



LCM-550x12

12 CHANNEL TELEVISION MODULATOR SYSTEM

INSTRUCTION MANUAL

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LCM-550x12

Frequency Agile Modulator System

Specifications

Output Frequency Range:	55.25 to 547.25MHz in 2MHz increments, selected by front panel DIP switch. 250KHz increments internally selectable for HRC frequencies.
Output Power:	+40dBmV minimum, +45dBmV typical per channel. Downward adjustable by 10dB minimum.
Spurious Outputs:	>60dB below output video carrier out of band.
Out-of-Band C/N:	>80dB below output video carrier (4MHz bandwidth) - per channel.
In-Band C/N:	>57dB
Frequency Stability/Accuracy:	Designed to meet F.C.C. title 47 part 76 (+10 Celsius to + 40 Celsius). Offset adjustable by front panel potentiometer.
Audio/Video Ratio Adjust:	From 13dB to 20dB below video carrier. Adjustable by front panel potentiometer.
Audio Inter-carrier Accuracy:	4.5MHz +/- 1KHz
Video Input:	1V P-P nominal for 85% modulation. Front panel adjustable, from as low as 0.5V P-P input. 75 Ohm input Z utilizing an RCA connector.
Audio Input:	500mV P-P for 25KHz deviation. Adjustable by front panel potentiometer. 10K input Z utilizing an RCA connector.
Power Requirements:	85 - 264VAC, 47 - 63Hz, 60 Watts maximum.
Size:	3.5"H x 19"W x 11"D (Rack Mount Chassis)
Weight:	10 LBS.

LCM-550x12

12 CHANNEL, FREQUENCY AGILE - F.C.C. COMPATIBLE TELEVISION MODULATOR SYSTEM

1.) INTRODUCTION

The Olson Technology LCM-550X12 can consist of twelve frequency agile F.C.C. compatible television modulators in a single 3 ½" rack – mount chassis. The LCM-550X12 has a separate RF output for each channel, and each channel may be operated at +45dBmV typical, +40dBmV guaranteed minimum. The LCM-550X12 modulator is compatible with baseband scrambling techniques. No I.F. loops are provided on these modulators.

Each of the twelve modulators will operate on any standard or cable channel from 55.25MHz to 547.25MHz (VHF channels 2 through 13 and cable channels 14 through 78). All channels are selectable by front panel DIP switches and a front panel adjustment allows setting to F.C.C. offset frequencies. HRC frequencies are available.

Each of the modulators in the LCM-550X12 offers the unique Olson Technology feature of >80dB out-of-band carrier to noise ratio. These units use SAW filtering for adjacent channel operation, and provide 60dB of spurious free dynamic range. These features allow virtually unlimited numbers of LCM-550X12's to be combined without the need for external bandpass filters.

The LCM-550X12 has low power consumption (approximately 5 watts per channel @ 115 VAC) for economical and reliable long term operation.

2.) CHANNEL SELECTION

Channel frequencies are selected by setting the 10-position DIP switch (visible through the vertical slot in the front panel). The front panel is illustrated in figure 1.

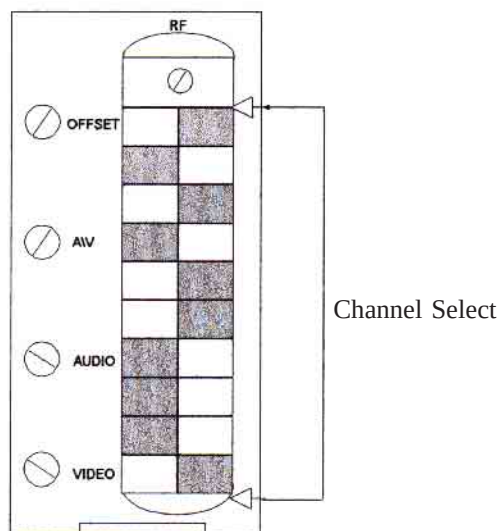


Figure 1 – LCM-550 Front Panel

Switch-setting codes for standard channels are shown in Figure 2 and on the code card provided with the system. Switch-setting codes for HRC channel frequencies can be found in Table 2 and Figure 3 in this manual. The front panel illustration in Figure 1 shows a switch properly set for standard channel 2.

3.) F.C.C. OFFSET ADJUSTMENT

F.C.C. Offset frequencies are shown in Table 1 and summarized on the code card provided with the system. To adjust the frequency of a selected channel to provide the correct F.C.C. offset, look up its offset frequency in Table 1 (or use the summary on the code card). Remove the video input and connect a counter to the RF output of the LCM-550. Use the front panel offset adjust control to set the output frequency to the correct value.

0=Switch in RIGHT Position
1=Switch in LEFT Position

	RF	
O OFFSET	O	POSITION
	0	1
O A/V	1	2
	0	3
O AUDIO	1	4
	0	5
O VIDIO	0	6
	1	7
	1	8
	1	9
	0	10

- 1) ABOVE DIP SWITCH SETTING DENOTES CHANNEL 2
- 2) TO SELECT DESIRED CHANNEL, SET THE CHANNEL SELECT SWITCHES PER ATTACHED CODE CARDS
- 3) TO SELECT F.C.C. OFFSET VALUE FOR A DESIRED CHANNEL, DISSCONNECT THE VIDIO INPUT SIGNAL AND CONNECT A COUNTER TO THE R.F. OUTPUT. THEN ADJUST THE F.C.C. OFFSET CONTROL POT UNTIL COUNTER READS CHANNEL FREQUENCY PLUS OFFSET.
- 4) REFER TO MANUAL FOR HRC SETTINGS

OFFSET VALUE INFORMATION

- 1) Channels A, B, C, L to W, AA to EE & GG to QQ=12.5kHz.
- 2) Channels A-2, A-1 & FF = 25kHz
- 3) All others = 0kHz

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CH	FREQ	SWITCH	SETTING
2	55.25	01010	01110
3	61.25	01010	10001
4	67.25	01010	10100
5	77.25	01010	11001
6	83.25	01010	11100
95	91.25	01011	00000
96	97.25	01011	00011
97	103.25	01011	00110
98	109.25	01011	01001
99	115.25	01011	01100
7	175.25	01100	01010
8	181.25	01100	01101
9	187.25	01100	10000
10	193.25	01100	10011
11	199.25	01100	10110
12	205.25	01100	11001
13	211.25	01100	11100
14	121.25	01011	01111
15	127.25	01011	10010
16	133.25	01011	10101
17	139.25	01011	11000
18	145.25	01011	11011
19	151.25	01011	11110
20	157.25	01100	00001
21	163.25	01100	00100
22	169.25	01100	00111
23	217.25	01100	11111
24	223.25	01101	00010
25	229.25	01101	00101
26	235.25	01101	01000
27	241.25	01101	01011
28	247.25	01101	01110
29	253.25	01101	10001
30	259.25	01101	10100
31	265.25	01101	10111
32	271.25	01101	11010
33	277.25	01101	11101
34	283.25	01110	00000
35	289.25	01110	00011
36	295.25	01110	00110
37	301.25	01110	01001
38	307.25	01110	01100

CH	FREQ	SWITCH	SETTING
39	313.25	01110	01111
40	319.25	01110	10010
41	325.25	01110	10101
42	331.25	01110	11000
43	337.25	01110	11011
44	343.25	01110	11110
45	349.25	01111	00001
46	355.25	01111	00100
47	361.25	01111	00111
48	367.25	01111	01010
49	373.25	01111	01101
50	379.25	01111	10000
51	385.25	01111	10011
52	391.25	01111	10110
53	397.25	01111	11001
54	403.25	01111	11100
55	409.25	01111	11111
56	415.25	10000	00010
57	421.25	10000	00101
58	427.25	10000	01000
59	433.25	10000	01011
60	439.25	10000	01110
61	445.25	10000	10001
62	451.25	10000	10100
63	457.25	10000	10111
64	463.25	10000	11010
65	469.25	10000	11101
66	475.25	10001	00000
67	481.25	10001	00011
68	487.25	10001	00110
69	493.25	10001	01001
70	499.25	10001	01100
71	505.25	10001	01111
72	511.25	10001	10010
73	517.25	10001	10101
74	523.25	10001	11000
75	529.25	10001	11011
76	535.25	10001	11110
77	541.25	10010	00001
78	547.25	10010	00100

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Figure 2 - CHANNEL SWITCH SETTING CODES

TABLE 1 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
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

TABLE 2 HRC CHANNEL CODES

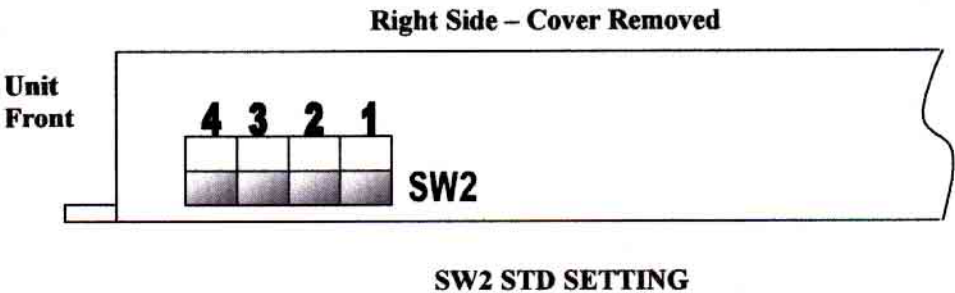
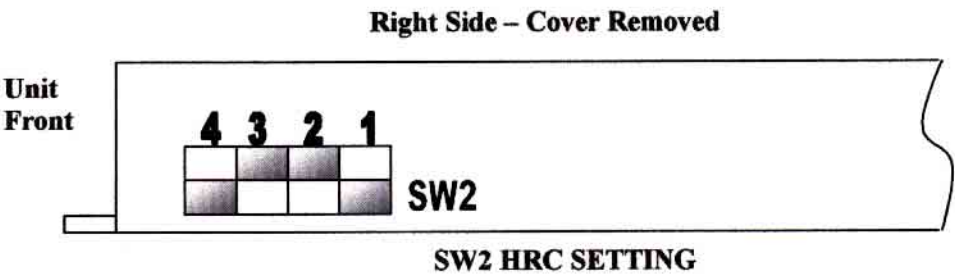
FREQUENCY MHz	EIA CHANNEL	HISTORIC CHANNEL	FRONT PANEL DIP SWITCH									
			1	2	3	4	5	6	7	8	9	10
54	2	2	0	1	0	1	0	0	1	1	0	1
60	3	3	0	1	0	1	0	1	0	0	0	0
66	4	4	0	1	0	1	0	1	0	0	1	1
78	5	5	0	1	0	1	0	1	1	0	0	1
84	6	6	0	1	0	1	0	1	1	1	0	0
174	7	7	0	1	1	0	0	0	1	0	0	1
180	8	8	0	1	1	0	0	0	1	1	0	0
186	9	9	0	1	1	0	0	0	1	1	1	1
192	10	10	0	1	1	0	0	1	0	0	1	0
198	11	11	0	1	1	0	0	1	0	1	0	1
204	12	12	0	1	1	0	0	1	1	0	0	0
210	13	13	0	1	1	0	0	1	1	0	1	1
120	14	A	0	1	0	1	1	0	1	1	1	0
126	15	B	0	1	0	1	1	1	0	0	0	1
132	16	C	0	1	0	1	1	1	0	1	0	0
138	17	D	0	1	0	1	1	1	0	1	1	1
144	18	E	0	1	0	1	1	1	1	0	1	0
150	19	F	0	1	0	1	1	1	1	1	0	1
156	20	G	0	1	1	0	0	0	0	0	0	0
162	21	H	0	1	1	0	0	0	0	0	1	1
168	22	I	0	1	1	0	0	0	0	1	1	0
216	23	J	0	1	1	0	0	1	1	1	1	0
222	24	K	0	1	1	0	1	0	0	0	0	1
228	25	L	0	1	1	0	1	0	0	1	0	0
234	26	M	0	1	1	0	1	0	0	1	1	1
240	27	N	0	1	1	0	1	0	1	0	1	0
246	28	O	0	1	1	0	1	0	1	1	0	1
252	29	P	0	1	1	0	1	1	0	0	0	0
258	30	Q	0	1	1	0	1	1	0	0	1	1
264	31	R	0	1	1	0	1	1	0	1	1	0
270	32	S	0	1	1	0	1	1	1	0	0	1
276	33	T	0	1	1	0	1	1	1	1	0	0
282	34	U	0	1	1	0	1	1	1	1	1	1
288	35	V	0	1	1	1	0	0	0	0	1	0
294	36	W	0	1	1	1	0	0	0	1	0	1
300	37	AA	0	1	1	1	0	0	1	0	0	0
306	38	BB	0	1	1	1	0	0	1	0	1	1
312	39	CC	0	1	1	1	0	0	1	1	1	0
318	40	DD	0	1	1	1	0	1	0	0	0	1
324	41	EE	0	1	1	1	0	1	0	1	0	0
330	42	FF	0	1	1	1	0	1	0	1	1	1
336	43	GG	0	1	1	1	0	1	1	0	1	0
342	44	HH	0	1	1	1	0	1	1	1	0	1
348	45	II	0	1	1	1	1	0	0	0	0	0
354	46	JJ	0	1	1	1	1	0	0	0	1	1
360	47	KK	0	1	1	1	1	0	0	1	1	0

TABLE 2 CONTINUED. HRC CHANNEL CODES

FREQUENCY MHz	EIA CHANNEL	HISTORIC CHANNEL	FRONT PANEL DIP SWITCH									
			1	2	3	4	5	6	7	8	9	10
366	48	LL	0	1	1	1	1	0	1	0	0	1
372	49	MM	0	1	1	1	1	0	1	1	0	0
378	50	NN	0	1	1	1	1	0	1	1	1	1
384	51	OO	0	1	1	1	1	1	0	0	1	0
390	52	PP	0	1	1	1	1	1	0	1	0	1
396	53	QQ	0	1	1	1	1	1	1	0	0	0
402	54	RR	0	1	1	1	1	1	1	0	1	1
408	55	SS	0	1	1	1	1	1	1	1	1	0
414	56	TT	1	0	0	0	0	0	0	0	0	1
420	57	UU	1	0	0	0	0	0	0	1	0	0
426	58	VV	1	0	0	0	0	0	0	1	1	1
432	59	WW	1	0	0	0	0	0	1	0	1	0
438	60	XX	1	0	0	0	0	0	1	1	0	1
444	61	YY	1	0	0	0	0	1	0	0	0	0
450	62	ZZ	1	0	0	0	0	1	0	0	1	1
456	63	63	1	0	0	0	0	1	0	1	1	0
462	64	64	1	0	0	0	0	1	1	0	0	1
468	65	65	1	0	0	0	0	1	1	1	0	0
474	66	66	1	0	0	0	0	1	1	1	1	1
480	67	67	1	0	0	0	1	0	0	0	1	0
486	68	68	1	0	0	0	1	0	0	1	0	1
492	69	69	1	0	0	0	1	0	1	0	0	0
498	70	70	1	0	0	0	1	0	1	0	1	1
504	71	71	1	0	0	0	1	0	1	1	1	0
510	72	72	1	0	0	0	1	1	0	0	0	1
516	73	73	1	0	0	0	1	1	0	1	0	0
522	74	74	1	0	0	0	1	1	0	1	1	1
528	75	75	1	0	0	0	1	1	1	0	1	0
534	76	76	1	0	0	0	1	1	1	1	0	1
540	77	77	1	0	0	1	0	0	0	0	0	0
546	78	78	1	0	0	1	0	0	0	0	1	1

Figure - 3 INTERNAL SW2 SETTINGS FOR HRC / STD

NOTE: For HRC operation internal switch SW2 must be set as illustrated below.



4.) REAR PANEL

The rear panel of each module has its audio and video inputs and its RF output. The audio and video inputs are RCA type phono jacks and the RF output is a type "F".

5.) VIDEO MODULATION ADJUSTMENT (Each modulator).

LCM-550X12 modulator modules are preset at the factory for 85% depth of modulation with a 1V P-P pulse and bar test signal. If the video modulation needs to be adjusted, follow the procedure below.

Connect the video source (to be used at approximately 1V P-P) to the video input phono jack. The video should be of a reasonably bright scene (commercials are usually excellent).

Adjust the video modulation control on the front panel to obtain approximately 85% depth-of modulation as measured on a spectrum analyzer or other test equipment capable of this measurement.

If the video modulation control needs to be set and there is no test equipment available, it can be set fairly close by comparison. View a video signal on a properly adjusted television receiver or receiver/monitor. Apply the same signal if possible, or one of equivalent brightness and contrast to the modulator that needs to be set. View the output of this modulator on the same receiver and adjust the video modulation control for brightness and contrast equivalent to the directly viewed picture. Use caution and do not set this control too high.

6.) AUDIO MODULATION ADJUSTMENT (Each modulator).

Connect the audio source (to be used at approximately 500mV P-P) to the audio input phono jack.

Monitor the audio on a television receiver and adjust the audio modulation control for proper loudness as compared with some channel known to be modulating at the correct level (such as a broadcast station).

The two sources of audio should be very similar in their content and should be near maximum loudness as compared to the average level of their program. In other words, compare a loud passage with a loud passage and set the audio modulation control with this program material. Use caution and do not set this control too high.

7.) OPERATION WITH COMPOSITE BASEBAND BTSC AUDIO INPUT (Each modulator).

The LCM-550X12 modulators are compatible with a composite baseband BTSC audio input. An internal jumper must be changed to remove audio pre-emphasis as required for this application.

To remove audio pre-emphasis, disconnect and remove the LCM-550 module from the main shelf and remove its left side cover. Cut board where indicated.

Replace the module cover, replace the module in the main shelf, and set-up the audio deviation per the instructions for the BTSC generator being used.

8.) RF OUTPUT AND AURAL CARRIER LEVEL ADJUSTMENT (Each modulator).

- A) Using a field strength meter or spectrum analyzer, set the video carrier to the desired level with the output level (RF) control (typically +40 to +45dBmV).
- B) Tune the field strength meter to the aural carrier, which is located 4.5 MHz above the video carrier.
- C) Adjust the aural carrier level control (A/V) to the desired level, typically 15dB below the video carrier.
CAUTION: Reducing the aural \ visual carrier ratio to less than 15dB can result in high out-of-band spurious signals on adjacent channels.

9.) MISCELLANEOUS

- A) The front panel adjustments (RF, OFFSET, etc.) are small, and somewhat delicate. Use CAUTION and an adjustment tool that is a proper fit when adjusting these controls.
- B) The LCM-550X12 is BTSC stereo compatible. Each modulator is shipped in the “mono” mode. To defeat the pre-emphasis in order to use a composite baseband BTSC input signal, see section 7 of this manual.
- C) The LCM-550X12 power supply is equipped with an internal 3Amp. 250V GMA fuse. For continued safety, and to maintain proper performance of the unit, please replace only with an equivalent fuse.