



knight-kit two-meter transceiver

If you've been shopping around for a little two-meter rig, you've probably seen the ads for the Knight-kit TR-108 transceiver. This little unit covers the entire two-meter band, and combines a sensitive double conversion receiver with fifteen watts input and a built-in 117-Vac/12-Vdc power supply. All you need to get on the air is an antenna and a crystal for your favorite two-meter frequency (an optional vfo kit is available if you want to move around the band a bit). Also, if you want to go mobile, an accessory mobile mount is available.

receiver

The first stage of the two-meter receiver section is a 6HA5 grounded-grid rf amplifier. This stage provides adequate gain and noise figure for the maximum range that can be expected with the TR-108. The crystal-controlled oscillator/tripler that feeds the first mixer uses a third-overtone crystal cut to 37.883 MHz—a 6CW4 serves as the oscillator and the triode section of a 6GJ7 as the tripler. The pentode section of the 6GJ7 is used as the first mixer with a resulting output of 30.35 to 34.35 MHz. Since the con-

verter section has a 4-MHz bandpass, each coil must be properly peaked to maintain the broadband characteristics. The converter section is the most critical part of the whole transceiver, and is prewired and aligned by the factory for maximum performance. Sensitivity is 0.5 μ V for 10 dB signal-plus-noise to noise ratio.

The output from the converter chassis is fed into the second mixer through a coaxial cable. The triode section of a 6EA8 is used as a tunable oscillator to provide injection for the second mixer; the second mixer is the pentode section of the same 6EA8. The oscillator circuit is a temperature-compensated shunt-fed Hartley circuit that tunes from 32 to 36 MHz; output from the second mixer is at 1650 kHz.

The 1650-kHz i-f strip in the TR-108 transceiver uses two high-gain 6BZ6 amplifiers and three double-tuned i-f transformers. The double-tuned i-f transformers provide a simple way to obtain narrow bandwidth. The selectivity is 6 dB down at the 8-kHz points. Image rejection is rated at 55 dB and i-f rejection is better than 50 dB.

The dual-diode 6AL5 used in the de-

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tector/automatic noise limiter stage is very sensitive to low-level signals. The first diode section of this tube functions as a standard a-m detector. The agc voltage is derived from this section, filtered and fed back to the control grid of the i-f amplifier stages.

The second-diode section of the 6AL5 is used as a series-gate noise limiter. This type of noise limiter introduces negligible distortion, even under strong-signal conditions with high-level modulation—most

from 300 to 3000 Hz, the speech range required for maximum intelligibility.

transmitter

The transmitter may be crystal controlled with crystals in the 8-MHz range, or an external vfo may be used. The Knight-kit V-107 vfo is designed to go along with the TR-108 and its six-meter cousin, the TR-106. The 6CL6 oscillator/tripler stage is operated as a Colpitts oscillator with the plate circuit tuned to

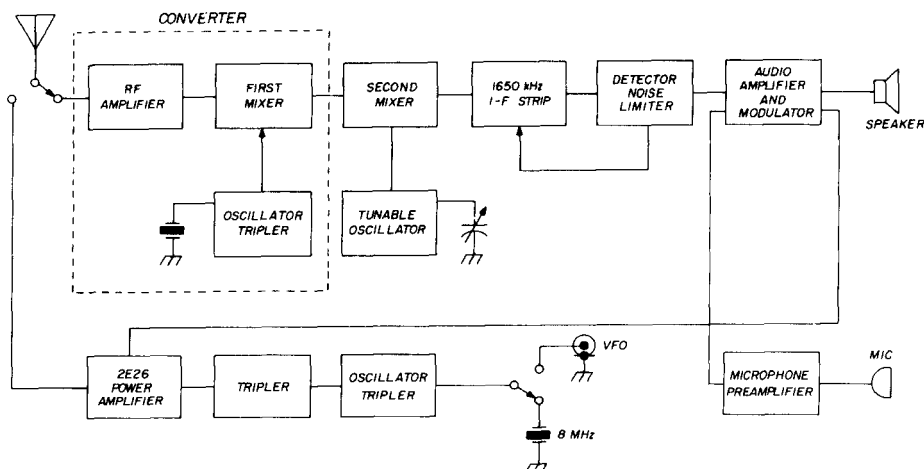


fig. 1. Block diagram of the TR-108 two-meter transceiver.

limiters distort the desired signal when limiting begins. The series-gate circuit is self-adjusting over a wide range of signal levels so the limiting level is compatible with the amplitude of the incoming signal.

One triode section of a 12AX7 is used for the audio amplifier to drive the 6L6 audio power stage; the other triode section of the 12AX7 serves as a microphone preamp. The audio output transformer has one primary and two secondaries; the primary is matched to the 6L6 audio power amplifier. In the receiver mode, one of the secondary windings is used to drive the speaker. A front panel jack allows headphone operation or an external speaker. The second audio-transformer secondary winding is used for modulation. The frequency response of the audio stage is engineered to cover

the third harmonic of the grid circuit. For vfo operation, the tube serves as an amplifier/buffer and tripler. Excellent vfo isolation is provided by the pentode.

The output from the 6CL6 drives a 6BQ5 tripler stage. This small beam-power tube drives the 2E26 power amplifier to its full capacity. The compact 2E26 stage runs at 15 watts input. The output circuit is a conventional pi network designed to work into 30 to 90 ohms with a vswr less than 3:1.

The Knight-kit engineers gave harmonic generation very careful consideration when they designed the TR-108 in an effort to eliminate problems with harmonic radiation. A double-tuned transformer is used to couple energy from the 6BQ5 tripler to the final; this reduces harmonics and provides adequate drive over the complete two-meter band. The

output pi network furnishes further harmonic suppression and the wrap-around case shields the entire unit so undesired radiation is minimized.

power supply

The power supply is one of the most interesting circuits in the transceiver since it is designed to operate from either 117 Vac or 12 Vdc. Switching from one power source to the other is automatically accomplished by using the proper power plug.

In the dc-to-dc-converter mode, the supply uses a two-transistor oscillator to switch the primary 12-volt dc power on and off at about 90 Hz: the resultant ac is stepped up by the transformer. In the ac mode, the transformer functions as a normal step-up type. The high voltage dc is provided by a voltage-doubler circuit across the transformer secondary. Power for an external vfo is available on the back panel.

summary

The transceiver is fairly easy to assemble and with the excellent instructions furnished with the kit, only a few evenings work is required to do the job. Plenty of lineup and tuneup instructions are provided as well as hints for operating on the vhf bands. The instruction manual also includes information on building a simple antenna, mobile installation and mobile noise suppression, as well as some excellent dope on television interference and how to cure it.

Performance is right up to the manufacturer's rating. You're not going to work any moonbounce or meteor scatter with 15 watts input, but with a good antenna and patience, you may be able to work a little DX when the band opens up. In the meantime, the little TR-108 is great for local ragchews, DX nets and a-m repeaters. The receiver is more than sensitive—the 15-watt input rating of the transmitter is the limiting factor as far as maximum range is concerned. You can be sure you'll hear the other guy if he can hear you.

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