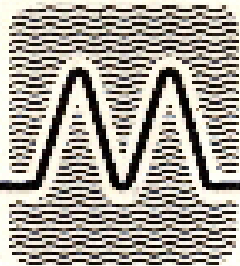


MICROWAVE MODULES LTD



MMT 432/144 TRANSVERTER SERIES



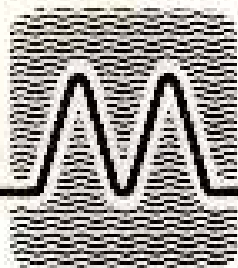
INTRODUCTION

This high performance 432 MHz solid state linear transverter is intended for use with 144 MHz SSB, FM, AM or CW equipment.

This transverter is available in two versions. MMT 432/144-S covers 432-436 MHz, and MMT 432/144-R incorporates a 1.6 MHz shift for use in the U.K. and certain other countries.

Please read this instruction book carefully to get the full benefit from your transverter.

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UNIT DESCRIPTION

This double conversion solid state linear transverter is intended for use with a 144 MHz transceiver to produce a high reliability transceive capability for satellite or terrestrial communication.

The unit has two ranges:—

432 – 434 MHz (LOW), 434.0 – 436.0 MHz (HIGH EXPORT MODEL)

432 – 434 MHz (LOW), 433.6 – 435.6 MHz (HIGH U.K. MODEL)

The appropriate range is selected by the two small toggle switches located directly above the D.C. power socket. These facilities have been included to enable the transverter to be used for communication via satellite or via repeater.

The transverter is supplied with a 15 dB attenuator unit, WHICH MUST BE CONNECTED TO THE AERIAL SOCKET OF YOUR 144 MHz TRANSCEIVER IN BOTH TRANSMIT AND RECEIVE MODES, AT ALL TIMES.

MAXIMUM RECOMMENDED POWER LEVELS TO BE FED INTO THIS ATTENUATOR ARE AS FOLLOWS:—

10 WATTS CONTINUOUS (FM)

15 WATTS INTERMITTENT (SSB)

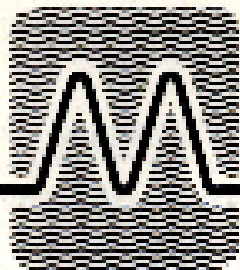
PLEASE TAKE EXTREME CARE TO AVOID OVERLOADING THE INPUT OF THE TRANSVERTER.

The incorporation of a double conversion transmit converter ensures a spurious-free output signal at 432 MHz, achieved by converting the 144 MHz signal down to 28 MHz before final conversion up to 432 MHz.

Due to the inclusion of an ultra-low noise receive converter and low distortion transmit mixers, the unit is ideal for all types of communication, particularly where a high degree of stability, sensitivity and linearity are of prime importance. An RF VOX network is included for optional use. Further details of this facility appear on page 9.

The unit is housed in a highly durable black diecast case and all circuitry is constructed on high quality glass-fibre printed circuit board. The high power linear amplifier stages are housed in a separate internal compartment, thus ensuring excellent electrical and thermal stability.

A wide range of applications is offered by this transverter, which by virtue of its linear mode of operation, will enable 144 MHz SSB, FM, AM or CW equipment to be used at 432 MHz.



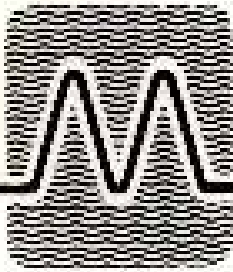
SPECIFICATION

GENERAL

FREQUENCY COVERAGE MMT 432/144-S	:	432-434 MHz LOW RANGE 434-436 MHz HIGH RANGE
FREQUENCY COVERAGE MMT 432/144-R	:	432-434 MHz LOW RANGE 433.6-435.6 MHz HIGH RANGE
INPUT FREQUENCY RANGE	:	144-146 MHz
D.C. POWER REQUIREMENTS	:	11-13.8 volts, 12.5 volts nominal
CURRENT CONSUMPTION	:	2.1 Amps peak
R.F. CONNECTORS	:	50 ohm BNC sockets
POWER CONNECTOR	:	5 pin DIN socket
SIZE	:	187 x 120 x 53 mm
WEIGHT	:	975 grams
ATTENUATOR SIZE	:	80 x 30 x 20 mm
ATTENUATOR WEIGHT	:	95 grams

RECEIVE SECTION

CONVERTER GAIN THROUGH TRANSEIVE PORT VIA ATTENUATOR	:	10 dB typical
CONVERTER GAIN THROUGH INDEPENDENT PORT	:	25 dB typical
OVERALL CONVERTER NOISE FIGURE	:	3 dB maximum
INPUT IMPEDANCE	:	50 ohm
IF OUTPUT IMPEDANCE	:	50 ohm
QUIESCENT RECEIVE CURRENT	:	100 mA



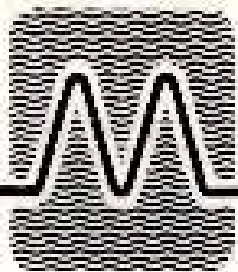
SPECIFICATION

TRANSMIT SECTION

INPUT IMPEDANCE	:	50 ohm
INPUT MODES	:	SSB, FM, AM or CW
INPUT DRIVE REQUIRED FOR FULL OUTPUT	:	10 Watts nominal
POWER OUTPUT	:	10 Watts continuous rating
OUTPUT IMPEDANCE	:	50 ohm
RELATIVE 404/406 MHz OUTPUT MMT 432/144-S	:	Better than -65 dB
RELATIVE 404/405.6 MHz OUTPUT MMT 432/144-R	:	Better than -65 dB
OTHER SPURIOUS OUTPUTS	:	Better than -65 dB
QUIESCENT TRANSMIT CURRENT	:	250 mA

LOCAL OSCILLATOR

MAXIMUM FREQUENCY ERROR AT 432 MHz	:	± 5 KHz
TYPICAL DRIFT AT 432 MHz	:	2 KHz/hour
FREQUENCY SENSITIVITY (11-13.8 volts)	:	50 Hz
FIRST OSCILLATOR	:	101 MHz
SHIFT OSCILLATOR	:	101.5 MHz
SECOND OSCILLATOR	:	116 MHz
} MMT 432/144-S		
FIRST OSCILLATOR	:	101 MHz
SHIFT OSCILLATOR	:	101.4 MHz
SECOND OSCILLATOR	:	116 MHz
} MMT 432/144-R		



SOCKET FUNCTIONS

432 MHz INPUT

This socket is not connected, since for transceive operation the receive input is routed through the socket marked "432 MHz output". However, should external changeover be required see page 9.

432 MHz OUTPUT

As supplied, the transverter is wired for transceive operation, and this socket is used as the common 432 MHz input/output. Whilst the P.A. transistors are able to withstand a considerable degree of mismatch, it is recommended that the SWR should not exceed 2 : 1

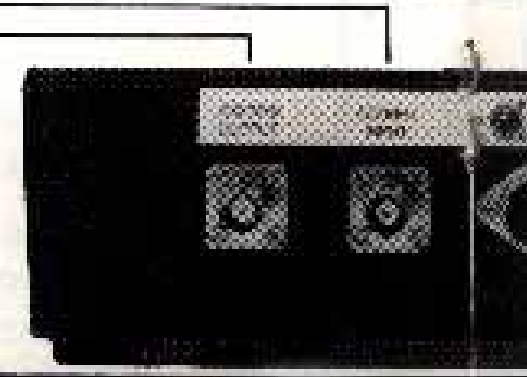
POWER

This socket carries all the DC functions of the transverter.

When looking at the socket as pictured below connections are as follows—

PIN 1—T/R

External control of the switching is available at PIN 1 (marked T/R), and the application of an earth to this pin will switch the transverter into the transmit mode. The current drawn from this pin, relative to earth, is 1mA



SOCKET FUNCTIONS

PIN 2 – NO CONNECTION

PIN 3 – NEGATIVE (EARTH)

This line should be connected to the negative side of the supply, and earth.

PIN 4 – NO CONNECTION

PIN 5 – POSITIVE (+ 12 V)

This line should be connected to + 12 Volts, in both receive and transmit modes.

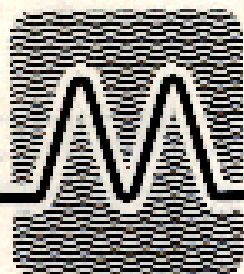
INDEPENDENT 144 MHz RX OUTPUT

As supplied the transverter is wired for transceive operation through the socket marked "144 MHz TRANSCEIVER". However, it is possible to use the internal receive converter independently with a separate tunable IF. This may be achieved by connecting the output from this socket to the input of a suitable receiver.

144 MHz TRANSCEIVER

For transceive operation at 432 MHz this socket should be connected to the aerial socket of the existing 144 MHz transceiver via the supplied 15dB attenuator. Attenuated incoming 144 MHz RF power is sampled by the RF VOX network, which enables the appropriate connection to the receive or transmit section of the transverter to the existing 144 MHz transceiver. On receive this socket provides access to the receive converter, thus allowing incoming 432 MHz signals to be converted to 144 MHz.





FREQUENCY RANGE SELECTION

MMT 432/144-S

This transverter covers the two ranges, 432-434 MHz (LOW) and 434-436 MHz (HIGH). For either range the transverter will work in conjunction with a transceiver operating on the 144-146 MHz range. As shown in the function table below, the transverter can be operated in the simplex mode on the range 432-434 MHz using Function 1. In Function 4 the transverter covers the range 434-436 MHz on both transmit and receive, and this is the recommended function when the transverter is being used for communication via satellite.

These functions are selected by the two small toggle switches located directly above the D.C. power socket. *The functions available are:*

<i>Function 1 Normal Mode</i>	<i>Function 2</i>	<i>Function 3</i>	<i>Function 4 Satellite Mode</i>
TX : LOW RX : LOW	TX : LOW RX : HIGH	TX : HIGH RX : LOW	TX : HIGH RX : HIGH

MMT 432/144-R

The MMT 432/144-R, is the model supplied for use in the U.K. and certain other countries, where a repeater shift of 1.6 MHz is in use.

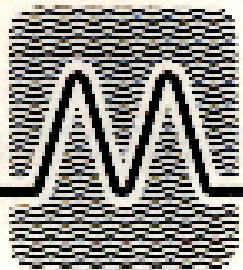
The transverter has two ranges, 432-434 MHz (LOW) and 433.6-435.6 (HIGH), each for an IF of 144-146 MHz.

As shown in the function table below, the transverter can be operated in the simplex mode on either of these two ranges.

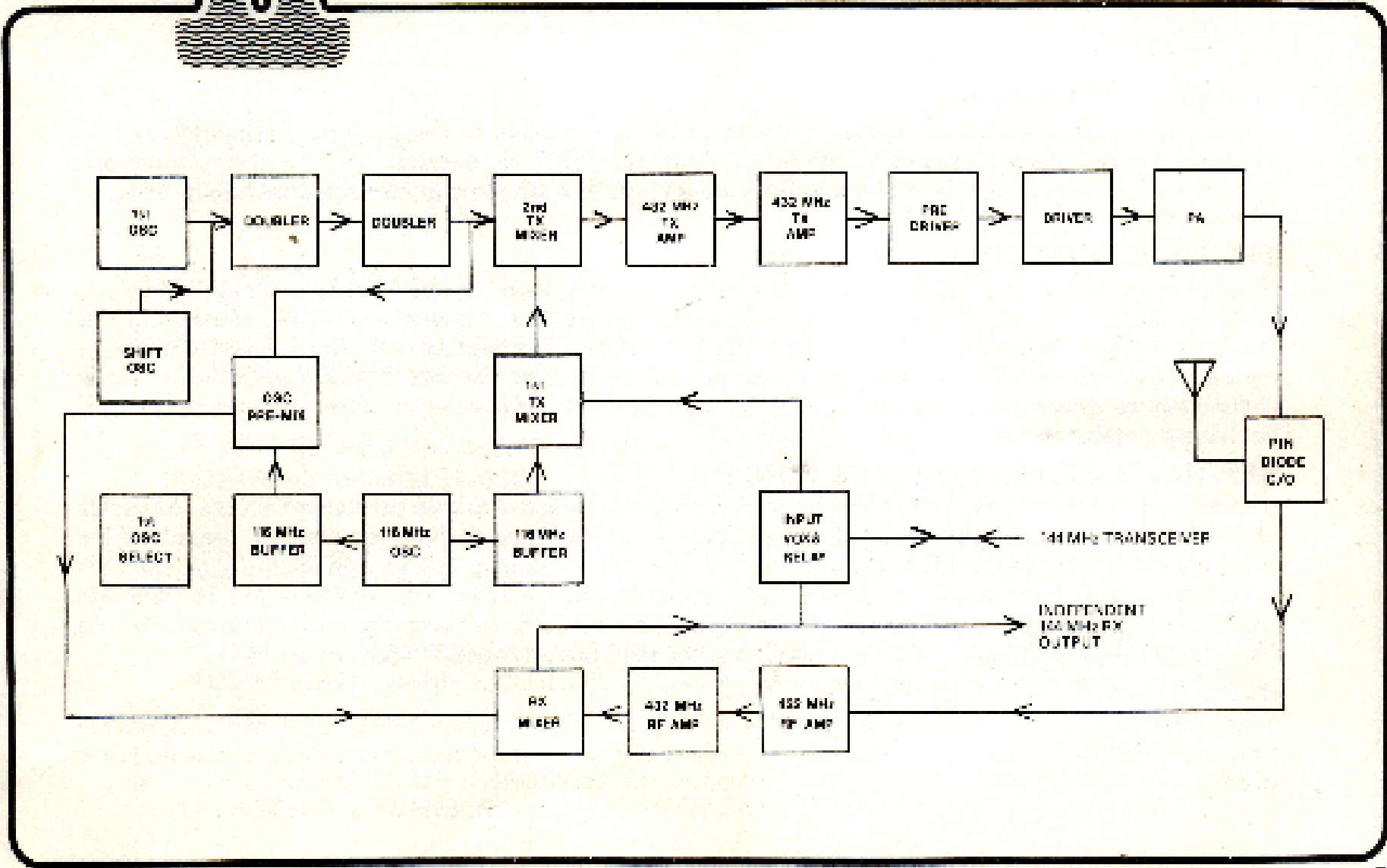
Additionally, in the U.K., the 432 MHz repeaters can be accessed when the transverter is in Function 3, or operated in the reverse repeater mode, Function 2.

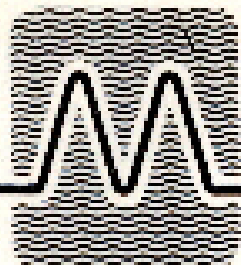
These functions are selected by the two small toggle switches located directly above the D.C. power socket. *The functions available are:*

<i>Function 1 Normal Mode</i>	<i>Function 2 Reverse Repeater Mode</i>	<i>Function 3 Repeater Mode</i>	<i>Function 4</i>
TX : LOW RX : LOW	TX : LOW RX : HIGH	TX : HIGH RX : LOW	TX : HIGH RX : HIGH



BLOCK DIAGRAM





SYSTEM CONSIDERATIONS

INPUT ATTENUATOR

The input attenuator supplied with this unit must be connected between the aerial socket of your 144 MHz transceiver and the socket marked "144 MHz TRANSCEIVER", for operation in both the transmit and receive modes. The specification of this attenuator is $15 \text{ dB} \pm 1 \text{ dB}$, rated at 10 watts continuous, 15 watts intermittent.

TRANSMIT/RECEIVE SWITCHING

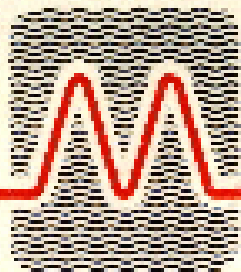
Grounding pin 1 of the 5 pin DIN power socket will switch the transverter into the transmit mode. This may be achieved by connection to your transceiver switching circuitry. Alternatively, in the absence of this connection, the transverter will be switched into the transmit mode when 144 MHz drive is applied, by means of internal RF VOX circuitry. However, we would recommend that the RF VOX is used only in circumstances where the transverter is used remotely from the transceiver, or when the transceiver does not have a suitable switching facility.

SEPARATE 432 MHz RECEIVE INPUT

Reference is made on page 5 to this input, which can be connected to give permanent access to the 432 MHz receive converter input, independently of the internal PIN diode changeover relay. On the side of the screened PA compartment will be seen several coloured feedthroughs. The second feedthrough from the socket panel face (marked with a painted dot), carries the receive input. The wire from this feedthrough should be disconnected, and a length of wire should be connected between the existing terminal pin on the main printed circuit board and the centre pin of the BNC socket marked "432 MHz INPUT".

INDEPENDENT 144 MHz RX OUTPUT

If required, this second receive output at 144 MHz is available to allow independent use of a second receiver for band monitoring, for example. The available gain from the receive converter at this output is 25 dB.



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**Other products available include:
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VHF and UHF Linear Transverters,
VHF and UHF Converters,
500 MHz Digital Frequency Meters.**

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