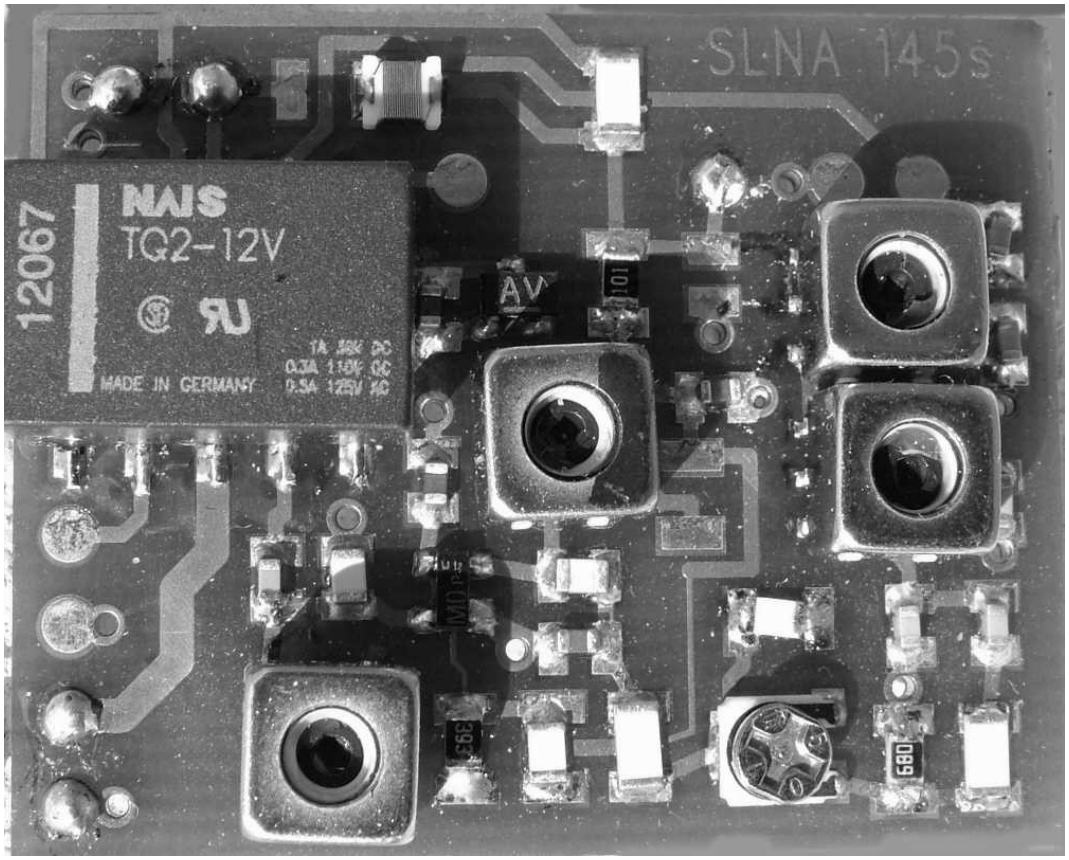
Edition 1

A VHF Preamplifier Kit SLNA145s

a product produced by Mutek (circa 1995)



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 slna145s.pdf***.

Specification

Noise Figure	1 dB
Transducer Gain	0 – 14 dB
3rd order intercept	-3 dBm
-3dB bandwidth	6 MHz
Relay Handling Power	30W
Relay control voltage`	12 V dc nominal
Preamp voltage	12 V dc nominal
Preamp size	26 x 39 x 7 mm (approx)

Kit List

Your kit should contain the following item:-

SLNA145s board 1 off

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	**Not Covered by this manual.** Through hole components. Produced as a preamplifier for the FT290 Mk1.	Circa 1983 onwards
*SLNA145ub	**Not Covered by this manual.** 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	**Not Covered by this manual.** Uses SMD and produced as a preamplifier for the FT290 Mk1.	1995

* Denotes not covered by this manual.

Introduction

Thank you for buying Mutek's SLN145s general purpose preamplifier. It has been designed to be fitted to any 144MHz transceiver as it is very small. It is very similar to the SLNA290s for the Yaesu FT290R

There are usually two reasons for the less than adequate sensitivity of modern transceivers. Firstly, the receiver designer must balance strong signal handling against sensitivity. With the devices currently available and at the prices the manufacturer is prepared to pay the balance usually comes out around 4 - 6dB noise figure and a 50 - 70dB dynamic range. The second point is that a typical economy is to use diode switching instead of an electromechanical relay. These diode switches are also usually run at low currents to save battery power and this inevitably leads to a greater insertion loss, often up to 4 dB. Hence it is not unusual for the noise figure to exceed 8dB.

At 144 MHz sky noise limits the maximum useable sensitivity of a receiver used for terrestrial communications to about 2dB noise figure (This corresponds to about 0.05uV for 10dB s+n/n ratio in ssb bandwidths). Lower noise figures can be obtained but will not let you hear any more. However, there is an advantage to using a low noise preamplifier to improve the sensitivity of a transceiver - it reduces the gain required to achieve the desired effect and hence does not degrade the dynamic range as much.

Overall system noise figure depends not only on the noise figure of the preamplifier but also on its gain and the second stage noise figure. By adjusting the gain of the preamplifier, it is possible to set the system noise figure to any value greater than the intrinsic noise figure of the preamplifier-transceiver system. Why adjust the gain? It is an unfortunate fact that the more gain ahead of the receiver, the more susceptible it becomes to overload by strong signals. By putting the minimum amount of low noise gain ahead of the receiver so as to set the sensitivity to a level where external noise is the limiting factor, an optimum (for the system) level is reached. A very low noise amplifier such as the SLNA145s will minimise the amount of gain required, and hence minimise the degradation of the dynamics

Circuit Description

Figure 1 shows the circuit diagram with component values in Table 1; the component layout is given on Fig. 2. A low loss relay provides the antenna changeover function. This is followed by a BF998 in a noise matched amplifier configuration. This provides the lowest noise figure with the optimum dynamic range. Following the output matching, a variable attenuator provides the gain control facility, without compromising the dynamic performance or the noise figure of the amplifier, as would be the case if the usual practice of varying the gate 2 bias was adopted. Following the attenuator, a bandpass filter provides substantial rejection of out of band signals, preventing these from reaching the original receiver and causing intermodulation. The amplifier has been designed, constructed and tested to very high standards.

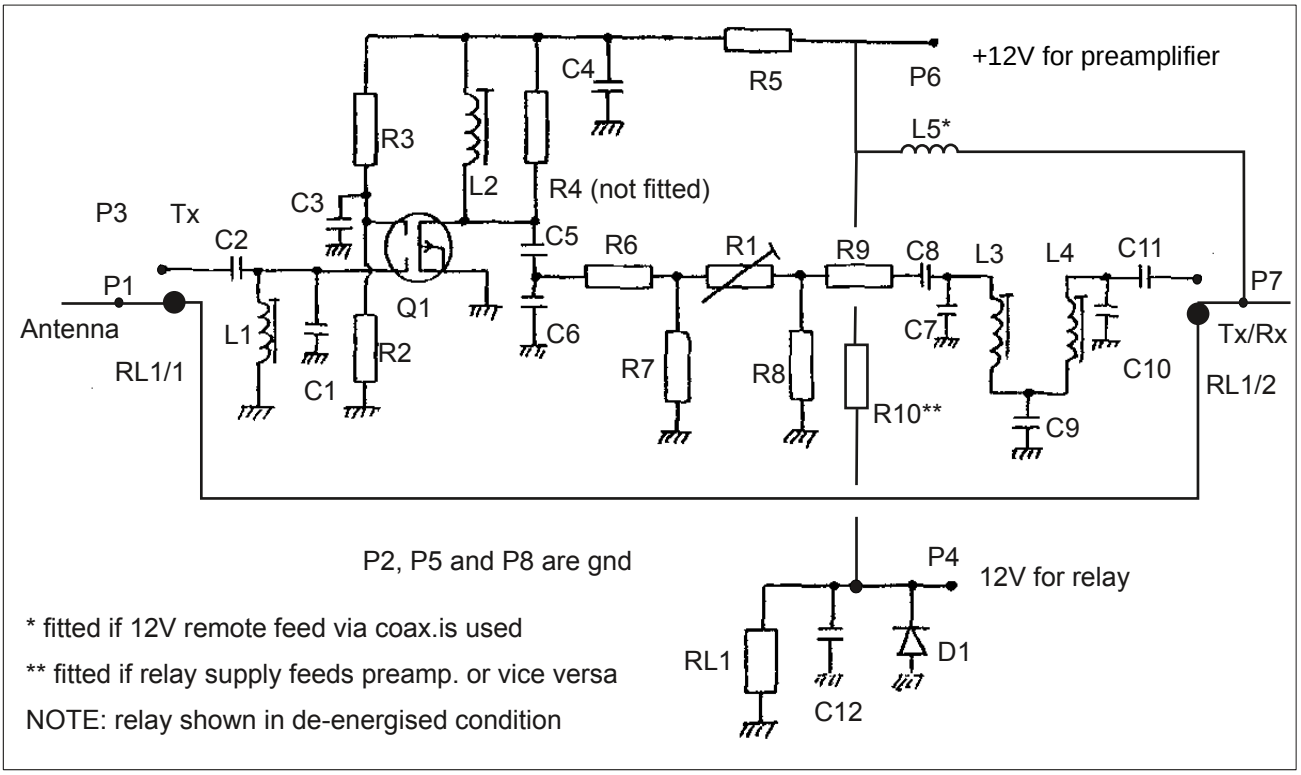


Figure 1: Circuit Diagram

Ref	Value	Ref	Value	Ref	Value
R1	470R pot	C1	1p8	C12	1n0
R2	39k	C2	4p7		
R3	82k	C3	1n0	L1	Type 100-074
R4	Not fitted	C4	1n0	L2	Type 100-074
R5	100R	C5	6p8	L3	Type 100-076
R6	15R	C6	22p	L4	Type 100-076
R7	68R	C7	2p2	L5	***
R8	68R	C8	2p2		
R9	15R	C9	100p	RL1	12V relay
R10	10R	C10	2p2	D1	BAS16
		C11	2p2	TR1	BF998

*** - no value found for this component

Table 1: Component Listing

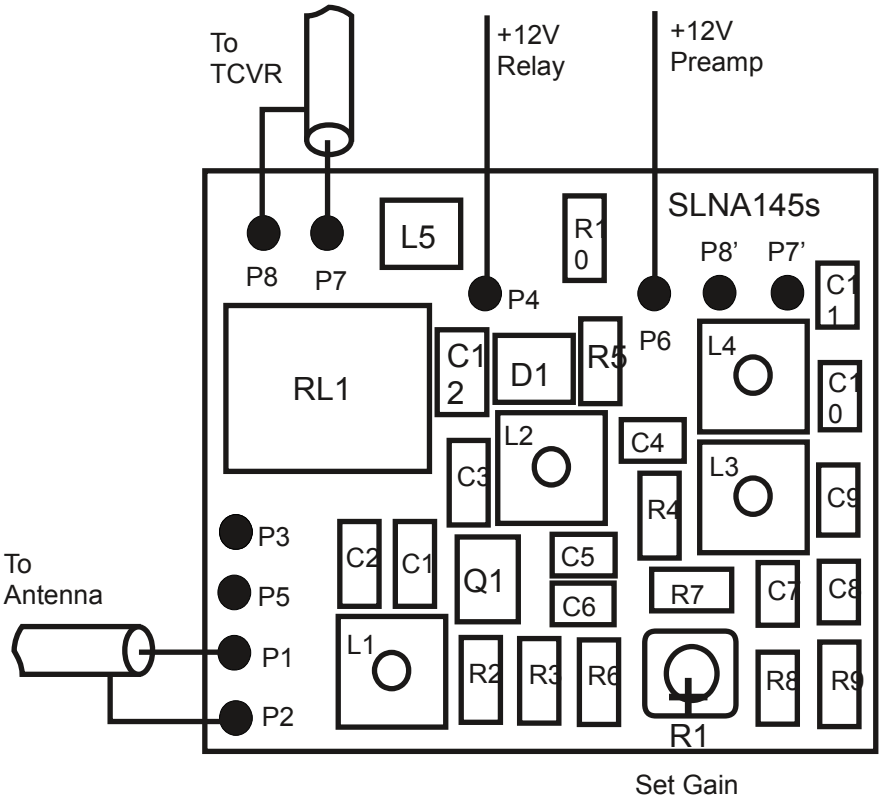


Figure 2; Component Layout

Installation Notes

Before attempting installation of the SLNA145s it is strongly recommended that the position of the preamplifier is determined and also the dc feeds and control signals available. This determines whether components R10 and L5 need to be fitted or removed – please see Table 2.

	Same 12V dc feed for preamp. and relay	Separate 12V dc feeds for preamp. and relay
Local dc feeds	Fit R10 only	No Components
DC feed via coax	Fit R10 and L5	

Tools Required

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