28.09.2025

MV2-X DUAL RX TRANSVERTER

144-148MHz

High Performance 3.5”color LCD screen dual receivers Transverter

The production of the ME2-XP transceiver has been discontinued. The new MV2-X Dual RX Transverter has been specifically designed for EME operators, but it is also ideal for high-quality contest and terrestrial operations. This high-performance transverter is available in both 30W and 50W output versions. The MV2-X consists of two 144/28 MHz RX converters sharing a common, high-stability, low-phase-noise AXTAL 0.5 ppm TCXO. The transverter is prepared for GPSDO LO capability, and an SMA socket has been installed on the rear panel for a 10 MHz reference signal. A dedicated PLL unit is currently under development and will be offered as an optional upgrade once available.

On the rear panel, there are three separate ‘N’-type connectors (RX1 and RX2) for horizontal (H) and vertical (V) polarized antennas. The TX power appears on the ‘ANT’ connector. Two separate BNC connectors provide IF output signals for SDR or dual-channel transceivers (IFO1 and IFO2). The 28 MHz IF input signal connects to the third BNC connector (IFi1). SAW filters have been installed in both the receiver and transmitter sections to ensure exceptional signal purity. On the transmitter side, a high-performance TX mixer unit and a linear Mitsubishi PA module (30W or 50W) are installed according to the customer’s request. For single-receiver transceivers without dual RX capability, the optional internal MC-1 IF combiner can merge the two separate IF outputs into one. The new base PCB includes a dedicated space for this combiner, which can be integrated upon request.

Changes in the new MV2-X Version

- The unit now includes three SMD PCB boards (display module, transverter mainboard, and RF power amplifier module), each factory-assembled to 95%.
- An enclosed RF shielding box has been added to the mixer panel.
- Provision for GPSDO (GPS Disciplined Oscillator) connection SMA is included.
- High-slope SAW filters are integrated into the band-pass filter (BPF) circuits on both the receiver and transmitter sides for improved selectivity.
- A direct connection option is provided for external antenna preamplifiers (for both H and V polarisation).
- An external preamplifier power supply option is now available via a DB-9 connector.
- The front panel features a 3.5-inch colour display.
- Analogue power control is available from the front panel, with redesigned circuitry supporting both the 0–30 W and 0–50 W ranges.
- The updated Arduino firmware ensures more accurate power and SWR measurements.
- The mechanical design has been enlarged, eliminating internal DC wiring and simplifying assembly. Additional test points have been added for easier servicing.

Technical Parameters

Frequency range	144–148 MHz
IF frequency range	28–32 MHz
Emission modes	CW, SSB, FM, Digital
I/O impedance	50 Ω — ANT: N-type; IF: 3 × BNC; 2 m 2 × RX N-type
Operating temperature range	0 to +50 °C
LO accuracy @ 20 °C	< 0.5 ppm with AXTAL TCXO
Input voltage	13.8 V ± 5%
Power consumption	0.85 A (RX), 6.5 A (TX), 10.5 A for 50 W version
IF power input	–20 … +37 dBm
IF input VSWR	1.1 : 1 typ., max 1.2 : 1
Nominal RF output power	30 W or 50 W
Output power adjustment	Analogue potentiometer, 0–30 W or 0–50 W range
TX harmonics	< –70 dB
IM3	< –33 dBc @ 25 W output (or 40 W output)
PTT control	Contact closure to ground
SND output	Open collector, +50 V / 1 A max
RF VOX	Available, triggered above +27 dBm IF input
RX noise figure @ 20 °C	< 1 dB
RX gain (maximum)	25 dB max, factory set to +22 dB (variable 15–25 dB)
RX OIP3 (typical)	+25 dBm
RX IP3 (typical)	+3 dBm
Image rejection	> 80 dB
Display	3.5″ colour display, 480 × 320 pixels
Displayed functions	FWD, REV, numeric PWR, VSWR, U_t, I_t, TMP, FAN & FLT

	(faults)
Protections	Antenna VSWR > 2.2, Current > 7 A or > 12 A, Temperature > 60 °C
Protection indication	3 × 1 s 2 kHz tone + SWR, TEMP & CUR shown in red
Reset function	STOP after high SWR, temperature or current event
Meter accuracy	< 2.5%
Sequencer delay	50 ms at TX mixer activation
Dimensions	280 × 330 × 115 mm (including optional fans)
Weight	2.2 kg (with fan unit)
Enclosure	Aluminium plate, 1 mm thick

Enhanced MV2-X Versions

The enhanced versions of the MV2-X transverter are housed in a larger enclosure, offering improved accessibility and a more efficient internal component layout. The new design features an Arduino-based processor controller and a clear, easy-to-read 3.5-inch colour display that is seamlessly integrated into the front panel.

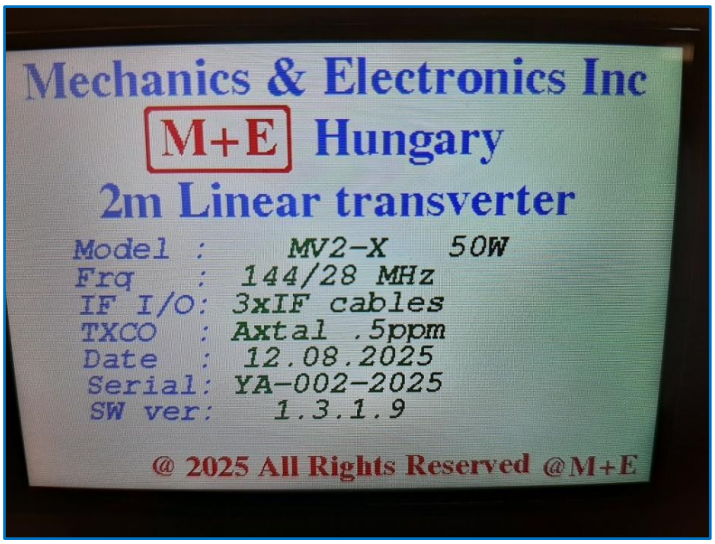
An additional improvement is the inclusion of a DB9 connector on the rear panel, providing the user with multiple connection options.
During the initial power-up, the transverter can be configured to operate with various HF radio models currently available on the market, as explained in the following sections. If desired, the manufacturer can also pre-configure the transverter to match the specific radio type requested by the customer.

Arduino Processor-Controlled Display Unit

The 3.5-inch colour display provides the following information and graphical indicators:

Power-On Display Information

Upon power-up, the display shows the **basic system information** for approximately **five seconds** (see illustration below).



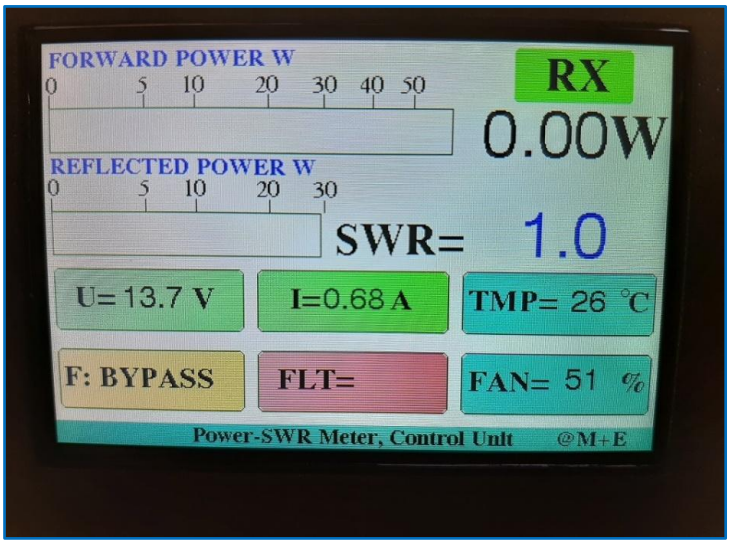
In addition to the equipment type, the following information is displayed:

- **FRQ** – Mixing frequency (144/28 MHz or 144/14 MHz, respectively)
- **IF I/O** – Configuration mode: *1 or 2 cable* (common/split IF I/O), *LP* or *HP* power IF
- **TCXO** – Oscillator type and stability (AXTAL 0.5 ppm standard)
- **Date** – Manufacturing date of the transverter
- **Serial** – Serial number of the transverter unit
- **SW version** – Installed software (firmware) version

Operational Display and Graphs

After approximately **five** seconds**,** the operational menu and graphical interface appear on the screen.
This display provides real-time measurement data and system status information during transverter operation.

The following parameters and graphs are typically shown:



Displayed Operational Parameters

The operational screen shows several key parameters in both graphical and numerical formats, allowing continuous monitoring of the transverter's performance during use.

Forward Power (W)
A bar graph represents the forward (output) power in watts. The corresponding numerical value, also expressed in watts, is displayed next to the graph.

RX / TX Indicator
Located in the upper-right corner of the display, this indicator shows the current operating mode:
• RX (green) – the unit is receiving
• TX (red) – the unit is transmitting

Numeric Watts (Display)
The numeric display shows the forward output power value, identical to that represented by the forward power bar graph.

Reflected Power (W)
The reflected power bar graph is positioned directly below the forward power graph and uses the same full-scale reference. It indicates the level of reflected RF power in watts.

Antenna SWR ("S")
The calculated VSWR value is continuously displayed, even during receive mode. If the SWR exceeds 2.2, an error message appears and the transverter automatically halts operation. To restore normal functionality, the unit must be switched OFF and then ON again.

Measured Values

Three measured parameters are displayed below the reflected power graph:

U =
Shows the measured DC supply voltage.
If the voltage exceeds +14 V, the numeric value automatically turns red on the display.

I = (Measured Supply Current)
Indicates the measured DC supply current.
• For the 30 W version:

- When I > 6.5 A, the numeric value turns red.
- When I exceeds 7 A, an error message "CUR" appears.

• For the 50 W version:

- When I > 10.5 A, the numeric value turns red.
- When I exceeds 12 A, an error message is displayed, and the transverter performs a STOP function.

TMP = (Heatsink Temperature)
Displays the heatsink temperature in °C (or °F on U.S. models).
• When TMP > 55 °C, the temperature value turns red.
• When TMP exceeds 60 °C, an error message "TMP" appears.
• If repeated over-temperature warnings occur, the unit must be turned off.
Operation can resume only after the heatsink temperature drops below 60 °C.

By default, the lower-left frame of the display remains empty ("BYPASS" mode).
Output power can be adjusted using the PWR control knob located on the front panel.

FLT = (Fault Indication)
When a fault condition is detected, the text "FLT" appears on the display.
• If SWR > 2.2, "FLT = SWR" is displayed in red, accompanied by three 2 kHz warning tones, each lasting one second.
• If I > 7.0 A (or I > 12 A for the high-power version), "FLT = CUR" appears in red, with the same audible warning tones.

• If TMP > 60 °C, “FLT = TMP” is displayed in red, again with three 2 kHz warning tones of one second each.
After the warning tones, the transverter automatically performs a STOP sequence.

FAN = (Cooling Fan Speed)
Displays the cooling fan speed as a percentage.
• The base fan speed is 50% at 25 °C.
• Above this temperature, fan speed increases proportionally with the heatsink temperature until 50 °C, where it reaches its maximum and remains constant beyond that point.

Front Panel

The MV2-X transverter is enclosed in a 280 × 330 × 115 mm aluminium housing.
The front panel includes the following components:
• A 3.5-inch colour display
• A PWR control potentiometer

The ON/OFF switch is positioned at the lower right corner of the front panel.

Rear Panel and Connectors

The rear panel of the transverter contains the main heatsink and all external electrical connectors, as described below.

1. DC Power Connectors

Rated for **20 A**, with red = positive and black = negative.
Requires an external stabilised **+13.5 V to +14.0 V** DC supply:

- Minimum **8 A** (30 W model)
- Minimum **12 A** (50 W model)

2. PTT Input

RCA-type female connector.
A **GND RCA** activates TX.
The centre pin is at positive potential; control is possible with an NPN open collector.
Maximum load current: **2.5 mA**.

3. SND Output

RCA-type connector for **external amplifier control**.
NPN open collector output, max **+50 V / 0.5 A load** permitted.

4. DB-9 Connector — Pin Assignment

DB-9 Pin	Function
1	GND
2	SND(GND onTX)
3	PTTi (GND to TX)
4	+13.8V/750mA max.
5	ICOM (+13V to tvtr mode)
6	NC.
7	GND
8	PRE amp on RX 13.8V/0.7A(FU2)
9	13.8V(0.7A) on TX FU1)

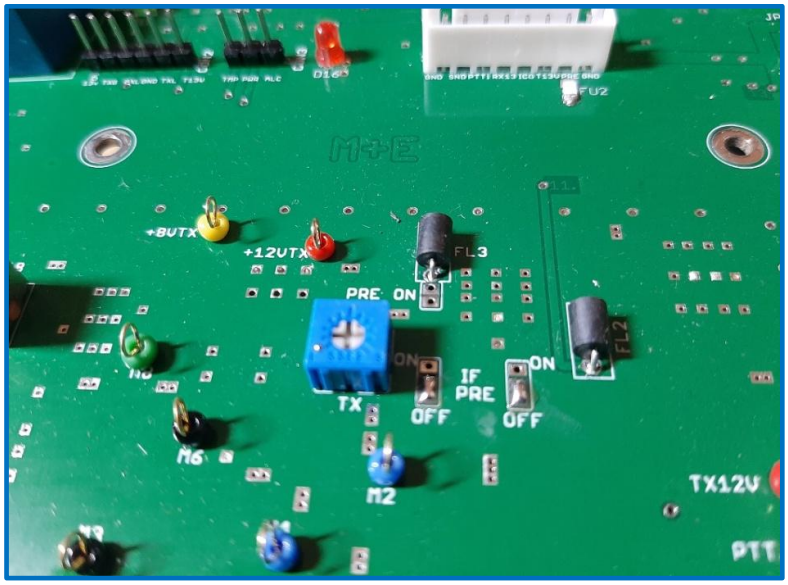
The DB9 connector serves as a multifunction control interface, providing both input and output signals.
Its pin configuration is described in the following section of the manual.

IF Input and Output Connections

IF Input (IFi)

The **IF input BNC connector** accepts signal levels from **–20 dBm to +37 dBm**, compatible with various HF radios.

- For **low-level radios** (below –10 dBm), the **internal IF amplifier** may be enabled.
- For **IF levels above –10 dBm**, solder the **centre and OFF jumper positions** together.
- To **enable the IF preamplifier**, solder the **centre and ON jumpers** together, which also connects the amplifier's power supply (PRE ON).



Built-In Attenuator Jumper Settings

Low PWR IF input (-20..+27dBm) 2x IF cable connection		Low PWR IF input (-20..+27dBm) 1x IF cable connection
JP1	**ON**	**ON**
JP2	OFF	**ON**
JP3	OFF	OFF
JP4	OFF	**ON**
JP5	**ON**	OFF (ON=2nd RX is ON)
High PWR IF input (+27..+37dBm) 2x IF cable connection		**High PWR IF input (+27..+37dBm) 1x IF cable connection**
JP1	OFF	OFF
JP2	**ON**	**ON**
JP3	**ON**	**ON**
JP4	OFF	**ON**
JP5	**ON**	OFF (ON=2nd RX is ON)

Jumper positions on the board is here:

Typical Jumper Setups for Different Radios

Levels, cables	Radio types
Low PWR, 2x IF cables	K2,K3,K3s,K4,TS590S,TS590SG,TS850,TS950SDX,IC756,FT2000, FT1000MP, FTDX5000, IC756,TS990S,TS850 mod..
Low PWR, 1x IF cable	IC7600,IC7610,IC7700,IC7800,FLEX6300,FLEX6400, FLEX5000,FLEX6600, IC765..
High PWR, 2x IF cables	Flex models,
High PWR, 1x IF cable	IC9100, IC746, FLEX1500, FLEX3000, ADAC,TS2000, FT450, FT950, FTDX10,FTDX3000, FTDX1200,IC7000,TS570, IC7300, FT991,IC705,IC710,

Operational Notes

- To **protect the RX IF amplifier**, always connect the **PTT cable**.
  Although the unit includes an RF VOX function, **do not rely on it** as a substitute for proper PTT control.
- RF VOX activates only in **single-IF-cable mode**, and only for IF levels above **+27 dBm**.
- Never exceed **5 W IF power** to the attenuator.
- Using **high-power HF radios (100 W)** without a dedicated transverter output is entirely at your own risk.

IF Output Connectors (IFo1, IFo2)

- **IFo1** — main IF output
- **IFo2** — available only on the **MV2-X** model (optional secondary output)
- In single-IF-cable mode, **JP5 = ON** enables connection to a **second receiver (e.g. SDR)**.
- When using the **MC-1 IF Combiner**, IFo2 remains available even in dual-IF-cable configurations.

Antenna and RX Inputs

- **ANT Connector:** N-type connector for 2 m antenna connection.
  (Optional common/separate RX input available.)
- **RX1 / RX2 Inputs:**
  Two independent 2 m receiver inputs.
  IFO1 and **IFO2** are IF output connectors.
- **10 MHz REF Input:** Prepared for GPSDO REF input.
  The MV2-X is designed to support GPSDO (GPS Disciplined Oscillator) operation.
  This connector allows the connection of an external 10 MHz reference signal for improved frequency stability.
  (Currently inactive in the standard configuration.)

2 m Transverter Unit – Circuit Description

As a default 0.5 ppm AXTAL low side noise TCXOs are installed.. The transverter equipment's block diagram is available here: and the RF block's diagram here:

The transverter PCB is a newly developed module that integrates both the control circuitry and a designated area for the future PLL unit, intended for GPSDO-based local oscillator operation.
The PLL unit is currently under development and will be available as an optional upgrade.

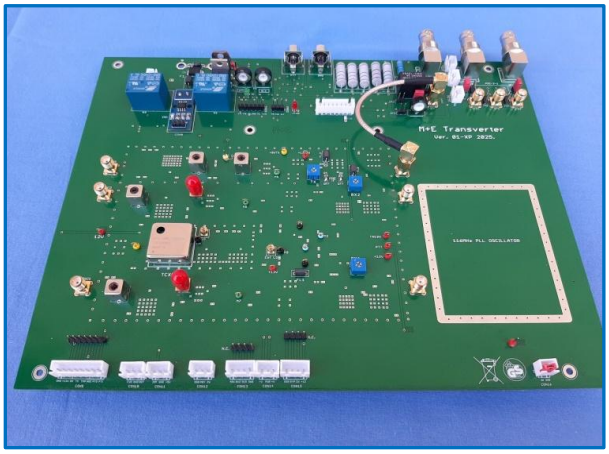
• SAW filters are employed throughout the design, replacing traditional LC-tuned circuits to provide improved frequency stability, selectivity, and temperature performance.
• The MV2-X includes two fully independent receiver channels:

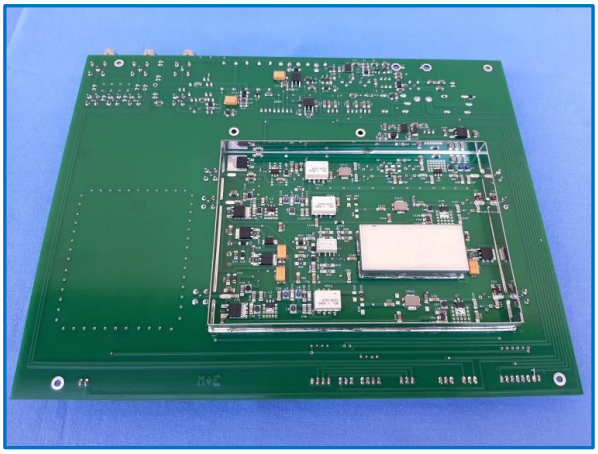
- **RX1 (H-pol)** handles signals from the H-polarised antenna.
- **RX2 (V-pol)** handles signals from the V-polarised antenna.

In contest or tropospheric (tropo) operating modes, the two receivers can also be connected to antennas with different orientations or polarisation characteristics.

By default, the two receiver paths provide independent IF outputs (IFo1 and IFo2).
When the optional MC-1 combiner module is installed (available upon request), these outputs are summed to form a single combined IF signal for use with single-receiver radios.

Transverter main unit photos:





Transverter unit PCB bottom view is here:

Receiver Section

- The input preamplifiers use Mini-Circuits PGA-103+ low-noise amplifier devices, offering excellent gain and noise figure characteristics.
- The RF mixer is based on a **Mini-Circuits CSYM-1815** dual-balanced mixer, chosen for its high dynamic range and low intermodulation performance.
- The intermediate frequency (IF) amplification stage uses **ASB** ASF240 MMICs for stable, broadband gain.
- Receiver gain can be adjusted independently for each channel using the **RX1** and **RX2** potentiometers accessible on the front panel.
- The local oscillator (LO) source is a high-stability **AXTAL 0.5 ppm TCXO** with low phase noise characteristics.

Transmitter Section

The transmitter section employs a dedicated up-conversion chain using SAW-filtered band-pass (TA2675A) networks for spectral purity and minimal spurious output.
It includes a broadband mixer and driver stage that feeds the final power amplifier module (either 30 W or 50 W, depending on the version).
Further description of the transmitter circuit follows in the next section.

The transmit chain (28MHz) includes a 10 dB attenuator, followed by a jumper-selectable IF amplifier.
This amplifier should only be enabled when using radios or transceivers that provide transmit signal levels below –10 dBm.

The transmitter mixer is a Mini-Circuits CSYM-1815, which requires a minimum +7 dBm LO drive level for proper operation.

A SAW filter follows the mixer, ensuring excellent spectral purity and minimal unwanted emissions.

The low-level output amplifier (approximately 120 mW) uses a dual-gate FET stage.
Power control is achieved by adjusting the voltage applied to the second gate, which ranges from –0.8 V to +1.5 V.

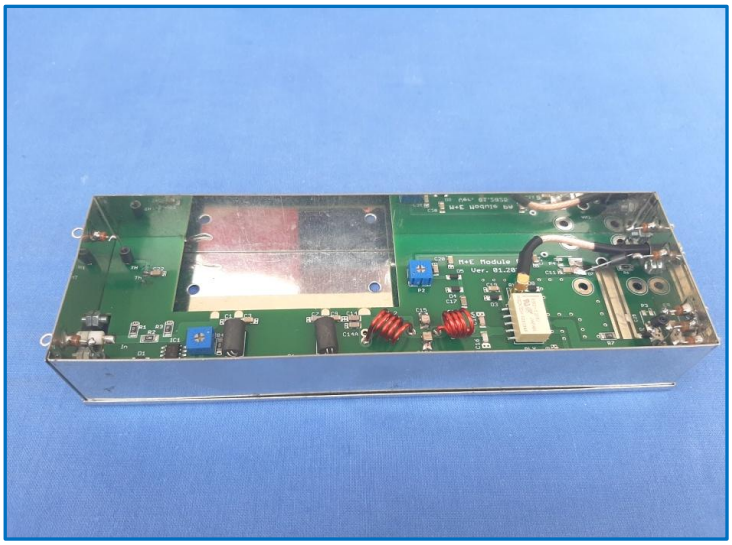
The driver amplifier is a Mini-Circuits ASB ASL550 MMIC, providing sufficient drive power for the final PA stage.

The Arduino-based control unit generates a sequencer (SEQ) signal with a 50 ms delay applied to the mixer stage.
This timing ensures that when the PA (power amplifier) is activated via the SND output, the RF drive signal appears only after all relays have switched, protecting both the transverter and connected equipment.

External Preamplifier Control

The external preamplifier is controlled by the same sequencer logic.
It is switched immediately and prior to RF transmission, ensuring that its internal relays are fully engaged before any RF power is applied.
This sequencing provides maximum protection for external LNAs and connected receiver front ends.

2 m 30 W and 50 W PA Module



The Power Amplifier (PA) unit is based on high-performance Mitsubishi RF power modules, available in 30 W or 50 W versions.
Both configurations include an Automatic Level Control (ALC) circuit and use NEC EB2-12NU type RF relays for reliable switching.

The transverter's output signal passes through a –3 dB attenuator before driving the RF module, ensuring proper input matching and preventing overdrive.

The amplifier operates in Class AB1, configured by a bias control circuit supplied by Mitsubishi.

Bias adjustment is performed using potentiometer P1, located inside the PA enclosure. The 50 W version employs an RA80H1415M RF module rated for 80 W output, while the 30 W version uses an RA30H1317M module rated for 30 W.

The final PA module PCB is here:

Both amplifier variants are optimised for linear operation, ensuring excellent intermodulation performance and high signal quality suitable for EME, contest, and terrestrial applications.

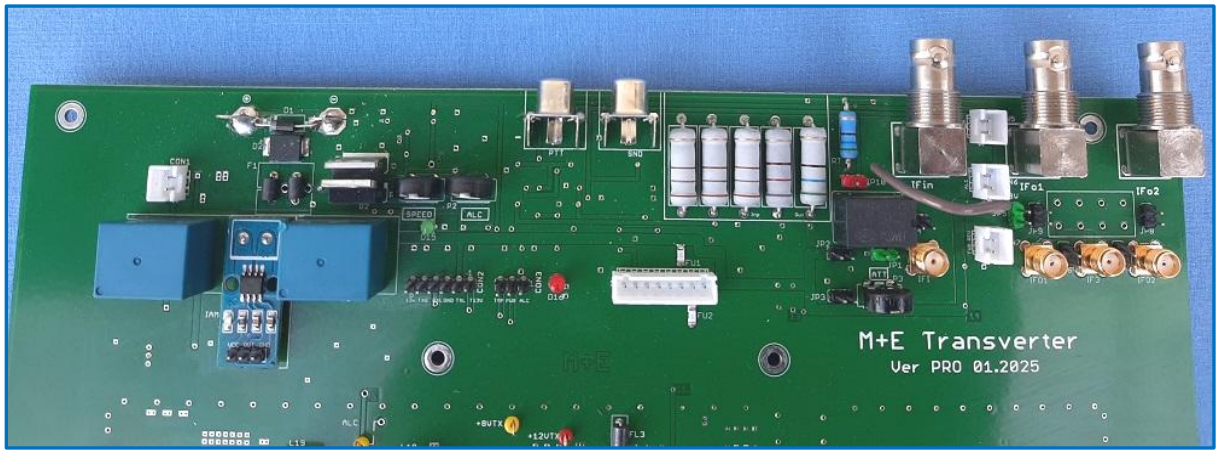
To achieve the best IMD (intermodulation distortion) performance, the RF modules are not driven beyond their nominal output power.

The PA unit includes a temperature sensor for monitoring the heatsink temperature. In the 50 W version, an active cooling fan is fitted as standard, while in the 30 W version, the fan is available as an optional accessory.

After the amplifier stage, the signal passes through a high-quality low-pass filter (LPF), followed by an SWR/PWR metering circuit and RF relay.

The Arduino control software calculates and displays the RF output power based on the calibration characteristics of the RF detector diodes used in the circuit.

Control Unit PCB



You can find the control unit's circuit diagram here.

The built-in control unit is a newly developed SMD-based circuit board that integrates all essential functions required for transverter control and monitoring.

It manages the cooling fan speed, includes a fixed 20 dB / 5 W RF attenuator, and provides jumper tabs to configure the transverter for compatibility with various HF radio types.

This board also incorporates an RF VOX circuit, intended solely as a safety feature to protect the RX IF amplifier in the event that the PTT cable is accidentally left disconnected. It must not be used as a substitute for the PTT input.

To enable full power control down to 0 W, a DC/DC circuit is implemented, adjusting the gate voltage of the driver FET into the negative range.

The analogue power control potentiometer on the display panel interfaces directly with this circuit.

The display panel also includes two additional adjustments:
• a SPEED trimmer for fan speed control, and
• an ALC trimmer for Automatic Level Control fine-tuning.

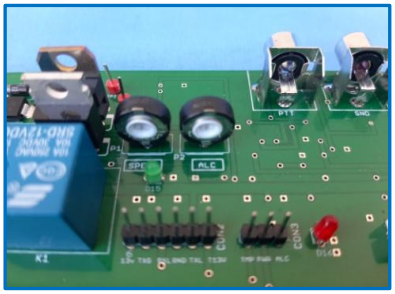
The ATT potentiometer acts as a –10 dB RF divider, allowing fine adjustment of the output power by varying the IF signal level.
The same PCB also houses the switching circuitry and IF relay section.
It is predesigned to accommodate the optional MC-1 combiner, which can be installed upon request to provide a split IF output for connecting a second receiver (IFo2 output), such as an SDR.

To enable full power regulation down to 0 W, the control board incorporates a DC/DC converter circuit.

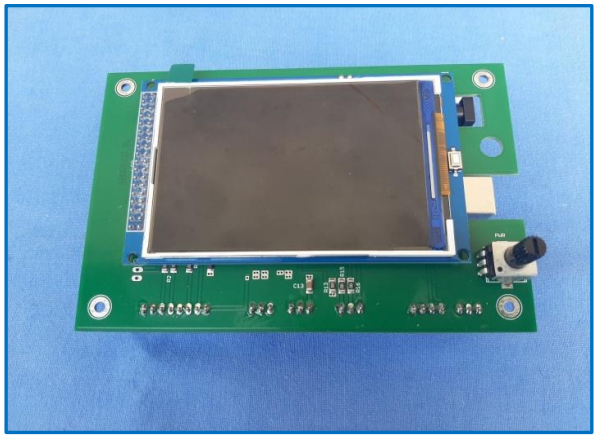
This allows precise control of output power by adjusting the second gate voltage of the driver FET into the negative range.

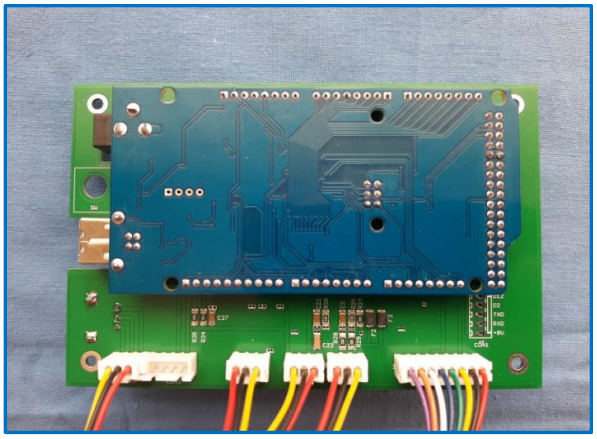
The analogue power control potentiometer is connected to the front display PCB, which also houses:
• the fan speed adjustment potentiometer (SPEED),
• the ALC control potentiometer (ALC), and the ATT (attenuator) potentiometer, which provides a –10 dB RF divider for precise output power adjustment via the IF signal level.

The control PCB also includes the switching circuitry and IF connector relays. The base PCB is designed to accommodate the optional MC-1 IF combiner module. When installed, this module splits the receiver IF signal into two separate paths. The second IF output is available at the IFO2 connector, allowing the connection of a second receiver (for example, an SDR receiver) for dual-channel operation.



Arduino, Display, and Control Units





You can find the Arduino unit's circuit diagram here.

The MV2-X transverter is controlled by an Arduino MEGA 2560 microcontroller. Both analogue inputs and outputs are used, in addition to the Arduino's integrated colour LCD driver.

The display unit is a 3.5-inch, 480 × 320-pixel, 16-bit colour LCD of the non-touch type. This screen provides a clear and reliable visual interface for all operational parameters and system status indicators.

The circuit diagram of the Arduino control unit is available in the schematic section of this manual.
The display panel connects to the main control board via flexible ribbon cables, allowing for easy replacement and servicing when required.

Using the Transverter

Operating the MV2-X transverter is straightforward.
Once the radio type you intend to use has been specified, the transverter will be factory-configured accordingly.

All that is required is to connect the appropriate number of IF cables between your radio and the transverter.

The factory-set cable configuration is displayed on the start-up screen.

Depending on your radio and connection type, the following configurations may apply:
• Three-cable configuration: separate IF connections for TX and dual RX (2 × RX + 1 × TX).

• Two-cable configuration: combined TX/RX connection or single RX system (for radios without a dedicated transverter socket).

• Single-cable configuration: shared IF line, typically used with radios that lack separate transverter ports.

During production, the internal jumpers are set for your specific radio type.
If you wish to use the transverter with a different radio, first determine the IF output power level of that radio during transmission.
A reference table in this manual lists the typical IF drive levels for various radio models and the corresponding input power requirements of the transverter.

Warning:
Some radios do not provide a low-level transverter output.
Using these radios directly with the MV2-X is possible only at your own risk.

Always reduce the radio's output power to the minimum setting (3–5 W) before connecting it to the transverter.

The MV2-X includes an internal –20 dB / 10 W RF power divider, allowing such radios (for example, the ICOM IC-7300) to be used safely in single-cable mode without the need for an external interface unit.

Dual Receiver Operation (EME / H & V Polarisation)
For standard terrestrial operation, typically only one receiver (RX1) is used.
However, for EME (Earth–Moon–Earth) or dual-polarisation operation, both receivers (RX1 and RX2) must be active.

In this configuration, three IF cables are required:
• Two IF cables for RX1 (H-pol) and RX2 (V-pol)
• One IF cable for TX

An SDR transceiver with dual-receiver capability is recommended for this setup.

EME Operation with a Single-Receiver Radio
If you wish to perform EME operation using a single-receiver radio with both horizontal and vertical polarisation, the signals from the two receiver channels must be combined using the optional built-in MC-1 combiner module.

When using H- and V-polarised antennas, this circuit provides an **additive** IF output signal, which should be connected to the RX input of your radio.

Interconnection and Power Supply
A PTT control cable must be connected between the TVTR PTT input and the radio's SEND (SND) output.
If an external power amplifier (PA) is used, connect the PA relay control input to the transverter's SND output.
Ensure that all ground connections are properly bonded to prevent RF feedback or noise coupling between devices.
Use high-quality, low-loss coaxial cables for all RF and IF connections.
The transverter should be powered from a stabilised 13.5–14.0 V DC supply with sufficient current capacity for the selected power version (30 W or 50 W).

TVTR SND Output
This output provides a switching signal rated up to +50 V / 0.5 A (maximum).
The transverter must be powered from a stabilised 13.8 V DC supply, rated at a minimum of 7A for the 30 W version or 12 A for the 50 W version.

Note:
Due to the high operating current, ensure that the power cables have sufficient cross-sectional area.
Undersized wiring may cause voltage drops at the DC connector, which can prevent the transverter from reaching its specified RF output power.

Summary of Basic Connections

1. Connect a stabilised 13.8 V DC power supply rated at least 7 A (30 W version) or 12 A (50 W version).
2. Connect the 2 m antenna cable to the ANT connector.
3. Connect the external PA (if used) and the PTT cable.
4. Connect the SND output to the PA's relay control input.
5. Switch ON the transverter. The start-up screen will show the factory settings.
   Note: Changing jumper settings does not automatically update the displayed parameters. These values can only be modified through the Arduino software.
6. Connect the IF cable(s) according to your specific radio configuration. Refer to the jumper tables in this manual for detailed guidance.
7. Set your radio to transverter (TVTR) mode as described in its user manual.
8. Verify reception by tuning to a known beacon or an active station.
   If no signal is received, check all cables, IF frequencies, and radio settings.
9. When pressing the PTT on your radio, the transverter should switch to TX mode.
   This is confirmed by the appearance of "TVTR" in the upper-right corner of the display.
10. In CW mode (key down), adjust the required output power using the PWR control knob.
    If the HF radio's IF output level is too low or too high, adjust it as follows:
    • Use P3 (ATT) on the transverter control board to fine-tune the input level.
    • The PWR control knob determines the maximum nominal output power (30 W or 50 W, depending on the version).
    For lower output requirements, set the PWR knob to maximum and reduce the drive using P3.

External Preamplifier Supply
If an external preamplifier is used, it can be powered directly via the DB9 connector.
The pin assignments for preamplifier control and power are detailed in the relevant wiring diagram later in this manual.

Important:
Do not supply the preamp through the coaxial cable.
This is considered poor engineering practice and may result in equipment damage or unsafe operating conditions.
Always use a dedicated power lead for the DC supply connection.

Low IF Output Radios

For radios with low-level IF output (typically below –10 dBm), the internal IF amplifier on the transverter must be enabled.
This can be done by setting the corresponding jumper on the main board, as shown in the jumper configuration table later in this manual.

If your external power amplifier (PA) does not require the transverter's full nominal drive power, you can reduce the TX output power without affecting the radio's IF signal level.

To adjust:
• Set the PWR control knob on the front panel to the maximum position.
• Use the P3 (ATT) trimmer on the control unit to adjust the maximum desired output power (for example, 15 W).

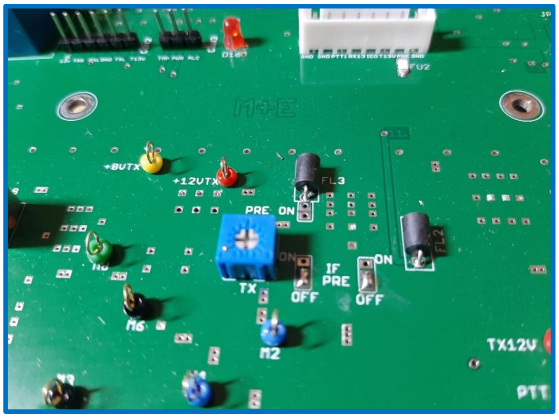
If the output power is still too high, set P3 to its mid-position and fine-tune the "TX Gain" potentiometer on the main transverter board until the required output level is achieved. This adjustment is particularly recommended when driving LDMOS-type external amplifiers.

Detailed wiring and configuration examples for different operation modes are provided in the final section of this manual (PDF drawings).

Some radios provide a low IF drive level (–20 dBm to –10 dBm).
For these radios, the built-in TX IF amplifier must be enabled.

Proceed as follows:

1. Open the transverter and locate the jumper area in the upper-right corner of the control PCB.
2. Set the IF PRE jumpers to the ON position (centre pins connected to ON pads).
3. Enable the IF preamp DC ON jumper.
4. Set the PWR control knob to maximum (nominal output).
5. If the output power is too high, reduce it using:
   • the P3 attenuator potentiometer on the control board, and
   • the TX gain trimmer on the mixer board (labelled "TX").



IF Output and Attenuator Settings
For radios providing an IF output of 3–5 W, the –20 dB / 5 W attenuator must be enabled.
Refer to the jumper configuration table for the correct settings.

The TX gain potentiometer, located on the main transverter board, must also be adjusted accordingly.

If your external power amplifier (PA) does not require the transverter's full nominal drive power, the output can be reduced without changing the HF radio's IF signal level.

Proceed as follows:

1. Set the PWR control knob on the front panel to the maximum power position.
2. Adjust the P3 trimmer on the control unit until the desired maximum power (for example, 15 W) is reached.
3. If the power output remains too high, set P3 to a mid-range position and fine-tune the "TX Gain" potentiometer on the mixer board to achieve the required level.

This procedure is strongly recommended when driving sensitive LDMOS amplifiers.

1. Adjust the P3 ATT trimmer on the control board until the desired output power is reached (for example, reduce the output to 15 W).

   If the output power remains too high:

2. Set the P3 trimmer to its mid-range position, and

   • Adjust the TX gain potentiometer on the mixer board (marked "TX") to achieve the required output power.

Note:
Using the TX gain adjustment method is strongly recommended when operating with LDMOS-type amplifiers, as it ensures optimum linearity and protection.

Detailed operating configurations and jumper settings are provided at the end of this chapter in PDF drawing format.

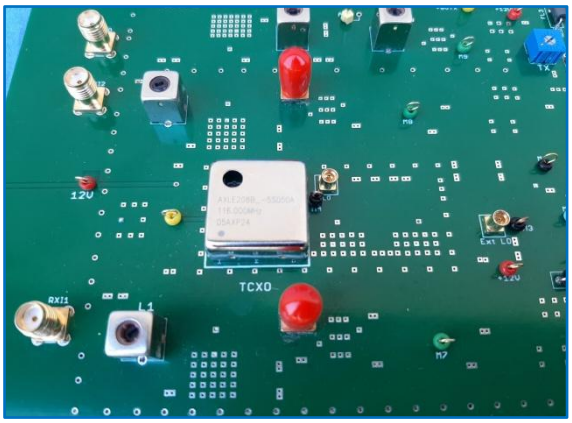
Receiver Section Adjustments

When using high-gain external preamplifiers, the overall receive gain of the transverter may become excessive, causing the radio's S-meter to indicate S2 or higher noise even without any input signal.
You can easily reduce the transverter's receive gain by adjusting the built-in RX potentiometers located on the transverter board (labelled "RX1" and "RX2"). Adjust both controls until the baseline noise level returns to S0 on each receiver.

Note:
This adjustment will not reduce noise originating from external electrical interference or other local RF noise sources.

SMA Connections for Lower-Noise Figure Operation

The MV2-X transverter is equipped with SMA connectors on the motherboard, positioned before the SAW filter, to allow direct connection of external preamplifiers.
This configuration improves both the overall noise figure (NF) and the dynamic range of the receiver system. If the total system gain becomes excessive due to the use of external preamplifiers, SMA–SMA cables may be connected directly between these sockets, bypassing the RX1 and RX2 inputs.



Both SMA ports have a 50 Ω impedance.
In this configuration, the internal TVTR preamplifiers are disabled, and only the antenna-mounted preamplifiers remain active.
A total preamplifier gain of at least +20 dB is recommended, including any losses introduced by the 2 m receive cables.

The factory-configured cable mode of the MV2-X transverter can be verified on the start-up (login) display screen.

Typical Wiring Configurations

The following diagrams illustrate various interconnection options for the MV2-X transverter, suitable for different station configurations.
Refer to the corresponding PDF drawings for detailed wiring examples.

1. Typical EME Station
2. Typical EME Station with single RX IF out
3. 2x antenna contest station, additive IF output
4. Single 2m ant station separate IF I/O
5. Single 2m ant station, separate 2m TX/RX cables, separate IF I/O
6. Single 2m ant station single IF I/O high PWR radio
7. 2x 2m antenna, 2x radio, separate IF I/O to radios