The MO-280 is a professional SFN/MFN DTMB modulator fully compliant with the GB20600-2006 and the GY/T 229.1-2008 standards contained in a 19” 1U chassis. The unit has two serial ASI MPEG-2 TS inputs, one 10 MHz GPS reference input and one 1pps GPS reference input. The GPS inputs are used in combination with the Second Frame Initialization Packet (SIP) embedded in the transport streams for SFN synchronisation purposes.

**General description of the DTMB modulator MO-280**

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**MFN mode**

In MFN mode, the modulator is locked to either the internal 10 MHz TCXO clock reference or to the external 10 MHz GPS reference. In this mode, the MO-280 is able to work with any incoming bit rate as long as the net bit rate resulting from dropping all NULL packets present in the stream is strictly lower than the value given in the DTMB specification for the modulation parameters in use. The input TS bit rate is adapted (bit rate adaptation) to the useful bit rate required by the DTMB signal by stuffing the TS with NULL packets (packet stuffing).

This stuffing process alters the sequence of PCR values embedded in the TS. These values have to be re-stamped for the resultant PCR jitter to remain within the limits specified by the DTMB.

**Control interface**

- Pushable rotary control on the front panel with navigation key and LCD display.
- Two LEDs indicating the power and synchronisation status of the equipment.
- RJ45 ethernet interface connector for remote control.

**SFN mode**

In SFN mode, the modulator can be locked to either the external 10 MHz GPS reference or to the internal 10 MHz TCXO. A loss of sync with the external 10 MHz reference can be used to trigger a swap of the synchronisation over to the input TS rate. This reduces the number of disruptions to the output IF/RF signals. SIP packets are constantly monitored in the TS input so as to dynamically adjust the delay of the modulator for accurate SFN synchronisation. If required, a positive or negative delay offset with 100-ns resolution can be added locally.

Two test modes are available in the MO-280, single tone output and test TS generation.
### SPECIFICATIONS

**SYNCHRONISATION**

**GPS Inputs**
- 10 MHz input
- 1 pps input
- 10 MHz output

**MFN Internal**

**SFN External**

**MPEG-2 TRANSPORT STREAM INPUT**

- Two ASI inputs, 75 Ω female BNC. TS packets of length 188 or 204 bytes (automatic detection).
- Support for burst and continuous packet mode.

**IF OUTPUT**

- 50 Ω BNC female connector.
- Frequency range: Variable between 31 and 36 MHz in steps of 1 Hz; fixed at 36 MHz when RF output is off.
- Spectrum polarity: Selectable via front panel controls.
- Power level (average): <0.6 dB.
- In-band amplitude ripple: <10 ns.
- In-band group delay ripple: 2 ppm.
- Frequency stability: 2 ppm.
- MER: >43 dB.

**RF OUTPUT**

- 50 Ω N-type female connector.
- Frequency range: Adjustable between 45 and 875 MHz in 1 Hz steps.
- Spectrum polarity: Selectable via front panel controls.
- Power level (average): Approximately 80 dBµV with no attenuation. Variable attenuation of 0 to 60 dB in steps of 1 dB.
- MER: >38 dB.

**DTMB PARAMETERS**

- Single, Multicarrier.
- Carrier Mode: 420, 595, 945 symbols.
- Frame Header Length: Fixed, Rotating.
- Frame Header Phase: 0.4, 0.6, 0.8.
- FEC rates: 4QAM-NR, 4QAM, 16QAM, 32QAM, 64QAM.
- Constellations: Available.
- Time Interleaving: 240, 720.
- MFN operation: Available.

**PROCESSING DELAYS**

- Static delay adjustable between 0 and 1 s. Resolution given by the DTMB elementary clock period.
- Dynamic delay automatically calculated from the 10 MHz GPS reference, the 1 pps signal and the SIP packet embedded in the TS multiplex. The resolution is 100 ns.
- A positive or negative local delay offset may be added as long as the total delay is never greater than 1 s or lower than the inherent latency of the modulator. Synchronisation accuracy better than ±200 ns.
- Rough estimate of the network delay from the SFN adapter output to the modulator TS inputs.

**TEST MODES**

- Generate a single carrier at the channel central frequency whose level equals the average DTMB output power. This is intended for signal level alignment.
- Internal generation of test TS using PRBS sequences (length 15 / 23 embedded within NULL packets).

**CREST FACTOR REDUCTION**

- Crest Factor range: 8 to 11 dB in 0.1 dB steps.

**NON-LINEAR PRE-DISTORTER**

- Correction bandwidth: >24 MHz
- Number of correction points: 2 to 16 using linear interpolation
- AM-AM table: -12 dB to +12 dB (abscissae), -6 dB to +6 dB (ordinates), both in 0.1 dB steps.
- AM-PM table: -12 dB to +12 dB (abscissae) in 0.1 dB steps, -30° to +30° (ordinates) in 0.1° steps.

**ETHERNET INTERFACE**

- Connector RJ45 with activity indicator LEDs. Standard 10BASE-T or 100BASE-TX (auto-sensing).

**POWER SUPPLY**

- 90 - 250 VAC @ 50 - 60 Hz. Consumption 20 W.

**MECHANICAL FEATURES**

- Dimensions 19" (W.) x 1.75" (H.) x 15" (D.). Weight 6.3 kg.