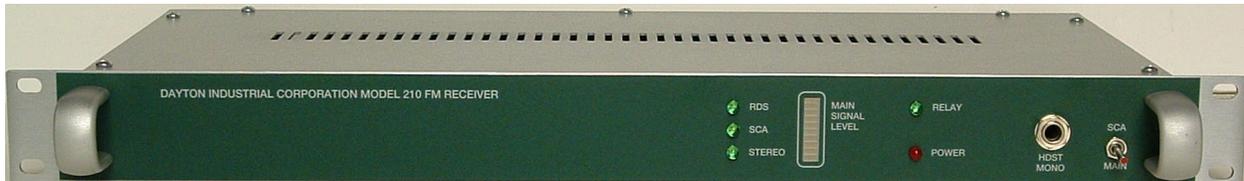


# MODEL AF210-FM FM/STEREO RECEIVER/MONITOR OPERATION MANUAL

## GENERAL:

The Model AF210-FM is a precision FM broadcast receiver with stereo demodulator designed for the most demanding sensitivity, low distortion and best signal to noise requirements. The Model AF210-FM is single channel with PLL (synthesized) tuning. The AF210-FM was designed for professional broadcast requirements, and has applications for FM relay (translator) service, EAS monitoring and paging service.



## FEATURES:

- Wide and narrow band AGC to prevent overload
- Balanced and Unbal FM audio (stereo) output
- Composite audio output
- Selectable 50, 75 microseconds, or no de-emphasis
- Selectable 25, 50 or 100 KHz (standard) frequency tuning steps
- 500mW audio amplifier for monitoring
- FM stereo with 46dB separation
- FM signal strength blend and high cut if desired
- Adjustable level carrier detection relay
- LED indicators for signal strength, power, main carrier, stereo
- Adjustable soft FM mute
- 19 inch rack mount (1 3/4") chassis

### Please Note:

This receiver has been constructed as FM/Stereo only. The IF filters have been narrowed and the composite bandwidth restricted to FM/Stereo. ( The RDS and SCA de-modulators are not present. The front panel RDS and SCA indicators do not operate. The front panel SCA/Main switch always provides Main/Stereo operation.)

## SPECIFICATIONS:

TUNING RANGE:	88 to 108 MHz, selected by internal DIP switch, in 100 KHz steps
ANTENNA INPUT:	"F" connector, 75 ohm
With 1 KHz modulation, 75KHz deviation:	
SENSITIVITY:	0.75uV (12dB SINAD) Limiting @ <3uV
FREQ RESPONSE:	20Hz to 15KHz (-3dB)
DISTORTION:	0.25% THD at 100 % mod
MAXIMUM S/N:	60dB
AM REJECTION:	50dB
INTERMODULATION:	5mV (73dB) Rejection
LINE Outputs:	1.0 V RMS, 600 Ohms
SPKR Output:	0.5 Watt into 8 Ohms
SELECTIVITY:	Varactor tuned input stages I.F: 150 KHz wide
POWER:	115 VAC, 20 Watts (wall converter supplied), or 12VDC direct
SIZE:	1 3/4" H x 19" W x 8" D Weight: 5 lbs

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# MODEL AF210-FM, FM/STEREO MONITOR/RECEIVER OPERATION MANUAL

## 1.0 FREQUENCY SETTING:

The first item to be performed is to set the receiver frequency of operation. The receiver is a PLL design, the frequency is set by a series of switches, arranged as internal DIP switches, marked SW1 and SW2.

Access to the switch is by removing the top cover of the receiver. Remove the seven (7) screws and remove the cover.

Locate SW1 and SW2. (See also parts layout diagram Figure 1.0, page 5) The switches are marked indicating the "on" position. The "on" position for a switch is the logical "1", and the "off" position is the logical "0" for the receiver microcontroller.

**Please note that SW1 positions R1 and R2 are always to be in the "0" or "off" position.**

The frequency of operation is set by the positions of switches D0, D1,...through...D12. Note that the switch "on" position is always the position towards the microcontroller, IC10. The D0 switch position is SW1, switch 4.

Table 1.0 lists the switch position for each switch corresponding to the desired frequency of operation. Set the switches according to Table 1.0, (Page 6), for the desired operating frequency.



Figure 2.0 AF210FM REAR PANEL DIAGRAM

## 2.0 CONNECTORS/CONTROLS (REAR):

After setting the frequency, the next item is to make the appropriate connections at the receiver rear panel. The connectors (standard) are shown in Figure 2.0. The screwdriver controls are set at the factory and should not be adjusted (except for the SPKR Volume control).

2.1 RF (88 - 108 MHz): The RF connector is an "F" connector. The input impedance is 75 Ohms. The antenna connection should be coaxial cable to reduce interference. 50 Ohm "N" connector available as option.

2.2 R and L Stereo Outputs (Unbalanced): RCA connectors for unbalanced line outputs from the receiver stereo decoder.

2.3 COMPOSITE Output: Receiver composite output. An RCA connector (unbalanced) is provided.

2.4 SCA: (Output not present)

2.5 VOL: A screwdriver volume control for the SPKR powered audio output.

2.6 SPKR: RCA connector output for 8 Ohm monitor speaker. The receiver power output is 0.5 Watt.

2.7 DATA: (Adjustment not provided)

2.8 SCA MUTE: (Adjustment not provided)

2.9 RELAY: A screwdriver adjustment that sets the input signal level where the carrier detect relay operates. This is factory set at -90dBm.

2.10 ON: A switch for controlling the input power, 12VDC, 300 mA. A front panel power LED will be bright when power is applied.

2.11 12 VDC, 500mA: A 2.0mm connector for applying power, 12VDC, 500 mA to the receiver. A 115 to 12VDC power converter is supplied to match with this connector. The connector is positive, center pin, 2.0 mm.

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# MODEL AF210-FM: FM/STEREO MONITOR/RECEIVER OPERATION MANUAL

## 2.12 SCREW CONNECTOR TERMINALS:

2.12.1 BALANCED STEREO OUTPUTS: Screw terminals are provided for L+,L-,G, R-,R+. The L+,L- terminals are provided for balanced L audio. The screw terminals R-, R+ provide the balanced R audio output.

2.12.2 NO,NC,COM: Screw terminals for the carrier detect relay outputs. Both NO and NC are referred to the COM terminal.

2.12.3 "S": A screw terminal for monitoring the receiver received field strength indicated as a voltage level. The voltage is measured with a voltmeter and the higher the voltage (0 to 5 VDC), the higher the receiver field strength.



Figure 3.0 AF210FM FRONT PANEL DIAGRAM

## 3.0 INDICATORS/CONTROLS FRONT PANEL:

3.1 SWITCH SCA or MAIN: A two position front panel switch (operates as MAIN only in this receiver) and selects MAIN audio for application to the rear panel mounted SPKR RCA connector or front panel mounted HDST speaker outputs.

3.2 HDST MONO JACK: A 1/4 inch audio jack for monitoring the MAIN demodulated signals with 8 Ohm headsets. The output is MAIN channel mono, but will be heard in both sides of stereo headsets. The HDST and SPKR outputs are in parallel. The volume control is located on the rear panel, marked VOL. The HDST jack is a 1/4 inch stereo jack.

**Do not use a MONO headset plug as the audio will be shorted and damage may result.**

3.3 POWER: Red or Green LED that is bright whenever power is applied to the receiver, 12 VDC 500 mA, input power receptacle on the rear panel.

3.4 RELAY: Green LED indicator that is lighted whenever the main carrier relay is active. The relay is set to operate at the factory whenever the received main carrier is above a specified (- 90 dBm) level. The NO, NC and COMmon terminals of the relay are provided at the rear panel screw terminal block.

3.5 MAIN SIGNAL LEVEL: Ten element vertical LED indicator that indicates the received signal level. This is adjusted with the lowest element lighted with no signal input. The more elements that are lighted, the higher the received field strength.

3.6 STEREO: Green LED that is bright whenever the received signal contains the stereo pilot. The L and R stereo outputs are active. If the received signal strength is low or the pilot is absent, the L and R outputs are monaural.

3.7 SCA: (Green LED that is present, but does not operate)

3.8 RDS: Green LED that does not function in this receiver.

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**4.0 INTERNAL JUMPERS/CONNECTORS:**

A diagram of the main internal printed circuit board is presented in Figure 1, Page 5. The internal jumper selection descriptions are provided below. The jumpers should be removed and repositioned using a pair of needlenose pliers or similiar device.

4.1 J4, marked "67" or "92": (Not used in this receiver)

4.2 J8, marked "DATA", "SCA", "AUDIO": (Not used

in this receiver)

4.3 J13, "75", "GND", "50": J13 has two sections, each is a three pin, two position jumper arrangement for selecting the receiver de-emphasis. The normal position for the jumpers is the 75 microsecond de-emphasis position.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:  
(1) This device may not cause harmful interference, and  
(2) This device must accept any interference received that may cause undesired operation.

---

**5.0 MISCELLANEOUS OPERATION:**

5.1 MONO ONLY: At times it may be necessary to operate the receiver in MONO, especially in circumstances where the transmitter is at very long distances. To make the adjustment remove the cover and locate the separation potentiometer marked "SEP". Observe where the control is set before any changes in case you want to return to optimum Stereo operation. Adjust the control fully counterclockwise (CCW) for Mono operation of the receiver.

**5.2 50KHz FREQUENCY SEPARATION:**

To make the adjustment remove the cover and locate the DIP switches (refer to 1.0 on page 2). Set R1=0 and R2=1. The reference will be 50KHz. The D0 to D12 settings are the binary number for the PLL divider. The divider is determined by adding 10.7 MHz to the desired receive frequency and then dividing by 50KHz.

For example: If the desired frequency is 106.650MHz the divider would be  $106.650 + 10.7$  or 117.350MHz divided by 50KHz (or 0.050) for 2347. The binary number would be, starting at D0: 1,1,0,1,0,1,0,0,1,0,0,1,0. The "1" being the "ON" switch position (switch handle towards the microprocessor).

If you need assistance, refer to our website, [www.daytonindustrial.com](http://www.daytonindustrial.com) or contact the Engineering Dept. (see page 1 for contact info).

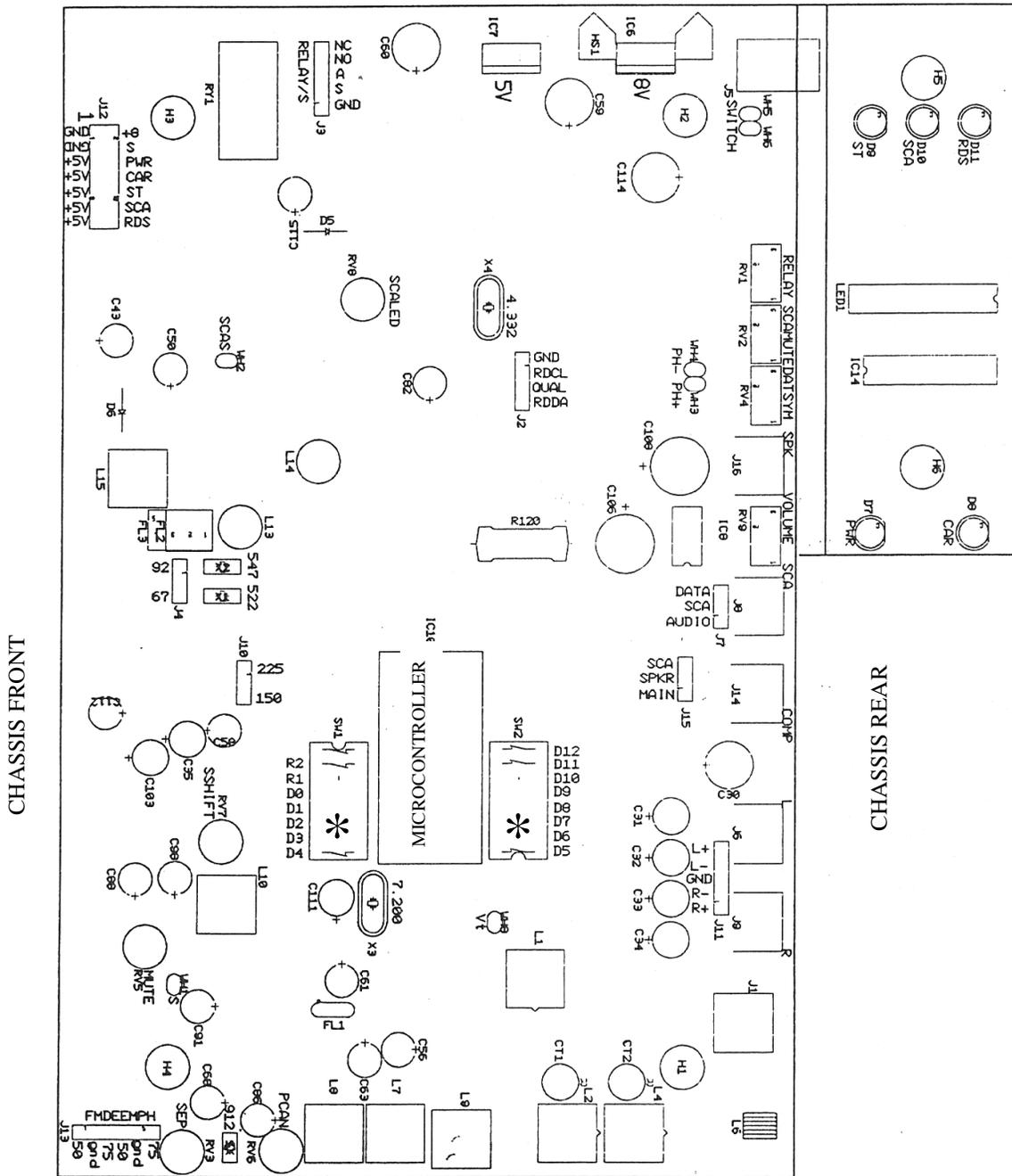


Figure 1 Receiver Board Component Layout

\* Frequency Setting switches

FREQUENCY OF OPERATION AND DIP SWITCH SETTINGS													
FREQ	D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
87.9	0	1	0	1	1	0	1	1	1	1	1	0	0
88.1	0	0	1	1	0	1	1	1	1	1	1	0	0
88.3	0	1	1	1	0	1	1	1	1	1	1	0	0
88.5	0	0	0	0	1	1	1	1	1	1	1	0	0
88.7	0	1	0	0	1	1	1	1	1	1	1	0	0
88.9	0	1	0	0	1	1	1	1	1	1	1	0	0
89.1	0	1	1	0	1	1	1	1	1	1	1	0	0
89.3	0	0	1	0	1	1	1	1	1	1	1	0	0
89.5	0	1	0	1	0	1	1	1	1	1	1	0	0
89.7	0	0	1	1	0	1	1	1	1	1	1	0	0
89.9	0	1	1	0	1	1	1	1	1	1	1	0	0
90.1	0	0	0	1	1	1	1	1	1	1	1	0	0
90.3	0	1	0	0	1	1	1	1	1	1	1	0	0
90.5	0	1	0	1	1	1	1	1	1	1	1	0	0
90.7	0	1	0	1	1	1	1	1	1	1	1	0	0
90.9	0	1	0	1	1	1	1	1	1	1	1	0	0
91.1	0	1	0	1	1	1	1	1	1	1	1	0	0
91.3	0	1	1	1	1	1	1	1	1	1	1	0	0
91.5	0	1	1	1	1	1	1	1	1	1	1	0	0
91.7	0	0	0	0	0	0	0	0	0	0	0	1	0
91.9	0	1	0	0	0	0	0	0	0	0	0	1	0
92.1	0	1	0	0	0	0	0	0	0	0	0	1	0
92.3	0	1	1	0	0	0	0	0	0	0	0	1	0
92.5	0	1	0	1	0	0	0	0	0	0	0	1	0
92.7	0	1	0	1	0	0	0	0	0	0	0	1	0
92.9	0	0	1	1	0	0	0	0	0	0	0	1	0
93.1	0	1	1	1	0	0	0	0	0	0	0	1	0
93.3	0	1	0	0	1	0	0	0	0	0	0	1	0
93.5	0	1	0	1	0	0	0	0	0	0	0	1	0
93.7	0	1	0	1	0	0	0	0	0	0	0	1	0
93.9	0	1	1	0	1	0	0	0	0	0	0	1	0
94.1	0	0	1	1	0	0	0	0	0	0	0	1	0
94.3	0	1	0	1	1	0	0	0	0	0	0	1	0
94.5	0	0	1	1	1	0	0	0	0	0	0	1	0
94.7	0	1	1	1	1	0	0	0	0	0	0	1	0
94.9	0	0	0	0	1	0	0	0	0	0	0	1	0
95.1	0	1	0	0	1	0	0	0	0	0	0	1	0
95.3	0	1	0	0	1	0	0	0	0	0	0	1	0
95.5	0	1	1	0	1	0	0	0	0	0	0	1	0
95.7	0	0	1	0	1	0	0	0	0	0	0	1	0
95.9	0	1	0	1	0	1	0	0	0	0	0	1	0
96.1	0	1	1	0	1	0	0	0	0	0	0	1	0
96.3	0	1	1	1	0	1	0	0	0	0	0	1	0
FREQ	D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
96.5	0	0	0	0	1	1	0	0	0	0	0	1	0

96.7	0	1	0	0	1	1	0	0	1	0	0	0	1	0	0
96.9	0	0	1	0	1	1	0	0	1	0	0	0	0	1	0
97.1	0	1	1	0	1	1	0	0	1	0	0	0	1	0	0
97.3	0	0	0	1	1	1	0	0	0	0	0	0	1	0	0
97.5	0	1	0	1	1	1	0	0	0	0	0	0	1	0	0
97.7	0	0	1	1	1	1	0	0	0	0	0	0	1	0	0
97.9	0	1	1	1	1	1	0	0	0	0	0	0	1	0	0
98.1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
98.3	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0
98.5	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0
98.7	0	1	1	0	0	0	1	0	0	0	0	0	1	0	0
98.9	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0
99.1	0	1	0	1	0	0	1	0	0	0	0	0	1	0	0
99.3	0	0	1	1	0	0	1	0	0	0	0	0	1	0	0
99.5	0	1	1	1	0	0	1	0	0	0	0	0	1	0	0
99.7	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0
99.9	0	1	0	0	1	0	1	0	0	0	0	0	1	0	0
FREQ	D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12		
100.1	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0
100.3	0	1	1	0	1	0	1	0	0	0	0	0	1	0	0
100.5	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0
100.7	0	1	0	1	1	0	1	0	0	0	0	0	1	0	0
100.9	0	0	1	1	1	0	1	0	0	0	0	0	1	0	0
101.1	0	1	1	1	1	0	1	0	0	0	0	0	1	0	0
101.3	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0
101.5	0	1	0	0	0	1	1	0	0	0	0	0	1	0	0
101.7	0	0	1	0	0	1	1	0	0	0	0	0	1	0	0
101.9	0	1	0	0	1	0	1	0	0	0	0	0	1	0	0
102.1	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0
102.3	0	1	0	1	0	1	1	0	0	0	0	0	1	0	0
102.5	0	0	1	1	0	1	1	0	0	0	0	0	1	0	0
102.7	0	1	1	1	0	1	1	0	0	0	0	0	1	0	0
102.9	0	0	0	1	1	1	1	0	0	0	0	0	1	0	0
103.1	0	1	0	0	1	1	1	0	0	0	0	0	1	0	0
103.3	0	0	1	0	1	1	1	0	0	0	0	0	1	0	0
103.5	0	1	1	0	1	1	1	0	0	0	0	0	1	0	0
103.7	0	0	0	1	1	1	1	0	0	0	0	0	1	0	0
103.9	0	1	0	1	1	1	1	0	0	0	0	0	1	0	0
104.1	0	0	1	1	1	1	1	0	0	0	0	0	1	0	0
104.3	0	1	1	1	1	1	1	0	0	0	0	0	1	0	0
104.5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
104.7	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
104.9	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
105.1	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0
105.3	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
105.5	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0
105.7	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0
105.9	0	1	1	1	0	0	0	0	0	0	0	0	1	0	0
106.1	0	1	1	1	0	0	0	0	0	0	0	0	1	0	0
106.3	0	1	1	1	0	0	0	0	0	0	0	0	1	0	0
106.5	0	1	1	1	0	0	0	0	0	0	0	0	1	0	0
106.7	0	1	1	1	0	0	0	0	0	0	0	0	1	0	0
106.9	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0
107.1	0	1	1	1	0	0	0	0	0	0	0	0	1	0	0
107.3	0	0	1	1	1	0	0	0	0	0	0	0	1	0	0
107.5	0	1	1	1	1	0	0	0	0	0	0	0	1	0	0
107.7	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
107.9	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0

106.1	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0
106.3	0	1	0	0	1	0	0	1	0	0	0	0	0	1	0
106.5	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0
106.7	0	1	1	0	1	0	0	0	0	0	0	0	0	1	0
106.9	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0
107.1	0	1	1	1	0	0	0	0	0	0	0	0	0	1	0
107.3	0	0	1	1	1	0	0	0	0	0	0	0	0	1	0
107.5	0	1	1	1	1	0	0	0	0	0	0	0	0	1	0
107.7	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
107.9	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0

**DIP Switch Settings for the EVEN Frequency Range:**

To set the receiver for operation at even frequencies, use the D0 ("D", zero) switch to increase the operating frequency by 100 KHz. For example, to set the frequency for 104.4 MHz, follow the settings for 104.3MHz and then turn switch D0 to the "ON" position (D0 is OFF for all uneven frequency settings shown in the manual)

The D0 switch is located on the DIP switch SW1 on the printed circuit board. The SW1 positions are marked on the board and are:  
 SW1 position 1: Blank (No Operation)  
 SW1 position 2: R2  
 SW1 position 3: R1  
 SW1 position 4: D0  
 SW1 position 5: D1  
 SW1 position 6: D2  
 Etc.