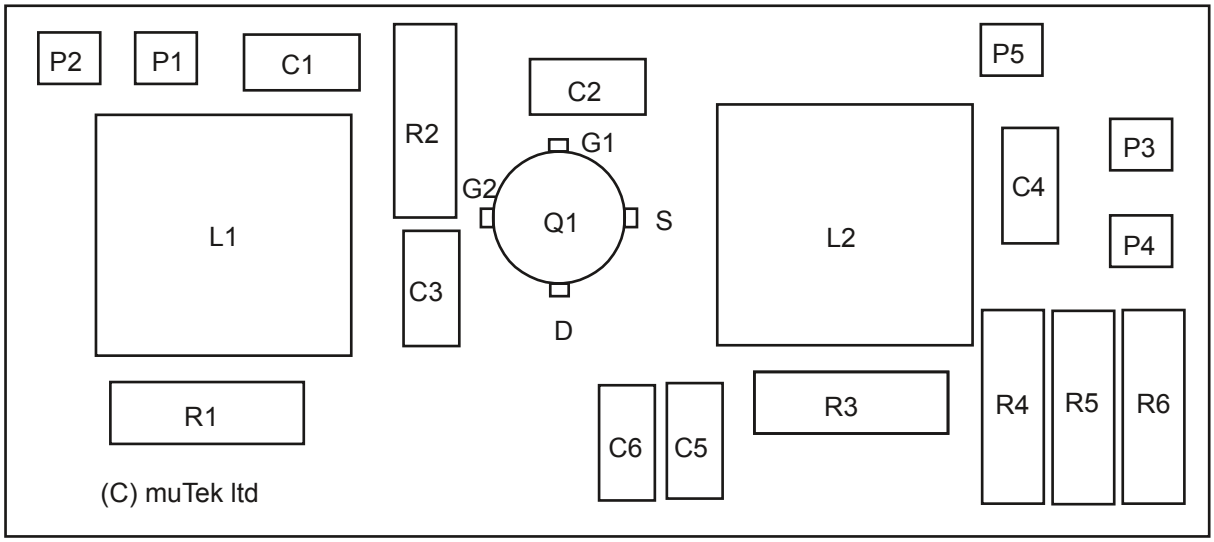


Figure 2: SLNA145ub Component Layout

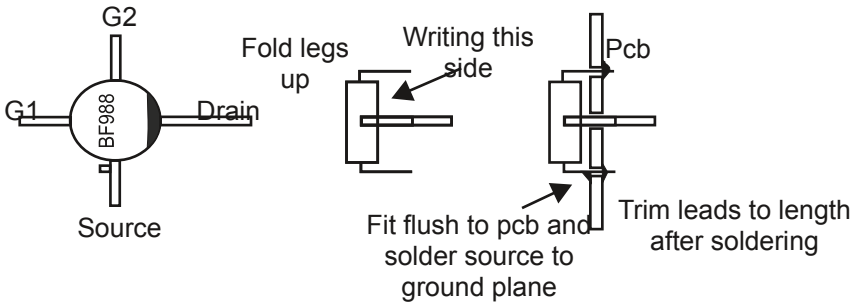


Figure 3: Fitting the BF988

Tuning the amplifier

If the amplifier has been correctly constructed it should have some gain when first powered up. to tune the amplifier the coil L1 should be tuned for maximum signal. This is normally achieved by raising the tuning slug to the top of the coil. L2 should then be adjusted to maximise the gain. If the amplifier shows signs of instability then the gain should be reduced by detuning L2 slightly.

Setting the Gain of the Amplifier

As supplied the amplifier has a gain of 23 dB (Nominal). In most cases this will be too high. It is possible to select a lower gain by increasing the output attenuation (R4, R5 and R6). A table of replacement resistor values is given below:-

Gain dB	R4	R5	R6	Attenuation dB
25	-	0	-	0
24	820	5.6	820	1
23	470	10	470	2
22	270	18	270	3
21	220	22	220	4
20	180	27	180	5
19	150	39	150	6
18	120	47	120	7
17	110	51	110	8
16	100	56	100	9
15	91	72	91	10
14	82	82	82	11
12	82	100	82	13*
10	75	320	75	15

Table 2: Values of R4, R5 and R6 to give various values of attenuation

Values given are closest 'standard' values. For other values of attenuation please refer to the Radio Data reference book, published by the R.S.G.B.

An alternative set of resistors for the attenuator are provided, these will give an overall gain of about 12 dB. See * above.

Tools Required

Soldering Iron (small) Solder (thin multicore) Solder sucker (might be useful)
Side cutters Small pair of pliers (long nose)