ARC-131 Circuit Diagrams

1. VHF tuner
2. Reference oscillators
3. Crystal Reference System (CRS)
4. IF amplifier and Homing circuits
5. Audio circuits
6. Transmitter circuits
7. RF switches
8. Modulator
9. Power supply and mechanical tuning

Left side and top modules
1 VHF tuner
2 Modulator
3 Crystal Reference System
4 60-pole main connector filter
5 Audio
6 Master osc & buffer
7 RF control
8 6 RF power amplifier
9 5 RF control
10 7 RF control

Bottom:
3 Crystal Reference System
The AN/ARC-131

The ARC-131 was made by Magnavox around 1969 as the successor of the Collins ARC-54. Magnavox used many of the modules of its vehicular transceiver VRC-12 with the same frequency range and (FM) modulation. The land-based roots are visible - weight and size are 20% higher than in the ARC-54, and homing was a later addition.

“The AN/VRC-12 and AN/VRC-43 through VRC-49 is a series of combat-proven vehicular radio sets. The equipment provides 920 VHF/FM voice channels in the 30-76 MHz range. It consists of three major units: Receiver-Transmitter RT-246A/VRC with a channel-presetting capability (10 pushbuttons), Manual Receiver-Transmitter RT-524A/VRC with built-in loudspeaker, and Auxiliary Receiver R-442A/VRC. “

Compared to the ARC-54, the ARC131 has:

**Same**
- The same plug and pinout;
- The same modulation (8kHz deviation FM)
- The same squelch modes (squelch based on 150Hz tone, 7.3kHz noise or disabled)
- Slightly more channels (920 versus 800, both with 50 kHz spacing)
- Retransmit capability is the same
- Both are mainly solid state with only 3 tubes. The ARC-131 has 3 tubes in the RF receiver input stages, the ARC-54 has 3 tubes in the transmitter RF stages.

**Differences** are mainly in the internal realisation:
- *Single* heterodyne with 11.5 MHz IF (ARC-54 is a double superhet)
- The local oscillator is **locked** to a harmonic of a 1MHz crystal oscillator plus one of ten crystals spaced 100kHz plus one of two crystals spaced 50kHz. This way, all 920 channels are kept accurate to within 3.5kHz with only 13 crystals.
- Tuning is faster: the ARC-131 has 3 tuning motors, the ARC-54 only has one.
- Tuning of the VHF stages is with **spiral coils**. There are no slug-tuned inductors nor variable capacitors as in the ARC-54. The spiral-coil inductors prevent the use of a uni-directional tuning motor, so an auto-reverse strategy was used to drive the tuning shafts.
- The RF and IF amplifiers in the ARC-131 always have maximum gain. **No AGC** in normal (FM) mode, only controlled gain reduction in HOME mode by PIN diodes in the antenna input circuit and IF amplifier input circuit. The ARC-54 has controlled gain in the RF, variable IF, and fixed IF stages in all modes.
- Non-grounded frequency control lines should be interconnected per digit in the ARC-54, but are left open in the ARC-131.
- Weight of the ARC-131 is 10kg, the ARC-54 is 7.5 kg
Transmitter RF parts
Oscillator/Buffer/Power Amplifier
A9700 Mechanical Tuner

Bidirectional MHz autopositioner

Endstop microswitch

Bidirectional kHz autopositioner

Endstop microswitch

M

Ledex 20-steps kHz autopositioner

Band A/B

K3

K2

K1

5k1

5k1

5k1

5k1

5k1

5k1

5k1

5k1

K9605

20 steps of 50 kHz

MHz

23 steps of 1 MHz (30.52 or 53.75, same code)

Total 20 x 23 x 2 = 920 channels

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“X” indicates connection to ground in the control panel. Remaining lines are open.

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Pin 29 (J on control panel) is grounded from 53 – 75 MHz (Band B)
Pin 23 (G on control panel) is grounded from 30 - 52 MHz (Band A)
Pin 32 (h on control panel = tuning) is not used inside the control panel

9.7 Mechanical Tuning Unit
9.5 Power Supplies