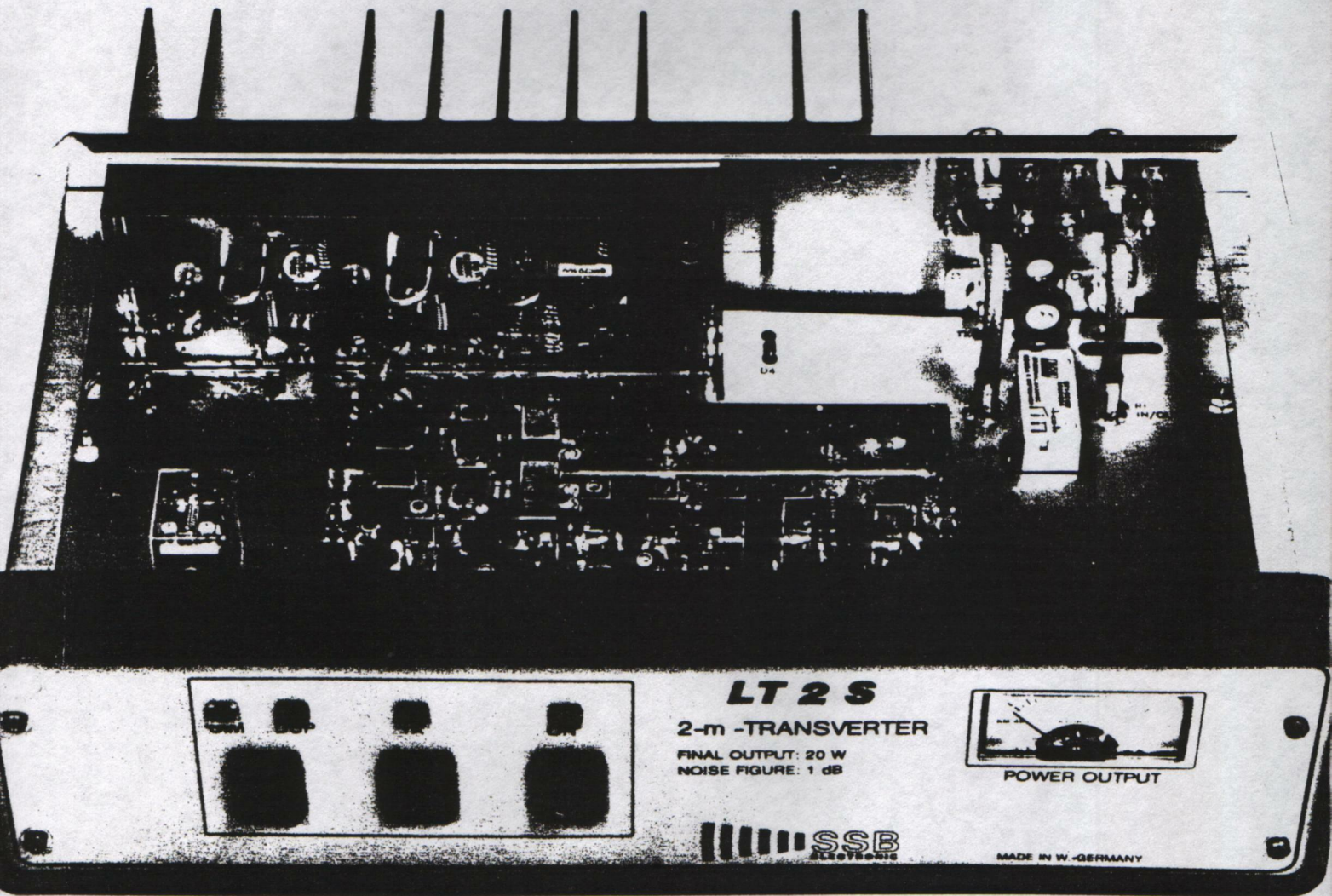


LT 2 S

2m TRANSVERTER



LT25 2m TRANSVERTER.

In the development of the LT 2 S the demand was made for a low noise receive-converter and also a high level signal handling capability, along with low inter-modulation signal products.

To achieve these results it was necessary to deviate from common circuit practices. Therefore the first stage uses a microwave GaAs-Fet, which is selected for a high IIP3 value. By having a high resting current (about 40 - 50 mA) and a suitable output network using a ferrite transformer, the first stage achieves a 3rd order intercept point (IP) of +10 dbm (referred to the input) for a noise figure of F = 0.8 db.

As a modulator a passive Schottky diode ringmodulator with a very low intermodulation distortion (TAK-1H) is used, which lowers the overall IP to about 6 dbm.

Experiments with super high current mixer (local oscillator level +23 to +27 dbm respectively) showed that the following diplexer with the high current Fet "P 8002" could not handle the passed input IP anymore.

An improvement of the diplexer using parallel switched Fets and toroid transformers on the output raised the overall IP of the transverter to +10 dbm.

Referred to the output, that means a 3rd order IP of +32 dbm.

Unfortunately for these very good values there is not yet any suitable shortwave receiver available.

At present in amateur radio an IP of +16 dbm is state of the art. Therefore the simple version with the TAK-1H is used, which still achieves a very good output, IP of about +28 dbm.

The system intercept point of a 2 meter station, equipped with a LT 2 S, is only defined by the shortwave transceiver.

A Schottky ring mixer is used as a balanced modulator, driven by a weak attenuated signal, followed by 2 class A amplifiers, which are operated at most 20 % of maximum power.

This signal with very few distortions (in the 3 db band width more than 40 db, in the 5 db band width more than 70 db) is fed into the 2 stage power amplifier, which is limited to 20 watts. However the amplifier is capable of approximately 50 watts.

Up to about 10 watts PEP the amplifier works in a pure class A mode. The intermodulation values of the LT 2 S are very good, however there is a distinct degree of the 5 db and 7 db product.

The data shows surprising similarity with measurements that were done with good tube power amplifiers because of the very clean output signal the LT 2 S is very good feeding 2 meter high power amplifiers.

The following 2nd stage harmonic filter suppresses the 1st harmonic by at least 60 db, the 2nd harmonic by at least 70 db.

The LT 2 S has a built-in antenna relay to directly connect the antenna cable. By resoldering of a jumper, it can also be operated with separate outputs for transmit and receive. In the 10 meter transmit input, a variable attenuator is used which allows input signals from - 10 ... + 27 dbm.

Further features: switchable shift (-600 khz), illuminated watt meter.

LT 2 S Operating hints

By using high tech measuring instruments, like spectrum analyzers, noise gain analysers, wattmeters etc., the LT 2S has been carefully calibrated and checked. Therefore the calibration settings should not be altered, otherwise this would result in deterioration of the parameters.

Power Supply

To get low intermodulation distortion in transmit mode, the LT 2 S needs stabilized operating voltage of 13.8 - 14.2 volts. The voltage drop on the cable has to be adjusted by measuring the voltage at the LT 2 S.

Then using the LT 2 S at a lower voltage (for example in a car) the output power has to be reduced by adjusting the 10 meter attenuator. Operating the LT 2 S at 12 volts, only about 12 watts HF can be achieved without much intermodulation distortion.

Connectors on the Back

The transverter comes with 2 BNC connectors for the SW transceiver. The connector "10-m out" is to be connected to the receiver input of the transceiver by using a coax cable. The transverter output of the transceiver (low power output) is to be connected to the connector "10-m in". This input can be fed with signals between 0.1 and 500 mW (-10... +27 dbm).

The built-in variable attenuator can be reached by a hole in the back of the transverter. The attenuator has to be adjusted, so that the built-in power meter shows an output power of 20 watts when feeding the LT 2 S with a carrier (FM or CW constant signal).

With a SSB signal the power meter may only indicate 5 watts, however on voice peaks (PEP) will produce up to 20 watts (PEP). In this manner the linearity of the transmitted signal can be maintained.

LT 2 S Operating Hints

On the 2 meter side the transverter has 2 female N-connectors, however only the connector "Antenna" is used for receive and transmit.

For working with separate coax cables for transmit and receive, the connector "RF Out" must be activated. Therefore open the case by loosening 2 screws on each side and changing of 2 jumpers on the system board near the antenna relay "SIS ST-1".

1. Remove the relay operating voltage by cutting jumper "A".
2. Close jumper "B-C" by using a piece of wire. Thereby the HF signal goes directly to the connector "RF-Out".

The split mode over separate transmit-receive cables has its advantages. You can use any power amplifiers and pre-amplifier without having a coax relay switch. There is only one good coax relay (HF 400 2z, with coil R.K. 500) near the antenna. From there, there are 2 separate coax cables to the station.

With longer cables you should use an additional pre-amp near the antenna relay! This can be connected to the RX output of the coax relay by using a double N connector.

You should only use special pre-amps of the newest generation with a good noise figure (less than 1 db), good intercept point (at least + 6 dbm related to the input) and low gain.

The gain should be adjustable and should be selected to just compensate for cable loss.

Therefore the very good noise figure and the good large signal handling capability is maintained.

The mentioned special pre-amp is available from us, starting July 1987.

LT 2 S Operating Hints

Transmit-Receive switching

The Transmit-Receive Switching of the transverter is done by the P.T.T. signal coming from the SW transceiver. The inner contact of the P.T.T. connector (Cynch-female connector) on the back of the LT 2 S must be connected to ground for transmitting.

The switch "TX" on the front of the set is parallel to that connector and allows manual transmit-Receive switching.

In Split mode with separate coax cables, the coax relay near the antenna receives its operating voltage via the coax-cable when receiving. This can also be used to power a pre-amp.

For transmitting, this voltage must be switched off completely. (Therefore you can use a contact of relay 1 in the LT 2 S). When the coax relay opens, the power to the pre-amp is switched off and the transmitting path to the antenna is clear. If using the coax relay "HF 400" with additional contacts, a power amp may be switched on with these contacts. This guarantees that the P.A. is activated after the coax relay has switched to Transmit!

Repeater Shift

For operating with a 2 meter transverter the LT 2 S has a built-in repeater shift. When transmitting, a built-in 2nd crystal oscillator works with a shift of 600 KHZ. You turn on the repeater shift by switching to "Duplex".

Warning: by using the switch in the wrong way, you could exceed the lower band edge up to 600 KHZ.

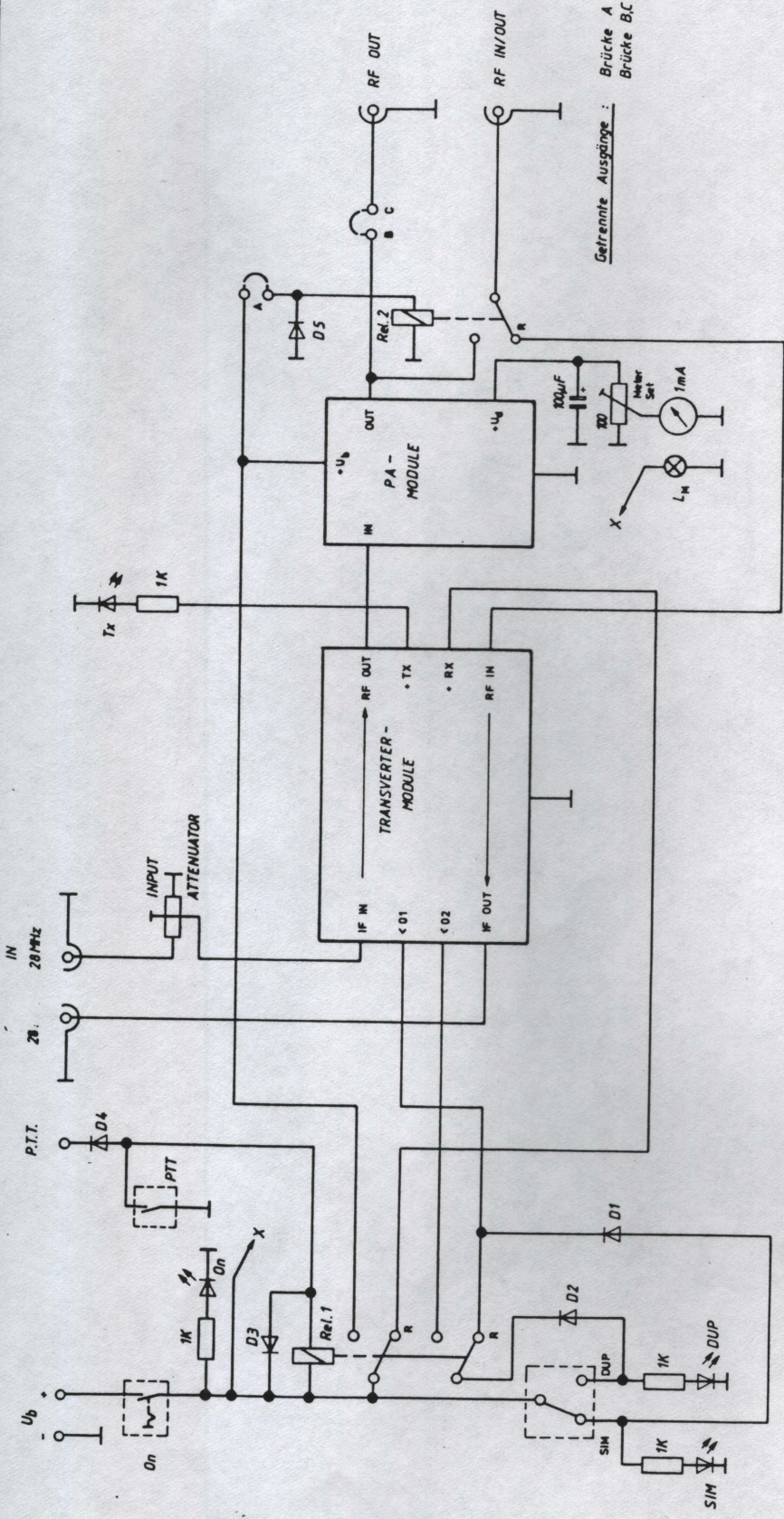
Continuous Operation

The excellent linearity of the power amp has been achieved by using high resting currents of the power transistors.

LT 2 S Operating Hints

The heat is dissipated by cooling fins. In any case these may not be covered to not interrupt the necessary air circulation.

For contest operation at higher temperatures, the use of a fan may be necessary.



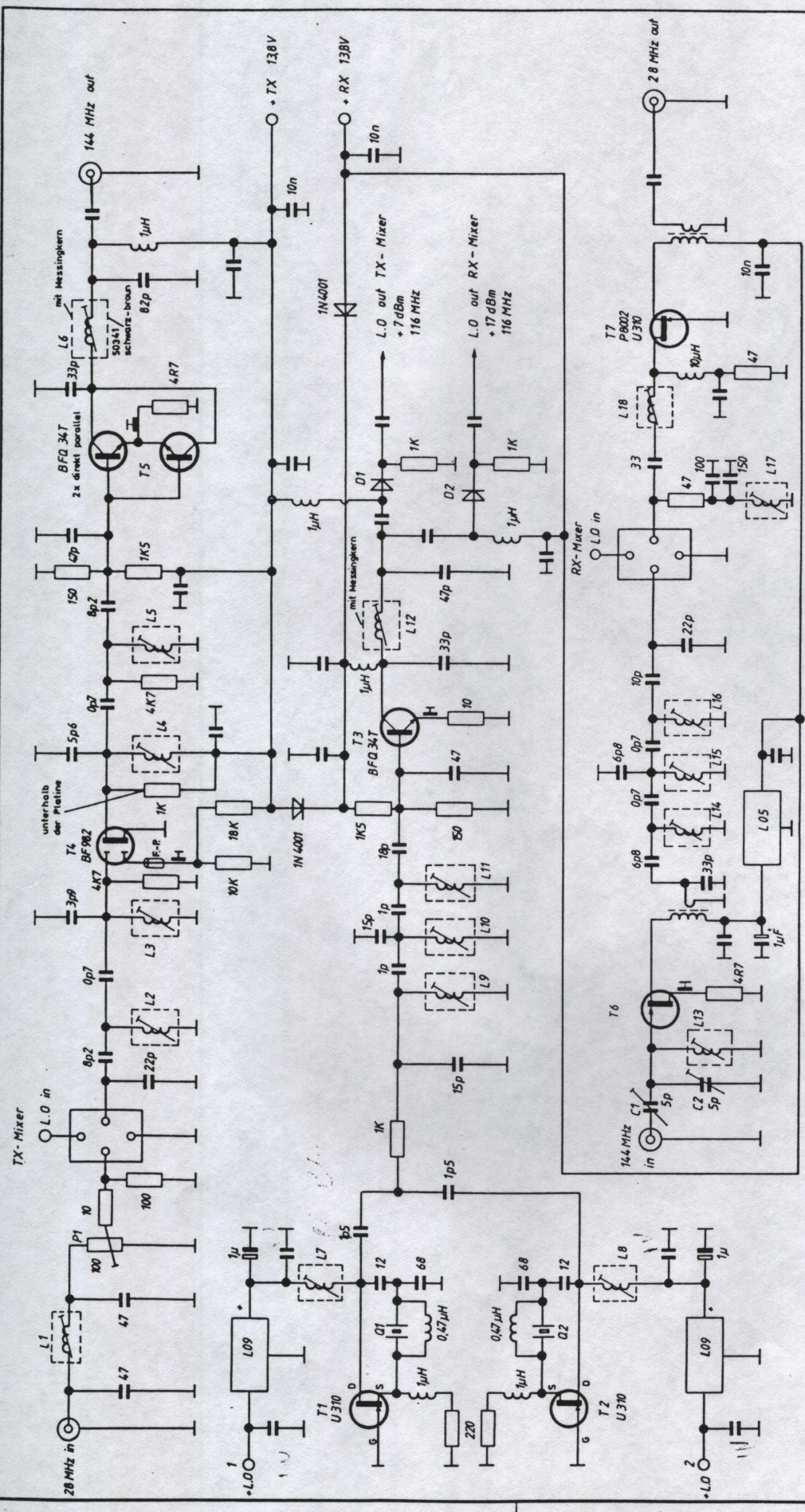
Getrennte Ausgänge :
 Brücke A öffnen
 Brücke B,C schließen

D1-D5 = 1N4007

Maßstab		Zeichnungs-Nr. : 020010	
Datum		Name	
Bearb. 16.3.87	11	K	
Gepr. 20.3.87			
Datum		Name	
Zust.		Datum	
Änderung		Name	
Blatt		SSB - ELECTRONIC ISERLOHN	
Bl.		Made in W.-Germany	

LINEAR - TRANSVERTER
 BLOCK - DIAGRAMM

SSB - ELECTRONIC ISERLOHN
 Made in W.-Germany

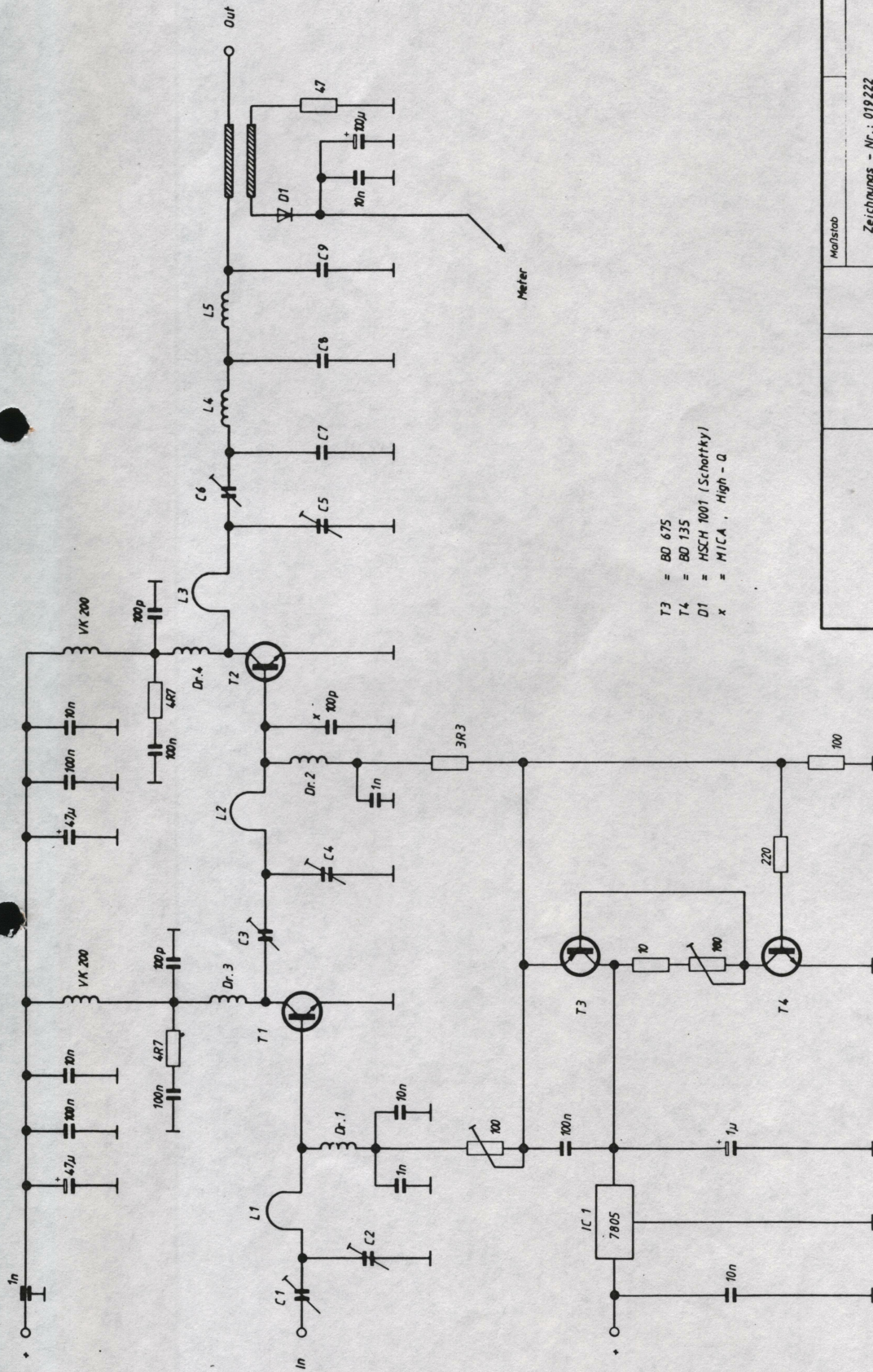


Technische Änderungen vorbehalten !

Maßstab		Zeichnungs-Nr.: 20020	
Name		Blatt	
Datum	Beorb.	SSB - ELECTRONIC ISERLOHN	
16.5.87	22.8.87	Made in W-Germany	
Gepr.	Norm	Blatt	
		Bl	
Zust.	Änderung	Datum	Name

- Q1 = 116.000 MHz
- L1 = 5049 gelb - weiß
- L2 - L6, L17x = 5061 braun - blau
- L18x = 5046 gelb - blau
- L19x = 5048 gelb - grau
- D1, D2 = BAV 20

x = ohne Abschirmbecher (without shielding). Abschirmbecher entfernen (remove shielding of these coils)



T3 = BD 675
 T4 = BD 135
 D1 = HSC11001 (Schottky)
 x = MICA, High-Q

Maßstab		Zeichnungs - Nr.: 019 222	
Name		Dr. - C	
Datum		5.3.87	
Bearb.		10.3.87	
Gepr.		Norm	
Zust.		Datum	
Aenderung		Name	
Blatt		SSB - ELECTRONIC ISERLOHN	
BI		Made in W.-Germany	

Transverter PA - Board

SSB - ELECTRONIC ISERLOHN

Made in W.-Germany