



**MODEL OTM-4870-PAL-B/G  
FREQUENCY AGILE 870MHz  
PAL B/G TELEVISION MODULATOR**

**USERS MANUAL**

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**RF**

Frequency Range..... 48.25MHz to 865.25MHz  
 Selectable by front panel  
 touchbuttons by channel or  
 frequency in 12.5KHz incre-  
 ments.  
 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 4.8MHz  
 Video AGC..... On/Off front panel control

**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 μs NTSC, 50 μs PAL, defeated  
 by internal jumper for BTSC  
 and SAP compatibility  
 Audio Subcarrier Input..... +25dBmV to +45dBmV  
 @75 Ω

**DUAL IF LOOPS**

Video IF..... +36dBmV @ 38.9MHz  
 (typical)  
 Audio IF..... Adjustable -12dB to -21dB  
 relative to video carrier

**COMPOSITE IF LOOP**

Video IF..... +18dBmV @ 38.9MHz  
 (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, Synthe-  
 sizer 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-PAL-B/G FREQUENCY AGILE 870MHz PAL B/G TELEVISION MODULATOR

## 1) INTRODUCTION

The Olson Technology OTM-4870 is a frequency agile, PAL B/G 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.

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-PAL-B/G

### 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.

### 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.

Default display of name and tuning. Comes here after 30 sec inactive. No right arrow.

Display of RF output status. Right arrow to turn on/off.

Display of Video AGC status. Right arrow to change.

Display of IF input preference. Right arrow to change. Source will stay at AUX if rear aux input is grounded.

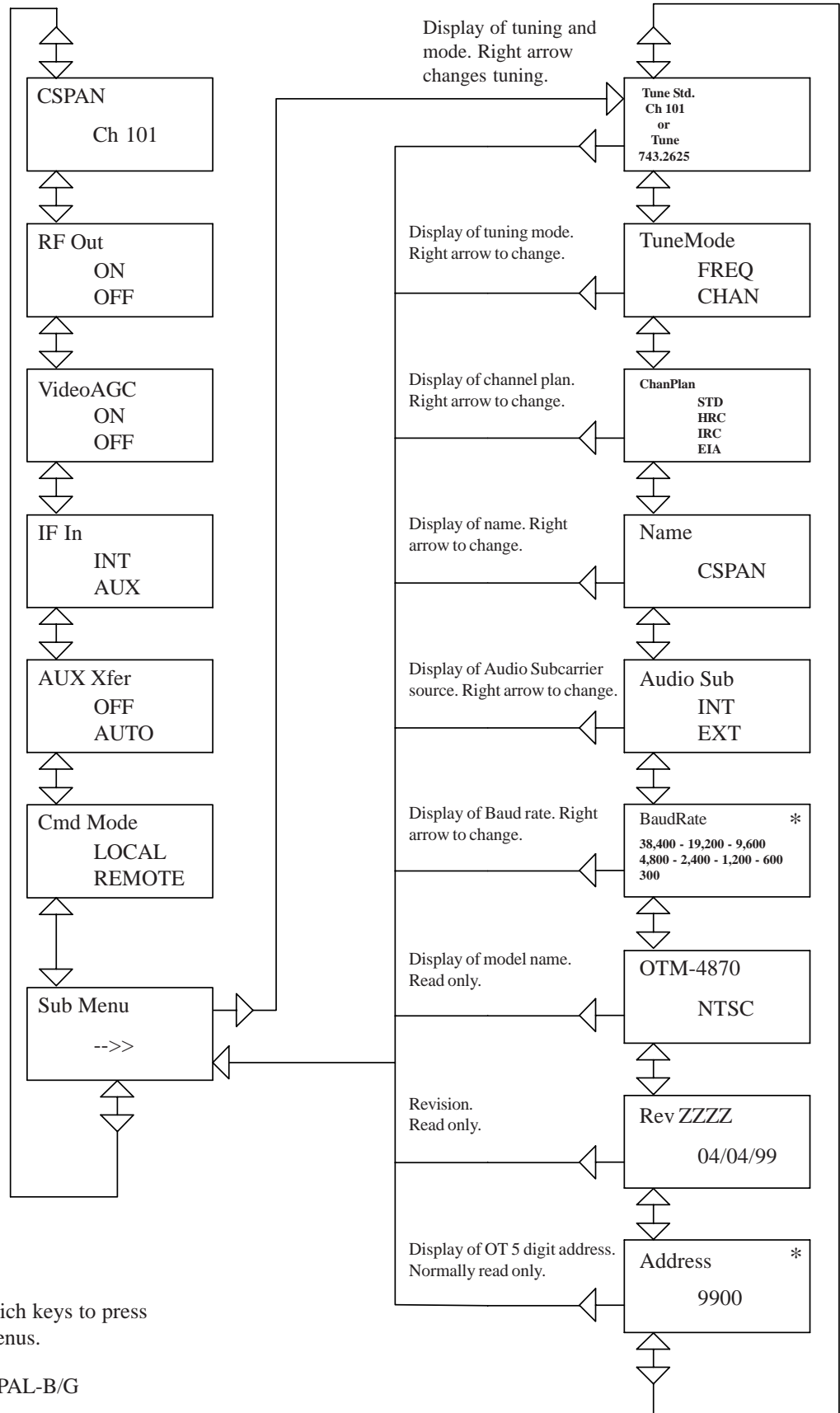
Display of automatic transfer status. Right arrow to change. If AUTO then IF source will transfer to AUX when video is absent.

Display of command mode. If command mode is REMOTE, must change it here to local before making any local changes. Right arrow to change. If no remote is installed, mode is always LOCAL.

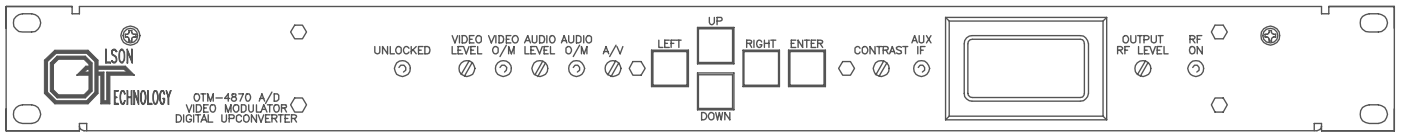
Sub-menu entry point. Right arrow to enter sub-menu

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

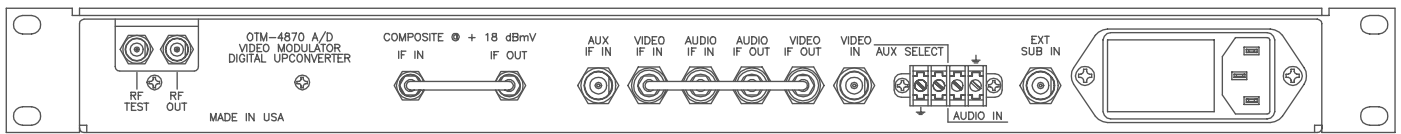
\* = Not used on OTM-4870-PAL-B/G



## OTM-4870-PAL-B/G Front Panel



## OTM-4870-PAL-B/G Rear Panel



## 4) FRONT PANEL CONTROLS AND INDICATORS



### OTM-4870-PAL-B/G FRONT PANEL

#### REMOTE

The remote control feature is not available on the OTM-4870-PAL-B/G

#### 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 momentarily when changing a channel or frequency. This momentary shutdown of the output prevents undesired interference to other channels if the OTM-4870-PAL-B/G 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-PAL-B/G.

#### AUDIO LEVEL

This control adjusts the audio deviation of the OTM-4870-PAL-B/G. 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-PAL-B/G is at  $\pm 50$ KHz. 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-PAL-B/G 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-PAL-B/G 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-PAL-B/G 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 than +60dBmV out.

## RF ON

This LED indicates the output RF status.

## 5) REAR PANEL CONNECTIONS



### OTM-4870-PAL-B/G 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 38.9MHz. Audio is 33.4MHz and is 12 to 18dB lower than video. In normally configured applications this output is usually connected to composite IF IN. The OTM-4870-PAL-B/G 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  $\pm 5$ dB 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-PAL-B/G 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-PAL-B/G 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-PAL-B/G 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-PAL-B/G is shipped from the factory with this jumper in place.

### **VIDEO IN**

1 Volt P-P baseband video input to the OTM-4870-PAL-B/G. When VIDEO AGC is enabled, the modulation will remain constant for input level changes of  $\pm 3$ dB.

### **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-PAL-B/G.

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

To change from 600 $\Omega$  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 5.5 MHz for PAL-B/G versions) should be +45dBmV (measured into 75Ω). The OTM-4870-PAL-B/G 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-PAL-B/G 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-PAL-B/G 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-PAL-B/G CHANNEL PLANS

PAL B, 7MHz spacing			PAL G, 8 MHz spacing			PAL G, 8 MHz spacing		
Display CH.	CCIR CH.	Video Freq.	Display CH.	CCIR CH.	Video Freq.	Display CH.	CCIR CH.	Video Freq.
2	K2	48.25	38	S21	303.25	74	K36	591.25
3	K3	55.25	39	S22	311.25	75	K37	599.25
4	K4	62.25	40	S23	319.25	76	K38	607.25
5	X	69.25	41	S24	327.25	77	K39	615.25
6	Y	76.25	42	S25	335.25	78	K40	623.25
7	Z	83.25	43	S26	343.25	79	K41	631.25
8	Z+1	90.25	44	S27	351.25	80	K42	639.25
9	Z+2	97.25	45	S28	359.25	81	K43	647.25
10	S1	105.25	46	S29	367.25	82	K44	655.25
11	S2	112.25	47	S30	375.25	83	K45	663.25
12	S3	119.25	48	S31	383.25	84	K46	671.25
13	S4	126.25	49	S32	391.25	85	K47	679.25
14	S5	133.25	50	S33	399.25	86	K48	687.25
15	S6	140.25	51	S34	407.25	87	K49	695.25
16	S7	147.25	52	S35	415.25	88	K50	703.25
17	S8	154.25	53	S36	423.25	89	K51	711.25
18	S9	161.25	54	S37	431.25	90	K52	719.25
19	S10	168.25	55	S38	439.25	91	K53	727.25
20	K5	175.25	56	S39	447.25	92	K54	735.25
21	K6	182.25	57	S40	455.25	93	K55	743.25
22	K7	189.25	58	S41	463.25	94	K56	751.25
23	K8	196.25	59	K21	471.25	95	K57	759.25
24	K9	203.25	60	K22	479.25	96	K58	767.25
25	K10	210.25	61	K23	487.25	97	K59	775.25
26	K11	217.25	62	K24	495.25	98	K60	783.25
27	K12	224.25	63	K25	503.25	99	K61	791.25
28	S11	231.25	64	K26	511.25	100	K62	799.25
29	S12	238.25	65	K27	519.25	101	K63	807.25
30	S13	245.25	66	K28	527.25	102	K64	815.25
31	S14	252.25	67	K29	535.25	103	K65	823.25
32	S15	259.25	68	K30	543.25	104	K66	831.25
33	S16	266.25	69	K31	551.25	105	K67	839.25
34	S17	273.25	70	K32	559.25	106	K68	847.25
35	S18	280.25	71	K33	567.25	107	K69	855.25
36	S19	287.25	72	K34	575.25	108	K70	863.25
37	S20	294.25	73	K35	583.25			