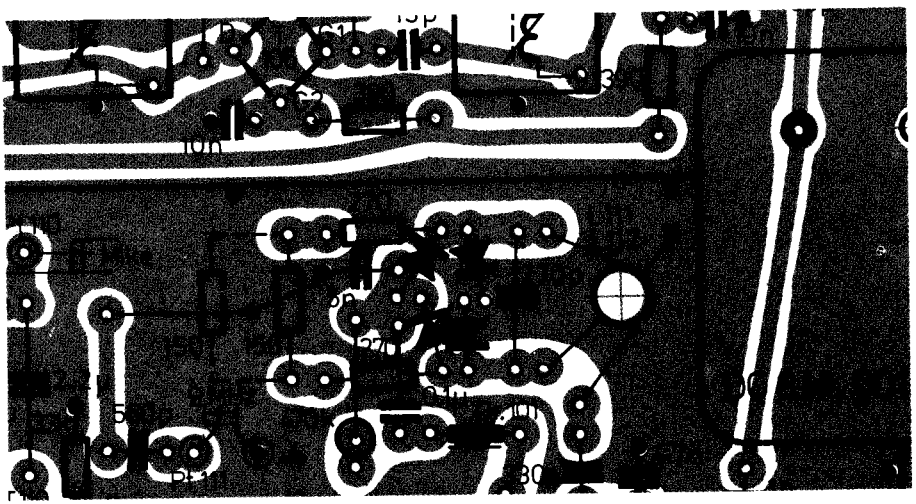
CORRECTIONS AND IMPROVEMENTS TO THE DC 6 HL SSB TRANSCEIVER

1. PC-BOARD DC 6 HL 001

Due to a film-retouching error the interconnection of the two short conductor lanes between the ring modulator (D 120 to D 123) and inductance L 111/capacitor C 168 (270 p) no longer exists. A bridge should be made at this point.



2. LOCAL OSCILLATOR MODULE DC 6 HL 003

Difficulties have been encountered by some constructors in obtaining a sufficient output voltage at 135-137 MHz. A discussion with the author at the Weinheim VHF meeting suggested the following possible cause of this:

The number of turns for L 312 to L 317 was reduced from the author's original 5 turns to 4 in the description and a VHF core was used instead of the RF-core used by the author in his prototype. This has caused the coupling to be too loose. It is therefore recommended that the original spaced 5 turns used in the author's prototype with RF core (red marking) be used. Since this core will not be inserted so far into the inductance, the strayfields of the inductances will be greater which will increase the coupling of the bandpass filters.

NOTES AND MODIFICATIONS

1. 2 m/70 cm LINEAR TRANSVERTER DC 8 NR

Several enquiries have been received regarding obtaining too low an output power from the second transmit mixer: Since there is generally sufficient power available in the drain circuit comprising L 21, C 66 and C 67, the cause is probably that the coupling to the push-pull circuit (L 22/C 70) is too loose. Inductances L 21 and L 22 should nearly touch another. Since trimmer capacitor C 70 is virtually at minimum capacitance in the author's prototype, it is possible that the circuit will not be able to be brought to resonance under all conditions. In this case, the diameter of inductance L 22 should be reduced to 4.5 mm or 5 mm diameter. The number of turns should be maintained. It may be sufficient to increase the spacing between turns. The same is valid for inductances L 8 and L 9.

A loosely-coupled calibrated absorption wavemeter is more suitable for alignment than a low-impedance RF-probe and millivoltmeter, since the latter would load the circuits too greatly. If the sensitivity of the indication is not sufficient, it is possible for the tube-amplifier also to be used.

Resistors of 47 Ω should be placed in series with chokes Ch 6 and Ch 8 in the collector circuits of transistors T 12 and T 13. The potentiometer P 1 should be separated from R 3 and directly connected to the positive pole of the operating voltage. Since the given ceramic tubular trimmers are soon worn after long alignment processes, the author would like to suggest the Philips type 2222 802-20002 (6 pF) as a replacement.

The numbers of turns for inductance L 14 should be reduced from 2.5 to 1.5 turns (from PA ∅ GMS)

2. DUAL-INPUT PREAMPLIFIER AND 2 : 1 PRESCALER DL 8 TM 003

As has already been mentioned, the frequency counter often indicates a one instead of a zero. A rather radical method of suppressing has already been recommenced. This condition occurs when the output of the 2 : 1 divider 74 S 112 possesses logic-H level; it can be avoided when the divider is reset to logic L after each count. In order to achieve this, the reset inputs of the dual flip-flop must be fed with H-level during the count and receive a short L-level pulse at the end of the counting cycle. The reset pulse of the first decade counter (74196) is suitable for this.

Modifications: Disconnect pins 13 and 15 of I 302 from the operating voltage and connect them via a bridge to pin 13 of I 216 (74196). (from DC 8 UE)

3. MODULAR ATV TRANSMITTER DJ 4 LB 004

A group of ATV amateurs in Cologne, W. Germany, are using a Schottky diode ring mixer in module DJ 4 LB 004 instead of transistors T 401 and T 402. The output is connected via 100 pF to L 402 (0.5 turns from the cold end). An original oscillator module DJ 4 LB 003 is used and an output power of 25 mW is easily obtained when aligned on a sweep generator, inspite of the insertion loss of at least 6 dB. Advantages: uncritical alignment and operation as well as a continuously high carrier suppression. A ring modulator manufactured by TEKO was used that is not so high but wider and longer than the wellknown types SRA-1 and IE-500, which would be just as suitable.

4. PORTABLE SSB TRANSCEIVER FOR 144-146 MHz

Due to the very compact dimensions of this transceiver, a large number of recommended modifications have been received that are often in conflict with another and do not seem to be necessary in all cases. Since it is mainly the resonant circuits that are referred to, it seems that the resonant frequencies vary. Due to the compact dimensions, the differing ground connections and screening panels of the constructor seem to have a different effect in each case. The editors can only suggest that the constructor try the various modifications himself.

4.1. MODULE DC 6 HL 001

The gain of the stage (T 113) following the crystal filter is too great. This can be cured by providing an emitter feedback by removing C 173. It is still possible to tune the circuit with L 113 without reduction of the output power. The following measured values result after removing C 173 and removing the core of L 113 (measured on a Tektronix oscilloscope 485 with 350 MHz bandwidth): The AF-voltage at the input of the balanced modulator should not exceed 150 mV (peak-to-peak) otherwise transistor T 113 will limit. A peak-to-peak voltage of 3 V will be present at the collector of this transistor. If the level is increased, limiting will take place in one of the following stages. It is advisable to balance the balanced modulator (D 120-D 123) not only with respect to amplitude but also with respect to phase. The carrier suppression can be increased by 10 to 20 dB so that the long-term suppression is in the order of 50 dB to 60 dB. This is achieved by connecting a fixed capacitor of 8 pF to one end of L 111 and a 3-13 pF trimmer between the other end and ground (from DK 2 GU).

Diodes D 120 - D 123 should be selected so that they possess the same forward resistance. This improves the carrier suppression considerably.
(from PA ∅ GMS)

The screening panels should not have any electrical contact to the case of the crystal filter, since this falsifies the filter grounding via the mounting screws and will cause deterioration of the filter curves. (from PA ∅ GMS)

When the absorption circuit comprising L 121 and C 184 cannot be resonated, three turns should be removed from L 121 and the value of C 184 reduced to 3 pF. It is then possible to reduce the indication of a sensitive SWR-meter to zero (switch off 9 MHz oscillator). (from DK 2 GU)

The quiescent current of the output transistor T 118 (2 N 5641) is greatly dependent on the operating voltage in the given circuit. Since too low a quiescent current at a low operating voltage can lead to strong distortion, the following modification is very advisable: Resistors R 189 and R 192 should be removed and replaced by a 1 N 4148 diode (cathode to ground). Resistor R 190 should be reduced to 470 Ω and R 191 to 1 kΩ. The quiescent current should now be adjusted to a value of between 25 mA and 50 mA. (from DK 2 GU)

The emitter decoupling capacitor of T 101 was decreased in value to reduce IF-gain. The values of resistors R 138 and 139 were increased to 1.1 kΩ. Bias adjustment of T 118 proved critical since R 192 heated up and changed resistance. This means that one must wait 10 minutes before continuing adjustment.

An additional screen has been provided between collector and base circuit of T 118 to improve stability.

The transmitter is easy to align after matching diodes D 120-123.

Transistor types 2 N 918 has been used for T 113 - T 115 instead of the BF 224. (from G 8 DET)

4.2. OTHER COMPONENTS OF DC 6 HL

If transistor T 2 is to operate as constant-current source, it is necessary to use a BF 245 A and select the value of R 1. The high current of the BF 245 C is too high for this circuit which is the reason why it does not operate as a constant-current source. It is also possible to leave out T 2 completely. (from DK 2 GU)

4.3. MODULE DC 6 HL 003

If other constructors find the resonant frequencies of the circuits comprising L 310 and L 311 are too low, the number of turns on L 310 and the values of capacitors C 318 and C 319 should be reduced by half. If the core of the inductance is also aligned slightly out of the coil, it is possible to obtain 2.3 V_{pp} or approx. 0.7 V rms at Pt 306 with only 150 m V_{pp} at Pt 304. A higher VFO voltage will produce an even higher level at 135-137 MHz. A voltage of 100 mV at a frequency of 130 MHz is present at Pt 306 on switching off the VFO. This means that this signal is only suppressed by 26 dB. However, it is suppressed further by the absorption circuit in the linear amplifier. (from DK 2 GU)

If the short 4 mm dia. coilformers have been used for L 312, L 317 it will be necessary to use the brown VHF cores. If longer 4 mm dia. coilformers are available, it is possible to increase the spacing between turns and to use red HF-cores. This allows one to obtain a higher output voltage and thus higher output power (from PA $\emptyset$ GMS)

The screening panels in the vicinity of L 308/L 309 to L 316/L 317 should be grounded at both sides of the long operating voltage line. Otherwise this amplifier can break into oscillation. (from PA $\emptyset$ GMS)

The capacitively tapped coils have been replaced by inductive coupling and are now resonated with ceramic trimmers. This gives increased output when cores are not used.

Transistor type 2 N 918 have been used for T 302-T 305. The modulator diodes have been matched for minimum carrier. There is still a slight component of 130 or 131 MHz signal at Pt 306 but is well suppressed. The value of coupling capacitor C 306 was reduced to 3.3 pF in order to reduce the heating of T 302, (from G 8 DET.)

4.4. DC 6 HL 007/008

If higher demands are to be made on the very good local oscillator T 706 in the FM-module DC 6 HL 007, it is possible to replace inductance L 707 by a crystal and the fixed capacitor C 720 by a trimmer capacitor of 50 pF. A frequency of 9.455 MHz should be selected since 8.545 MHz produces a spurious signal in the band. Resistor R 720 should be reduced to approximately 200 Ω to 300 Ω in order to reduce the drive to the mixer. (from DK 2 GU)

The frequency stability of the free-running oscillator in DC 6 HL 008 is often unsatisfactory. Instead of making modifications at this point, it is simpler to frequency modulate the VFO by connecting a varactor diode via a 15 pF capacitor to the base of T 50. The carrier is then injected by unbalancing the ring modulator. This is achieved by placing a voltage of 9 V to 12 V to Pt 112; R 196 should be deleted, as should the whole module DC 6 HL 008. (from DK 2 GU)

MATERIAL PRICE LIST OF EQUIPMENT described in Edition 4/74 of VHF COMMUNICATIONS

DK 1 OF 016/017	144 MHz/9 MHz CONVERTER		Ed. 4/1974
PC-board	DK 1 OF 016	(with printed plan)	DM 14.--
PC-board	DK 1 OF 017	(with printed plan)	DM 9.--
Semiconductors	DK 1 OF 016	(4 transistors, 1 diode)	DM 28.--
Minikit	DK 1 OF 016	(8 coilformers with cores, 1 coilset, 3 ferrite chokes, 1 trimmer capacitor)	DM 9.60
Ring modulator	IE 500		DM 48.50
Kit	DK 1 OF 016/017	with above parts	DM 108.--
DJ 4 BG 014	PRODUCT DETECTOR with CRYSTAL OSCILLATORS		Ed. 4/1974
PC-board	DJ 4 BG 014	(with printed plan)	DM 10.--
Semiconductors	DJ 4 BG 014	(1 IC, 2 transistors, 4 diodes)	DM 18.--
Minikit 1	DJ 4 BG 014	(3 trimmer caps., 15 ceramic capacitors, 2 tantalum electrolytics, 1 coilset)	DM 22.--
Minikit 2	DJ 4 BG 014	(1 TEKO-Box 3 A, 2 HC-25/U crystal holders, 1 13-pin connector)	DM 20.--
Crystals	XF 901, XF 902	set	DM 40.--
Kit	DJ 4 BG 014	with above parts	DM 109.--
DJ 4 BG 016	SYSTEM BOARD for MODULAR RECEIVER		Ed. 4/1974
PC-board	DJ 4 BG 016	(with printed plan)	DM 26.--
Transformer	VAC encapsuled 220 V/2 x 12 V, 5 VA		DM 23.--
Kit	DJ 4 BG 016	with above parts	DM 49.--
Connectors	13-pin	male, each	DM 4.10
	13-pole	female for wiring, each	DM 5.40
	13-pole	female for PC-board, each	DM 4.90
KITS	FOR SYSTEM BOARD DJ 4 BG 016:		
DJ 4 BG 007	Edition 1/1972		DM 72.--
DJ 4 BG 011	Edition 1/1973		DM 73.--
DJ 4 BG 014	Edition 4/1974		DM 100.--
	DJ 4 BG 013 and 015 in preparation		
DJ 5 HD 003	500 MHz PRESCALER		Ed. 4/1974
PC-board	DJ 5 HD 003	(double-coated, no through contacts)	DM 18.50
Semiconductors	DJ 5 HD 003	(4 ICs, 3 transistors)	DM 365.--
Minikit	DJ 5 HD 003	(6 ferrite chokes, 12 resistors, 2 potentiometers, 3 feed-through caps., 1 tantalum electrolytic, 10 bypass caps., 4 ceramic caps.)	DM 20.20
Kit	DJ 5 HD 003	with above parts	DM 398.--
DJ 1 EE 003	13 cm CONVERTER		Ed. 4/1974
PC-board	DJ 1 EE 003	(Teflon/PTFE, double-coated)	DM 34.--
Semiconductors	DJ 1 EE 003	(2 transistors, 2 Schottky diodes)	DM 50.--
Minikit	DJ 1 EE 003	(10 chip caps., 5 feed-through caps., 6 ceramic caps., 2 trimmer caps., 3 ferrite chokes, 1 TEKO box 3A, 3 BNC-connectors)	DM 41.90
Kit	DJ 1 EE 003	with above parts	DM 125.--