MODEL OTM-4870
FREQUENCY AGILE 870MHz
F.C.C. COMPATIBLE
TELEVISION MODULATOR

USERS MANUAL

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025-000412 Rev. B

7/19/01

RF

Frequency Range..... 48.25MHz to 865.25MHz Selectable by front panel touchbuttons by channel or frequency in 12.5KHz increments.
RF Output Level..... +61dBmV typical
Accuracy/Stability..... ±5KHZ
Spurious Output..... >60dBc (typical)
Out-of-Band C/N Ratio.....>80dB
Phase Noise..... >90dBc @ 10KHz offset
Audio/Video Ratio..... -12dB to -21dB below video carrier level

VIDEO

Baseband Input Level..... .5 to 1.5 volts p-p (75Ω)
Video Performance..... 1V p-p @ 87.5% modulation
Differential Gain <3%
Differential Phase <2°
Frequency Response..... ±1dB, 30Hz to 4.2Mhz
Video AGC.....On/Off front panel control
Chroma-Luma Delay..... 170 ±nsec

AUDIO

Baseband Input Level..... -10 to +10dBm, 600 Ω balanced, Hi Z unbalanced
Intercarrier Stability.....±1KHz
Audio Performance.....2% maximum THD (1% typical)
Frequency Response..... 50Hz to 15KHz, ±1dB
Pre-Emphasis..... 75 ì s NTSC, 50 ì s PAL, defeated by internal jumper for BTSC and SAP compatibility
Audio Subcarrier Input..... +25dBmV to +45dBmV @75 Ω

DUAL IF LOOPS

Video IF..... +36dBmV @ 45.75MHz (typical)
Audio IF..... Adjustable -12dB to -21dB relative to video carrier

COMPOSITE IF LOOP

Video IF..... +18dBmV @ 45.75MHz (typical)
Audio IF..... Adjustable -12 to -21dB relative to video carrier

AUX. IF INPUT

Four Modes of Control..... Loss of video to modulator, rear panel closure screws for EAS compatibility

EXTERNAL FEATURES

Front Panel Controls..... Video/Audio modulation levels, Audio to Video carrier ratio, RF output level, LCD contrast control, Push button menu controls
Front Panel LED's..... RF on, AUX IF in use, Synthesizer unlocked, Video/Audio over modulation

Rear Panel Connectors..... Type "F" connectors for RF output, RF test point, AUX IF input, Video baseband input, Video and Audio IF inputs/outputs. Composite IF input/output and Audio subcarrier. Screw terminals for contact closure/audio baseband

GENERAL

Power Supply..... Universal 90 VAC to 240 VAC, 50 to 60Hz with IEC 320 power connector
Physical Size..... 1.75" H x 19" W x 10" D
Weight.....9 lbs.
Power Consumption..... 24 Watts
Operating Temperature..... 0° C to 50° C

OTM-4870
FREQUENCY AGILE 870MHz
F.C.C. COMPATIBLE TELEVISION MODULATOR

1) INTRODUCTION

The Olson Technology OTM-4870 is a frequency agile, F.C.C. compatible television modulator. This microprocessor-controlled unit is capable of operation on any frequency from 48MHz to 870MHz and output frequency selection is possible in 0.0125MHz increments. Output frequencies may be selected in MHz or by channel designation. Standard, HRC, IRC, or EIA channel plans may be specified. FCC offsets of +12.5KHz and +25KHz are automatically provided depending on the plan and/or channel chosen.

An RF output level of +60dBmV (minimum) is possible over the operating frequency range of the OTM-4870.

SAW filtering and Olson Technology system design factors insure an out-of-band carrier-to-noise ratio greater than 80dB. This allows unlimited numbers of these units to be combined.

The OTM-4870 has many advanced features including a menu/button control system, front panel display of channel and channel ID text, a manual or loss-of-video controlled auxiliary I.F. input with AGC, selectable video AGC, external audio subcarrier input, configurable audio input, dual IF loops, composite IF loop, BTSC compatibility and more.

The OTM-4870 up-converter section is a high performance tuner with excellent phase noise and frequency response that exceeds DOCSIS and CMTS specifications.

2) CONTROL OF THE OTM-4870

A.) FRONT PANEL ADJUSTMENTS:

Video and audio modulation levels, video-to-audio carrier ratio, and the RF output level are adjustable by means of slotted controls accessible through the front panel. There is also a control for the LCD panel contrast which should be adjusted for proper viewing once the unit is installed.

See section 4 of this manual for more information on these adjustments.

B.) FRONT PANEL MENU ITEM CONTROLS:

Most features of the OTM-4870 are configurable from the front panel by means of the menu/button system which includes an LCD panel and 5 buttons. The LCD panel displays the menu(s) and the currently-selected configuration or value.

The “UP”, “DOWN”, “LEFT”, and “RIGHT” buttons are used to move between menus, to select configurations, and to change values. All items except tuning mode and channel number/frequency will instantly change to match the display. A new tuning mode or channel/frequency takes effect only when you press the “ENTER” button. To make other changes permanent, press the “ENTER” button.

Note that when changing the output frequency, the unit’s digital synthesizer may become unlocked momentarily resulting in operation on an undesired frequency until it re-locks. The OTM-4870 will turn its RF output off anytime the unit is in an unlocked state, thus preventing unwanted interference when changing channels.

As illustrated on page 5 below, there are two menu trees; the main menu tree (on the left) and the sub-menu tree (on the right). The arrows indicate which buttons to press to move around the menus. Review each menu and the information below to become familiar with the various functions.

Note
DOCSIS = Data over cable service interface specification
CMTS = Cable modem termination system

C.) CHANGING MENU ITEMS:

To change a function or value, select the menu containing the item to change using the “UP”, “DOWN”, “RIGHT”, and “LEFT” buttons. After selecting the correct menu, press the “RIGHT” button to change a menu item. If part or all of the bottom row starts flashing, you can change that item.

If the entire bottom row flashes (most items), press the “UP” or “DOWN” button to change it. These buttons have auto-repeat. For tuning or channel ID (NAME) values, only one character in the bottom row will flash. The “LEFT” and “RIGHT” buttons select the position to change and the “UP” and “DOWN” buttons change the value.

When you are through with the change (or if there is no change), pressing the “ENTER” button will enable the displayed parameter or value, the change mode is exited, and the display will stop flashing. If you do not press the “ENTER” key, the parameter will return to the original value after a time-out of about 15 seconds.

3) SOME MENU-SPECIFIC INFORMATION

A.) Display of NAME and TUNING:

This is the normal (default) display and is the menu shown as the top left menu on page 5 of this manual. You can not make any change from this menu. The NAME is programmable from the NAME menu and the tuning is programmable from the TUNING menu. The display will return to this default after about 30 seconds of button inactivity

If the programmed TUNING MODE is CHAN, the display will be the channel number. If the programmed TUNING MODE is FREQ, the display will be the frequency in MHz.

Note that if the TUNING MODE is changed from CHAN to FREQ, the LCD will display the frequency of the previously-selected channel.

B.) IF INPUT:

This indicates the preferred choice of the normal IF source. A rear panel input or an automatic transfer could switch to the AUX IF input.

C.) CHANNEL PLAN:

The CHANNEL PLAN determines the OTM-4870 output frequency for a selected channel number. Tables at the end of this manual list these values.

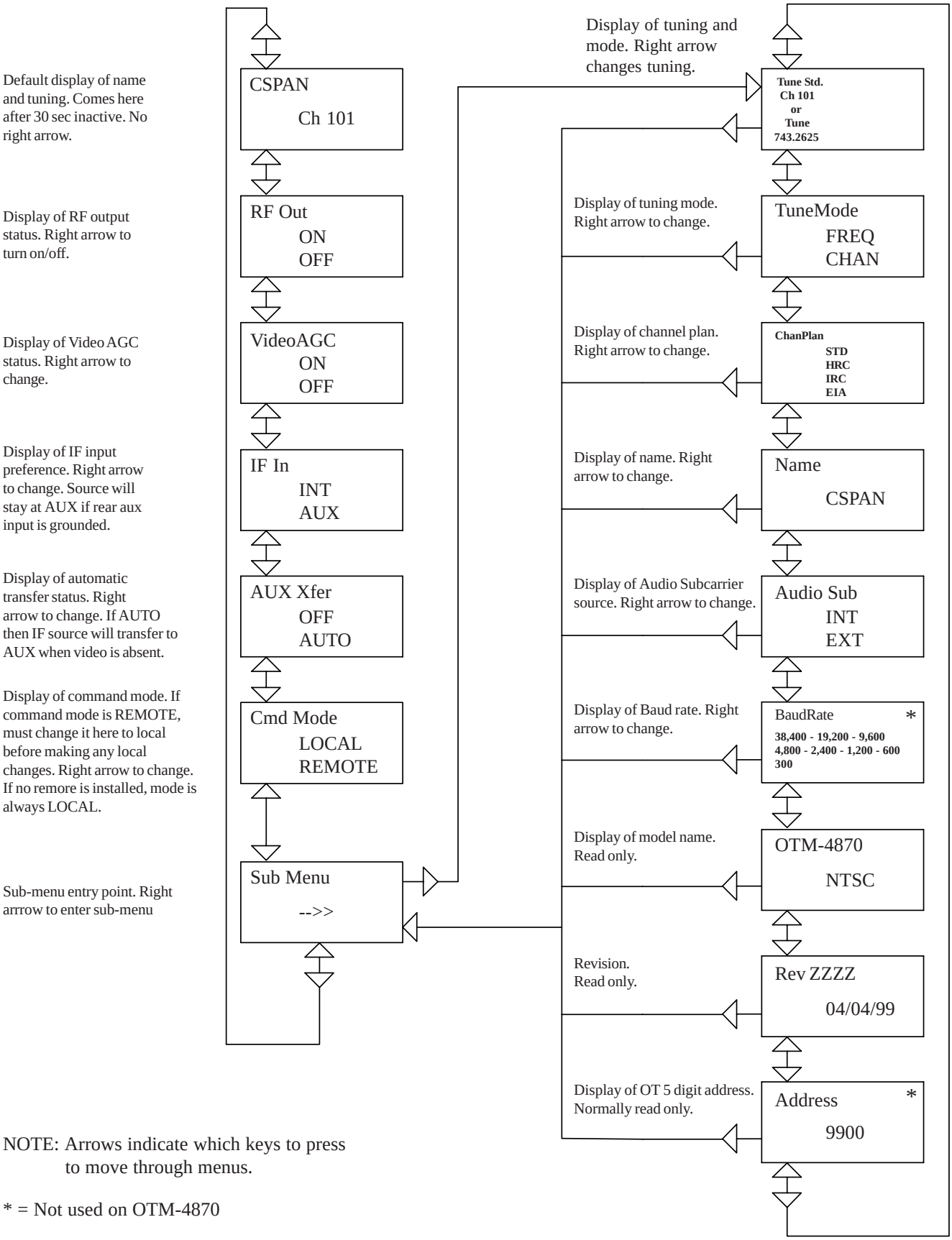
Note that FCC offsets are automatically provided for the STD and EIA channel plans and that an offset is applied to all channels in the IRC plan. The HRC channel plan provides no offsets.

D.) NAME:

This menu allows you to program the NAME that appears at the top of the normal (default) display. Upper case and lower case letters as well as numbers and various symbols are available for use.

E.) COMMAND MODE, BAUD RATE, and ADDRESS:

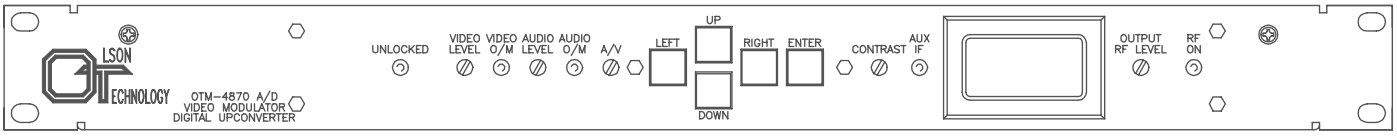
These functions are not used with the OTM-4870.



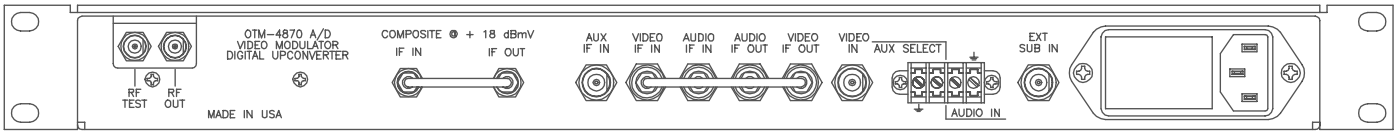
NOTE: Arrows indicate which keys to press to move through menus.

* = Not used on OTM-4870

OTM-4870 Front Panel



OTM-4870 Rear Panel



4) FRONT PANEL CONTROLS AND INDICATORS

OTM-4870 FRONT PANEL

REMOTE

The remote control feature is not available on the OTM-4870

UNLOCKED

This LED, when on, indicates that one of the digital synthesizers is not locked. This condition will result in shutdown of the RF output as long as the condition exists. Note that this LED will usually flash on momentarily when changing a channel or frequency. This momentary shutdown of the output prevents undesired interference to other channels if the OTM-4870 is connected to a system or network when its channel is changed.

VIDEO LEVEL

This control adjusts the video depth-of-modulation. Choose a bright scene (commercials are usually excellent) and set it carefully while observing the VIDEO O/M LED. This control should be advanced to a point JUST SHORT of where the VIDEO O/M LED flashes-on.

VIDEO O/M

This LED, when on, indicates a depth-of-modulation greater than 87-1/2%. It should never be on continuously but might be on for short periods during bright scenes. See VIDEO LEVEL above.

This LED will stay on for several seconds when power is first applied to the OTM-4870.

AUDIO LEVEL

This control adjusts the audio deviation of the OTM-4870. Choose program material that is of high average volume when setting this control and adjust it so the AUDIO O/M LED just blinks-on during program audio level peaks.

AUDIO O/M

This LED, when on, indicates that the peak deviation of the OTM-4870 is at ±25KHz. It should only flash-on occasionally during normal operation. See AUDIO LEVEL, above.

A/V

This control adjusts the aural carrier level relative to the video carrier level. It is typically adjusted for an A/V ratio of 15-17dB.

LEFT, RIGHT, UP, DOWN, ENTER

These buttons are used in selecting and changing menu items as displayed on the LCD panel.

CONTRAST

This control adjusts the LCD panel contrast. Adjust it for best display legibility when the OTM-4870 is placed in operation.

AUX IF

This LED, when on, indicates that the current IF source is the AUX input at the rear panel.

LCD DISPLAY PANEL

This displays menu and status information.

OUTPUT RF LEVEL

This control is used to set the RF output level. If the OTM-4870 is feeding a system or network with many channels, it is suggested that it be operated at an output level of +55dBmV minimum to prevent degradation of the C/N ratio of that channel. If lower output levels are required, place an in-line attenuator at the RF output.

Note that the OTM-4870 may be capable of output levels greater than +60dBmV on some channels. The specifications for spurious performance, etc. are based on a maximum operating level of +60dBmV. This unit may not meet its full specification if operated at greater that +60dBmV out.

RF ON

This LED indicates the output RF status.

5) REAR PANEL CONNECTIONS

OTM-4870 REAR PANEL

RF TEST

This output is approximately 20dB below the main RF output and may be used for monitoring or test.

RF OUT

This output is (typically) +61.0dBmV. Over the frequency range of 48.250 to 865.250MHz

IF IN

This is composite IF input at approximately +18dBmV with 44MHz center frequency and 6MHz bandwidth feeding the output tuner. In normally configured applications, this input is usually connected to composite IF out. The OTM-4870 is shipped from the factory with this jumper in place.

IF OUT

This is the composite IF source for the analog TV modulator, after the saw filter, with video carrier at +18dBmV at 45.75MHz. Audio is 41.25MHz and is 12 to 18dB lower than video. In normally configured applications this output is usually connected to composite IF IN. The OTM-4870 is shipped from the factory with this jumper in place.

AUX IN

This is the AUX IF input. This input is before the SAW IF section and normally expects an IF input level of +38 dBmV. It has AGC which will allow levels to vary as much as ±5dB while holding the RF output level constant.

This input may be enabled by shorting the AUX SELECT terminals on the rear panel, by front panel control, or by loss of video.

VIDEO IF IN

This is the video IF input to the SAW filter / output converter section. The AUX IF switch is AFTER this input. The video IF level at this point should be +38 dBmV.

In normally-configured applications this input is usually connected to the VIDEO IF OUT connector. The OTM-4870 is shipped from the factory with this jumper in place.

AUDIO IF IN

This is the aural IF input to the SAW filter / output converter section. The AUX IF switch is AFTER this input. The aural IF level at this point is relative to the video IF level at the RF output. IE: If the A/V ratio at the output is 15dB, then the aural IF level at this point would be approximately 15 dB below the video IF level at the VIDEO IF IN connector (approximately +23dBmV).

In normally-configured applications this input is usually connected to the AUDIO IF OUT connector. The OTM-4870 is shipped from the factory with this jumper in place.

AUDIO IF OUT

This is the aural IF output from the IF modulator section. The aural IF level here is relative to the video IF level at the RF output. IE: If the A/V ratio at the output is 15dB, then the aural IF level at this point would be approximately 15 dB below the video IF level at the VIDEO IF IN connector (approximately +23dBmV).

In normally-configured applications this output is usually connected to the AUDIO IF IN connector. The OTM-4870 is shipped from the factory with this jumper in place.

VIDEO IF OUT

This is the video IF output from the IF modulator section. The video IF level here is +38dBmV.

In normally-configured applications this output is usually connected to the VIDEO IF IN connector. The OTM-4870 is shipped from the factory with this jumper in place.

VIDEO IN

1 Volt P-P baseband video input to the OTM-4870. When VIDEO AGC is enabled, the modulation will remain constant for input level changes of ±3dB.

AUX SELECT

When these two terminals are connected together, the AUX IF IN is enabled. This is a “hard” control and will override any other function that instructs the internal IF to be selected. The left terminal is chassis ground and the right terminal is grounded to activate the function.

AUDIO IN

Baseband audio input to the OTM-4870.

This input is configurable for 600Ω balanced or high impedance unbalanced applications. When configured for high impedance input, ground should be connected to the right-side terminal.

To change from 600Ω to high-impedance input, disconnect the unit from AC power, remove the top cover and locate jumper “JMP1” near the front left corner of the circuit board. Move the jumper from the position marked “BAL” to the position marked “UNBAL”.

If it is desired to defeat the audio pre-emphasis for baseband BTSC input or other applications, locate the jumper marked “JMP2” and move it from the position marked “PRE-EMPH” to the position marked “BY PASS”.

EXT SUB IN

External aural subcarrier input. This input is selectable from the front panel. The input level (at 4.5 MHz for NTSC versions) should be +45dBmV (measured into 75Ω). The OTM-4870 has limiter circuitry to keep the aural carrier constant over this range in the external subcarrier signal level.

AC LINE POWER INPUT

The OTM-4870 may be powered by 90 to 240 VAC and 47-63HZ and it draws about 30 Watts.

6) MISCELLANEOUS

A) When mounting the OTM-4870 in an equipment rack, it is best to leave a blank space above and below the unit to allow for adequate flow of cooling air.

B.) This unit is equipped with a 0.5A slo-blo fuse which is located at the IEC power input module at the rear panel. For continued safety and to maintain proper performance of the unit, please replace only with an equivalent fuse.

OTM-4870 CHANNEL PLANS

Chan.	STD	HRC	IRC	EIA
2	55.2500	54.00	55.2625	55.2500
3	61.2500	60.00	61.2625	61.2500
4	67.2500	66.00	67.2625	67.2500
5 (A-7)	77.2500	78.00	79.2625	77.2500
6 (A-6)	83.2500	84.00	85.2625	83.2500
7	175.2500	174.00	175.2625	175.2500
8	181.2500	180.00	181.2625	181.2500
9	187.2500	186.00	187.2625	187.2500
10	193.2500	192.00	193.2625	193.2500
11	199.2500	198.00	199.2625	199.2500
12	205.2500	204.00	205.2625	205.2500
13	211.2500	210.00	211.2625	211.2500
14 (A)	121.2625	120.00	121.2625	121.2625
15 (B)	127.2625	126.00	127.2625	127.2625
16 (C)	133.2625	132.00	133.2625	133.2625
17 (D)	139.2500	138.00	139.2625	139.2500
18 (E)	145.2500	144.00	145.2625	145.2500
19 (F)	151.2500	150.00	151.2625	151.2500
20 (G)	157.2500	156.00	157.2625	157.2500
21 (H)	163.2500	162.00	163.2625	163.2500
22 (I)	169.2500	168.00	169.2625	169.2500
23 (J)	217.2500	216.00	217.2625	217.2500
24 (K)	223.2500	222.00	223.2625	223.2500
25 (L)	229.2625	228.00	229.2625	229.2625
26 (M)	235.2625	234.00	235.2625	235.2625
27 (N)	241.2625	240.00	241.2625	241.2625
28 (O)	247.2625	246.00	247.2625	247.2625
29 (P)	253.2625	252.00	253.2625	253.2625
30 (Q)	259.2625	258.00	259.2625	259.2625
31 (R)	265.2625	264.00	265.2625	265.2625
32 (S)	271.2625	270.00	271.2625	271.2625
33 (T)	277.2625	276.00	277.2625	277.2625
34 (U)	283.2625	282.00	283.2625	283.2625
35 (V)	289.2625	288.00	289.2625	289.2625
36 (W)	295.2625	294.00	295.2625	295.2625
37 (AA)	301.2625	300.00	301.2625	301.2625
38 (BB)	307.2625	306.00	307.2625	307.2625
39 (CC)	313.2625	312.00	313.2625	313.2625
40 (DD)	319.2625	318.00	319.2625	319.2625
41 (EE)	325.2625	324.00	325.2625	325.2625
42 (FF)	331.2750	330.00	331.2750	331.2750
43 (GG)	337.2625	336.00	337.2625	337.2625
44 (HH)	343.2625	342.00	343.2625	343.2625
45 (II)	349.2625	348.00	349.2625	349.2625
46 (JJ)	355.2625	354.00	355.2625	355.2625

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Chan.	STD	HRC	IRC	EIA
47 (KK)	361.2625	360.00	361.2625	361.2625
48 (LL)	367.2625	366.00	367.2625	367.2625
49 (MM)	373.2625	372.00	373.2625	373.2625
50 (NN)	379.2625	378.00	379.2625	379.2625
51 (OO)	385.2625	384.00	385.2625	385.2625
52 (PP)	391.2625	390.00	391.2625	391.2625
53 (QQ)	397.2625	396.00	397.2625	397.2625
54 (A-8)	73.2500	72.00	73.2625	403.2500*
55 (A-7)	79.2500	78.00	79.2625	409.2500*
56 (A-6)	85.2500	84.00	85.2625	415.2500*
57 (A-5)	91.2500	90.00	91.2625	421.2500*
58 (A-4)	97.2500	96.00	97.2625	427.2500*
59 (A-3)	103.2500	102.00	103.2625	433.2500*
60 (A-2)	109.2750	108.00	109.2750	439.2500*
61 (A-1)	115.2750	114.00	115.2750	445.2500*
62 (RR)	403.2500	402.00	403.2625	451.2500
63 (SS)	409.2500	408.00	409.2625	457.2500
64 (TT)	415.2500	414.00	415.2625	463.2500
65 (UU)	421.2500	420.00	421.2625	469.2500
66 (VV)	427.2500	426.00	427.2625	475.2500
67 (WW)	433.2500	432.00	433.2625	481.2500
68 (XX)	439.2500	438.00	439.2625	487.2500
69 (YY)	445.2500	444.00	445.2625	493.2500
70 (ZZ)	451.2500	450.00	451.2625	499.2500
71	457.2500	456.00	457.2625	505.2500
72	463.2500	462.00	463.2625	511.2500
73	469.2500	468.00	469.2625	517.2500
74	475.2500	474.00	475.2625	523.2500
75	481.2500	480.00	481.2625	529.2500
76	487.2500	486.00	487.2625	535.2500
77	493.2500	492.00	493.2625	541.2500
78	499.2500	498.00	499.2625	547.2500
79	505.2500	504.00	505.2625	553.2500
80	511.2500	510.00	511.2625	559.2500
81	517.2500	516.00	517.2625	565.2500
82	523.2500	522.00	523.2625	571.2500
83	529.2500	528.00	529.2625	577.2500

OTM-4870 CHANNEL PLANS

84	535.2500	534.00	535.2625	583.2500
85	541.2500	540.00	541.2625	589.2500
86	547.2500	546.00	547.2625	595.2500
87	553.2500	552.00	553.2625	601.2500
88	559.2500	558.00	559.2625	607.2500
89	565.2500	564.00	565.2625	613.2500
90	571.2500	570.00	571.2625	619.2500
91	577.2500	576.00	577.2625	625.2500
92	583.2500	582.00	583.2625	631.2500
93	589.2500	588.00	589.2625	637.2500
94	595.2500	594.00	595.2625	643.2500
95	601.2500	600.00	601.2625	91.2500

OTM-4870 CHANNEL PLANS

Chan.	STD	HRC	IRC	EIA
96	607.2500	606.00	607.2625	97.2500
97	613.2500	612.00	613.2625	103.2500
98	619.2500	618.00	619.2625	109.2750
99	625.2500	624.00	625.2625	115.2750
100	631.2500	630.00	631.2625	649.2500
101	637.2500	636.00	637.2625	655.2500
102	643.2500	642.00	643.2625	661.2500
103	649.2500	648.00	649.2625	667.2500
104	655.2500	654.00	655.2625	673.2500
105	661.2500	660.00	661.2625	679.2500
106	667.2500	666.00	667.2625	685.2500
107	673.2500	672.00	673.2625	691.2500
108	679.2500	678.00	679.2625	697.2500
109	685.2500	684.00	685.2625	703.2500
110	691.2500	690.00	691.2625	709.2500
111	697.2500	696.00	697.2625	715.2500
112	703.2500	702.00	703.2625	721.2500
113	709.2500	708.00	709.2625	727.2500
114	715.2500	714.00	715.2625	733.2500
115	721.2500	720.00	721.2625	739.2500
116	727.2500	726.00	727.2625	745.2500
117	733.2500	732.00	733.2625	751.2500
118	739.2500	738.00	739.2625	757.2500
119	745.2500	744.00	745.2625	763.2500
120	751.2500	750.00	751.2625	769.2500
121	757.2500	756.00	757.2625	775.2500
122	763.2500	762.00	763.2625	781.2500
123	769.2500	768.00	769.2625	787.2500
124	775.2500	774.00	775.2625	793.2500
125	781.2500	780.00	781.2625	799.2500
126	787.2500	786.00	787.2625	805.2500
127	793.2500	792.00	793.2625	811.2500
128	799.2500	798.00	799.2625	817.2500
129	805.2500	804.00	805.2625	823.2500
130	811.2500	810.00	811.2625	829.2500
131	817.2500	816.00	817.2625	835.2500
132	823.2500	822.00	823.2625	841.2500
133	829.2500	828.00	829.2625	847.2500
134	835.2500	834.00	835.2625	853.2500
135	841.2500	840.00	841.2625	859.2500
136	847.2500	846.00	847.2625	865.2500
137	853.2500	852.00	853.2625	
138	859.2500	858.00	859.2625	
139	865.2500	864.00	865.2625	