OTM-3000

FREQUENCY AGILE F.C.C. COMPATIBLE TELEVISION MODULATOR

INSTRUCTION MANUAL

Phone: (209) 586-1022
(800) 545-1022
Fax: (209) 586-1026
E-Mail: salessupport@olsontech.com
www.olsontech.com

025-000033 REV F

8/21/01

OTM-3000

SPECIFICATIONS

Output Frequency Range	Selectable in 1MHz increments. 55.25MHz, Ch. 2 to 445.25MHz, Ch. 61 (YY)
Output Level	+55dBmV min., 55.25 - 445.25MHz min.
Frequency Accuracy/Stability	<±5KHz of selected channel frequency
Out-of-Band C/N Ratio	>80dB as measured in a 4.0MHz noise bandwidth.
Spurious Output	60dB down @ 55dBmV output, 54.00 to 445.25MHz
I.F. Output Frequency	Video 45.75MHz, audio 41.25MHz
Video IF Level	+40dBmV
Video Carrier Level	Adjustable downward by 10dB minimum.
Video Performance	Measured @ 80% modulation. Differential gain <6%. Differential phase <3°. Video input 1 volt p-p (75Ω). 170 nSec predistortion, ± 40nSec.
Audio Intercarrier Stability	<±1KHz
Audio Deviation	25KHz - 75 µsec pre-emphasis. Minimum 500mV p-p input.
Audio/Video Ratio	Adjustable from 12dB to 20dB below video carrier.
Front Panel Controls	Channel/F.C.C. offset, video/audio modulation, R.F. level and A/V ratio.
Front Panel Indicators	LED's for video/audio overmodulation.
Rear Panel Connectors	75Ω type F: Video input, RF output, -20dB test point and video/audio IF loops. Terminal strip: 600Ω balanced audio input. 3-wire power cord/USA plug.
Power Consumption	115 VAC @ 60Hz - 12 watts.
Fuse	0.5 amp Slo-blo
Size	1.75" H x 19" W x 8" D.

OTM-3000

FREQUENCY AGILE - F.C.C. COMPATIBLE
TELEVISION MODULATOR

1) INTRODUCTION

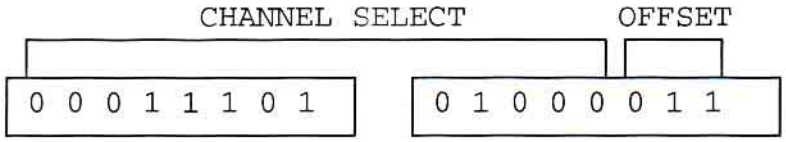
The Olson Technology OTM-3000 is a frequency agile F.C.C. compatible television modulator that will provide high level output, on any channel from 55.25MHz, Ch. 2 through 445.25MHz, Ch. 61 (YY). All channels are selectable in 1MHz increments by front panel DIP switches. F.C.C. offsets of +12KHz and +25KHz are also selectable by front panel DIP switches.

The OTM-3000 uses SAW filtering for 60dB adjacent channel rejection. This unit also offers the unique Olson Technology feature of >80dB out-of-band carrier to noise ratio which allows virtually unlimited numbers of the OTM-3000 to be combined without the need for external band pass filters. The OTM-3000 is BTSC stereo compatible.

2) CHANNEL SELECTION

Remove the front panel plate marked "Output Channel Select" to expose the channel select and offset select DIP switches as shown in Figure #1.

Figure #1
FRONT PANEL DIP SWITCHES



0 = Switch in DOWN Position
1 = Switch in UP Position

1) Select the desired channel by use of the channel select switch and the code sheets.
2) Select the proper offset by use of the offset switch and the offset information on the next page.
3) The example above indicates channel 6 with 0KHz offset.

OFFSET SELECT INFORMATION

1) Channels 14 (A), 15 (B), 16 (C), 25 to 41 (L to EE) & 43 to 53 (GG to QQ) = 12.5KHz.
2) Channels 98 (A-2), 99 (A-1) & 42 (FF) = 25KHz.
3) All others = 0KHz.

Offset	(3) Rightmost DIP Switches
0KHz	0 1 1
12.5KHz	1 0 1
25.0KHz	1 1 0

3) F.C.C. OFFSET FREQUENCIES

EIA CHANNEL	HISTORIC CHANNEL	F.C.C. OFFSET KHz	CHANNEL FREQUENCY INCL. OFFSET MHz
98	A-2	25.0	109.2750
99	A-1	25.0	115.2750
14	A	12.5	121.2625
15	B	12.5	127.2625
16	C	12.5	133.2625
25	L	12.5	229.2625
26	M	12.5	235.2625
27	N	12.5	241.2625
28	O	12.5	247.2625
29	P	12.5	253.2625
30	Q	12.5	259.2625
31	R	12.5	265.2625
32	S	12.5	271.2625
33	T	12.5	277.2625
34	U	12.5	283.2625
35	V	12.5	289.2625
36	W	12.5	295.2625
37	AA	12.5	301.2625
38	BB	12.5	307.2625
39	CC	12.5	313.2625
40	DD	12.5	319.2625

F.C.C. OFFSET FREQUENCIES (Continued)

EIA CHANNEL	HISTORIC CHANNEL	F.C.C. OFFSET KHz	CHANNEL FREQUENCY INCLUDING OFFSET MHz
41	EE	12.5	325.2625
42	FF	25.0	331.2750
43	GG	12.5	337.2625
44	HH	12.5	343.2625
45	II	12.5	349.2625
46	JJ	12.5	355.2625
47	KK	12.5	361.2625
48	LL	12.5	367.2625
49	MM	12.5	373.2625
50	NN	12.5	379.2625
51	OO	12.5	385.2625
52	PP	12.5	391.2625
53	QQ	12.5	397.2625

4) VIDEO MODULATION ADJUSTMENT

A) Connect a video source of approximately 1V p-p to the video input connector (75 ohms input Z) on the rear panel. The video should be of a reasonably bright scene (commercials are usually excellent).

B) The video overmodulation indicator LED may stay on for approximately one minute after the unit is first turned on. Wait for approximately one minute before adjusting the video modulation control and observing the LED.

Rotate the video modulation level adjust control slowly clockwise until the video overmodulation LED just turns on. CAUTION: If the modulation is set too high, compression or lack of contrast will occur during high intensity scenes.

5) AUDIO MODULATION ADJUSTMENT

A) Connect an audio source of 500mV p-p (minimum) to the balanced audio input connector (600 ohms input Z) on the rear panel. The source should be typical of the program material to be carried.

B) Rotate the audio modulation level adjust control slowly clockwise until the audio overmodulation LED just begins to blink. CAUTION: Overmodulation can result in severe distortion in some TV sets. Set this control at peak program levels.

6) RF AND AURAL CARRIER LEVEL ADJUSTMENT

A) Using a field strength meter, set the video carrier to the desired level with the RF output level adjust control. It is suggested that the operating level of the OTM-3000 be not less than 4dB below the specified output level. If the output level must be lowered more than 4dB from the full specified output level, a fixed attenuator pad may be placed at the unit's output.

B) Tune the field strength meter to the aural carrier (4.5MHz above the video carrier).

C) Adjust the aural carrier level control to the desired level, typically 15dB below the video carrier. CAUTION: Reducing the visual/aural carrier ratio to less than 15dB can result in high out-of-band spurious signals in adjacent channels.

7) MISCELLANEOUS

A) The OTM-3000 is BTSC stereo compatible. It is shipped in the "mono" mode. To use a composite BTSC baseband input signal the pre-emphasis must be defeated. Remove the top cover and move the internal jumper plug from W2 "PRE" to W2 "BY". This plug is located in the left front area of the circuit board.

B) This unit is equipped with external video and audio I.F. loops. Each loop is connected with a short "F" type coax jumper. If either jumper is disconnected or lost, the unit will not perform properly.

C) If a scrambling unit is utilized with the OTM-3000, follow the instructions associated with the scrambler. The video I.F. output level is +40dBmV, and the audio carrier level is determined by the aural carrier level adjustment - typically +22dBmV @ 15dB A/V ratio.

D) This unit is equipped with a 0.5A slo-blo fuse. For continued safety and to maintain proper performance of the unit, please replace only with an equivalent fuse.

E) A -20dB test point (type F connector) is provided in the rear panel.

F) When installing the OTM-3000 in an equipment rack, it is best to leave an empty rack space above and below the unit to allow for optimum air circulation.

OTM-3000

STANDARD TV CHANNEL CODES FOR MODULATOR

FREQUENCY MHz	EIA CHANNEL	HISTORIC CHANNEL	CHANNEL SELECT SW1	SW2
55.25	2	2	0 0 1 1 1 0 0 1	0 1 0 0 0
61.25	3	3	0 1 0 0 0 1 0 1	0 1 0 0 0
67.25	4	4	0 0 0 1 0 1 0 1	0 1 0 0 0
77.25	5	5	0 1 0 0 1 1 0 1	0 1 0 0 0
83.25	6	6	0 0 0 1 1 1 0 1	0 1 0 0 0
91.25	95	A-5	0 0 0 0 0 0 1 1	0 1 0 0 0
97.25	96	A-4	0 1 1 0 0 0 1 1	0 1 0 0 0
103.25	97	A-3	0 0 1 1 0 0 1 1	0 1 0 0 0
109.25	98	A-2	0 1 0 0 1 0 1 1	0 1 0 0 0
115.25	99	A-1	0 0 0 1 1 0 1 1	0 1 0 0 0
121.25	14	A	0 1 1 1 1 0 1 1	0 1 0 0 0
127.25	15	B	0 0 1 0 0 1 1 1	0 1 0 0 0
133.25	16	C	0 1 0 1 0 1 1 1	0 1 0 0 0
139.25	17	D	0 0 0 0 1 1 1 1	0 1 0 0 0
145.25	18	E	0 1 1 0 1 1 1 1	0 1 0 0 0
151.25	19	F	0 0 1 1 1 1 1 1	0 1 0 0 0
157.25	20	G	0 1 0 0 0 0 0 0	1 1 0 0 0
163.25	21	H	0 0 0 1 0 0 0 0	1 1 0 0 0
169.25	22	I	0 1 1 1 0 0 0 0	1 1 0 0 0
175.25	7	7	0 0 1 0 1 0 0 0	1 1 0 0 0
181.25	8	8	0 1 0 1 1 0 0 0	1 1 0 0 0
187.25	9	9	0 0 0 0 0 1 0 0	1 1 0 0 0
193.25	10	10	0 1 1 0 0 1 0 0	1 1 0 0 0
199.25	11	11	0 0 1 1 0 1 0 0	1 1 0 0 0
205.25	12	12	0 1 0 0 1 1 0 0	1 1 0 0 0
211.25	13	13	0 0 0 1 1 1 0 0	1 1 0 0 0
217.25	23	J	0 1 1 1 1 1 0 0	1 1 0 0 0
223.25	24	K	0 0 1 0 0 0 1 0	1 1 0 0 0
229.25	25	L	0 1 0 1 0 0 1 0	1 1 0 0 0
235.25	26	M	0 0 0 0 1 0 1 0	1 1 0 0 0

STANDARD TV CHANNEL CODES FOR MODULATOR (Continued)

FREQUENCY MHz	EIA CHANNEL	HISTORIC CHANNEL	CHANNEL SELECT SW1	SW2
241.25	27	N	0 1 1 0 1 0 1 0	1 1 0 0 0
247.25	28	O	0 0 1 1 1 0 1 0	1 1 0 0 0
253.25	29	P	0 1 0 0 0 1 1 0	1 1 0 0 0
259.25	30	Q	0 0 0 1 0 1 1 0	1 1 0 0 0
265.25	31	R	0 1 1 1 0 1 1 0	1 1 0 0 0
271.25	32	S	0 0 1 0 1 1 1 0	1 1 0 0 0
277.25	33	T	0 1 0 1 1 1 1 0	1 1 0 0 0
283.25	34	U	0 0 0 0 0 0 0 1	1 1 0 0 0
289.25	35	V	0 1 1 0 0 0 0 1	1 1 0 0 0
295.25	36	W	0 0 1 1 0 0 0 1	1 1 0 0 0
301.25	37	AA	0 1 0 0 1 0 0 1	1 1 0 0 0
307.25	38	BB	0 0 0 1 1 0 0 1	1 1 0 0 0
313.25	39	CC	0 1 1 1 1 0 0 1	1 1 0 0 0
319.25	40	DD	0 0 1 0 0 1 0 1	1 1 0 0 0
325.25	41	EE	0 1 0 1 0 1 0 1	1 1 0 0 0
331.25	42	FF	0 0 0 0 1 1 0 1	1 1 0 0 0
337.25	43	GG	0 1 1 0 1 1 0 1	1 1 0 0 0
343.25	44	HH	0 0 1 1 1 1 0 1	1 1 0 0 0
349.25	45	II	0 1 0 0 0 0 1 1	1 1 0 0 0
355.25	46	JJ	0 0 0 1 0 0 1 1	1 1 0 0 0
361.25	47	KK	0 1 1 1 0 0 1 1	1 1 0 0 0
367.25	48	LL	0 0 1 0 1 0 1 1	1 1 0 0 0
373.25	49	MM	0 1 0 1 1 0 1 1	1 1 0 0 0
379.25	50	NN	0 0 0 0 0 1 1 1	1 1 0 0 0
385.25	51	OO	0 1 1 0 0 1 1 1	1 1 0 0 0
391.25	52	PP	0 0 1 1 0 1 1 1	1 1 0 0 0
397.25	53	QQ	0 1 0 0 1 1 1 1	1 1 0 0 0
403.25	54	RR	0 0 0 1 1 1 1 1	1 1 0 0 0
409.25	55	SS	0 1 1 1 1 1 1 1	1 1 0 0 0
415.25	56	TT	0 0 1 0 0 0 0 0	0 0 1 0 0

STANDARD TV CHANNEL CODES FOR MODULATOR (Continued)

FREQUENCY MHz	EIA CHANNEL	HISTORIC CHANNEL	CHANNEL SELECT SW1	SW2
421.25	57	UU	0 1 0 1 0 0 0 0	0 0 1 0 0
427.25	58	VV	0 0 0 0 1 0 0 0	0 0 1 0 0
433.25	59	WW	0 1 1 0 1 0 0 0	0 0 1 0 0
439.25	60	XX	0 0 1 1 1 0 0 0	0 0 1 0 0
445.25	61	YY	0 1 0 0 0 1 0 0	0 0 1 0 0

See end of manual for switch setting calculations for other frequencies.

MODULATOR SWITCH SETTING CALCULATION
THE OTM-3000 IS FACTORY PRESET WITH 1MHz STEP SIZE.

To calculate the switch settings for a given output frequency use the following procedure:

1) Calculate the number "N" required for step 2, below.
Use this formula:

$$N = \frac{\text{OUTPUT FREQUENCY} + \text{2ND IF FREQUENCY}}{\text{STEP SIZE (IN MHZ)}}$$

NOTE: 2nd IF FREQUENCY FOR ALL NTSC = 612.75

2) Convert the number "N" to reversed binary as required to set the unit DIP switches. This binary number represents the switch settings with 1 = UP and 0 = DOWN.

Use this chart to convert the number "N" to reversed binary:

SWITCH POSITION:	1	2	3	4	5	6	7	8	9	10	11	12	13
DECIMAL NUMBER:	1	2	4	8	16	32	64	128	256	512	1024	2048	4096
BINARY NUMBER:	___	___	___	___	___	___	___	___	___	___	___	___	___

3) Set the DIP switches using the binary number from above.

4) Determine what FCC offset, if any, is required and set the offset select switch positions correctly.

EXAMPLE OF SWITCH SETTING CALCULATION

- -

Required: Settings for channel 7 (175.250 MHz).

1) $$\frac{175.25 + 612.75}{1} = 788$$

2) Convert the number "N" (788) to reversed binary.

A) Consult the chart above and locate the largest number <u>less than or equal to 788</u>. This would be "512". Place a "1" below this number.

Subtract this number from the original number to obtain the remaining number to use in the next step. This would be "276" (788 - 512 = 276).

B) Consult the chart above and locate the largest number <u>less than or equal to 276</u>. This would be "256". Place a "1" below this number.

Subtract this number from the previous number to obtain the remaining number to use in the next step. This would be "20" (276 - 256 = 20).

C) Consult the chart above and locate the largest number
less than or equal to 20. This would be "16". Place a "1" below this number.

Subtract this number from the previous number to obtain the remaining number to use in the next step. This would be 20 - 16 = 4.

D) Continue in this fashion until the remaining number is reduced to "0". Note that the remaining number must be reduced to exactly 0 by the above process.

E) Place a "0" below all other decimal numbers in the chart.
The resulting reversed binary number is
0 0 1 0 1 0 0 0 1 1 0 0 0.

3) Set the DIP switches using the binary number from above.

A) Set the unit DIP switches left-to-right. Set them DOWN for a binary "0" and UP for a binary "1".

4) Determine what FCC offset, if any, is required and set the offset select switch positions correctly.

A) Determine if any offset is required from the offset select section of this manual. No offset is required for channel 7 (175.250 MHz).

B) Set the last three DIP switch positions using the information from the offset select section of this manual. This would be 0 1 1.