

**Technical description of the transmitters ML-1401, ML-1402, ML-1404
FCC ID: NKPD21140**

The transmitter ML-1401, ML-1402, ML-1404 serve to output a data telegram which triggers an action in a corresponding receiver.

The carrier frequency is equivalent to 40MHz. It is generated with T201 in a quartz-controlled oscillator. The end stage T202 operates at class a operation and is coupled to the oscillator circuit via the capacitor voltage divider C202, C203. HF power is tapped at the collector from T202 and fed to the antenna circuit ANT, C213, C214 via the π filter C204, C205, L202. The coupling utilized via C206 (serves also for isolation amplification) promotes harmonic damping which is improved further by the high quality of the antenna circuit.

By means of the corresponding grounding surfaces, the HF component is designed in such a manner so that undesirable disturbances are avoided to a large degree.

The amplitude modulation of the end stage is produced at its emitter with the help of T203. This transistor functions as a Miller-Integrator (C207, C208, R208, R209) in order to limit the transmitter bandwidth.

The amplitude modulation of the final stage is effected on its basis by means of a resistance-capacitance combination. The modulating signal consists of a data item (48 bits) and a pause of 9 milliseconds. This enables the amplification control in the receiver to settle before the data item is evaluated.

The transmitter is switched on through T 101 by activating one of the buttons TA 101, TA 102, TA 103 or TA 104. Once the activation is ended, the transmitter switches off automatically. The controller supply voltage (4...6 volt) is generated by the stabilizing circuit consisting of R 103 and D 105. A brown-out-circuit keeps the controller in reset in the event of voltage dips under approx. 4,2 volts. This prevents the transmitter operating outside of the voltage range guaranteed for the controller. The transistor T 104 ensures that no impermissible voltage level exists at any controller pin when a telegram is being fed into the non-operating transmitter. Apart from that, the data telegram is received or sent out through T 104.

The data item cycle is used to drive the LED 101 used for checking operation. Current consumption is typ. 32 mA.

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Model ML-1401 / Model ML-1402 / Model ML-1404
Description of the 48-bit standard telegram

The telegram consists of 48-bit data and a start bit. A pause of 9 milliseconds is set between consecutive telegrams. A Manchester code is used which defines an upward edge as logical '1' and a downward edge as logical '0'. A time base of 2 milliseconds is set for one bit so that one telegram including start bit takes 97 milliseconds.

The telegram consists of 4 function bits, 2 bits for the sensitive area, 26 bits keyword, 8 bits button variable and 8 CRC bits. The keyword represents the transmitter's individual coding which of course differs from transmitter to transmitter. In the 8-bit variable the code stands for the activated button and the function bits write the function to be carried out (usually pulse). An 8-bit CRC check is carried out on 40 bits of the telegram. The result is added to the 40 bits and produces the complete telegram.

In the learning mode only the keyword and the 8-bit button variable is learned so that the data specific to the transmitter and application remain unaffected. If random is learned, a new 26-bit keyword is determined (through a linear shift register). The button variable is reproduced as standard.

As the time base of the telegram is produced by the controller, the tolerances are low. A maximum deviation of $\pm 10 \mu\text{s}$ occurs at 1 millisecond.

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Specifications

Frequency	40.685 MHz
Radiated power	max. -10 dBm
Aerial	Conductor track
Modulation	AM (A1D)
Channels (digital)	1, 2, 4
Supply voltage	12V battery
Working current consumption	typ. 32 mA
Closed-circuit current consumption	< 0,1 μ A
Size	42 x 72 x 15 mm (W x H x T)
Weight	32 g (incl. battery)