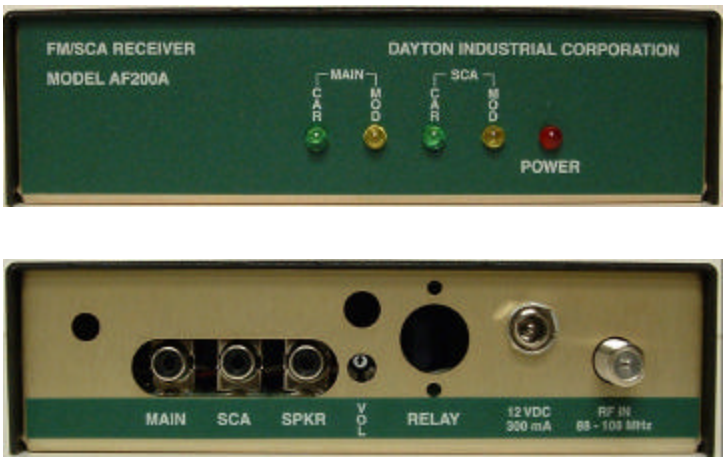
MODEL AF200A: FM, FM/SCA RECEIVER/MONITOR OPERATION MANUAL

THE AF200A IS AN FM AND FM/SCA PROFESSIONAL STYLE RECEIVER/ MONITOR. IT'S MANY APPLICATIONS INCLUDE STATION MONITORING AND EAS MONITORING.

The AF200A is an improved version of the Dayton Industrial Corporation Model AF200 which has become the industry standard for FM/SCA reception over the past 20 years.

The receiver is phase lock loop (P.L.L.) controlled (88 to 108 MHz), with a 67 or 92 kHz (selectable) SCA de-modulator. The receiver has all internal controls, is housed in a metal case and designed for professional installations.



AF200A Front/Rear (w/o Relay Option)

MAIN CHANNEL:

Frequency of operation:	88 to 108 MHz (in 100 KHz steps)
Antenna Input:	"F" connector, 75 Ohm

With modulation of 1 kHz at 75 kHz deviation:

Sensitivity:	1.0 uV (12 dB SINAD) Limiting @< 3uV
Frequency Response:	20 Hz to 15 kHz (-3 dB)
THD:	Less than 1%
Maximum S/N:	60 dB
AM Rejection:	50 dB
Intermodulation:	5 mV (73 dB) Rejection
LINE Output:	1.0 V rms, 600 Ohms
SPKR Output:	0.5 Watt into 8 Ohms

SCA MODULATION:

With SCA modulation of 400 Hz at 7.5kHz deviation, 225 uS de-emphasis, main channel modulated with 100% L-R; 10% injection:

67 KHz Sensitivity:	7uV (12dB SINAD)
92 KHz Sensitivity:	10uV (12dB SINAD)
Main - SCA crosstalk:	> 50 dB down
Maximum S/N:	55dB
THD:	1.5%
LINE Output:	1.0V RMS, 600 Ohms
SPKROutput:	0.5 Watt into 8 Ohms

SCA Channel Frequency Response measured without de-emphasis is -3dB at 6 kHz.

SCA Carrier Mute Level Control.

POWER: 12 VDC (115VAC to 12VDC, 300mA Power Converter supplied)
SIZE: 6-1/2" W x 8-1/2" D x 1-3/4" H
WEIGHT: 1 1/2 lbs. (w/o converter)

CONTROLS/FEATURES:

Frequency of operation set by internal DIP switch,
SCA Demodulator frequency selector 67/92 kHz (jumper),
SCA/Main Speaker Output Selector (jumper),
Main de-emphasis 50 or 75 microseconds (jumper),
SCA de-emphasis 150 or 225 microseconds (jumper),
Audio Volume Control (Screwdriver adj),
SCA Carrier Mute Level Control,
Audio Speaker Monitoring Output (0.5 Watt),
Power "ON" LED Indicator,
MAIN Carrier LED Indicator,
MAIN Modulation LED Indicator,
SCA Carrier LED Indicator,
SCA Modulation LED Indicator

OPTIONS AVAILABLE:

Option –MF 19" front panel rack mount (1 3/4")
Option –B Balanced LINE output via DIN connector
Option –R Carrier operated Relay via DIN connector

AF200A can be selected as one of the receivers in the AFC3 package (options B & R are standard in the AFC3).

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1.0 GENERAL: The AF200A is an improved version of the Dayton Industrial Corporation Model AF200 which has become the industry standard for FM and FM/SCA reception and monitoring over the years. Improvements include improved circuitry, specifications, options and indicators.

2.0 FREQUENCY SETTING: The first item to be performed is to set the receiver frequency of operation. The receiver is a PLL design. The received frequency is set by a series of internal DIP switches, marked SW1 and SW2.

Access to the switches is by removing the top cover of the receiver. Remove the six (6) screws and remove the cover.

Locate SW1 and SW2. (See also parts layout diagram Figure 4.0) 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 for the desired operating frequency.

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. Any 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.

2.2 **12 VDC, 300mA**: A 2.1mm connector for applying power, 12VDC, 300 mA to the receiver. A 115 to 12VDC power converter is supplied to match with this connector. The connector is positive, center pin, 2.1 mm.

2.3 **RELAY:** An **optional** feature of this receiver. If installed, a DIN connector is installed for the NO, NC and COM terminals of a relay. The relay is activated by the MAIN carrier level or SCA carrier level (as selected by internal jumpers) and screwdriver adjustments that set the input signal level where the carrier detect relay operates.

2.4 **VOL:** A screwdriver adjustment that sets the level of the audio speaker (SPKR) output.

2.4 **SPKR:** RCA connector output for connecting an 8 Ohm monitor speaker. The audio power output is 0.5 Watt (RMS). Internal jumpers select either the MAIN or SCA audio signals to be applied to this output.

2.5 **SCA**: RCA connector output from the SCA demodulator. This is a LINE level output , 0 dBm, 600 Ohms.

2.6 **MAIN:** RCA connector output for the MAIN composite output. The bandwidth extends to 110 kHz. The output is a LINE level output, 0dBm, 600 Ohms

Figure 2.0 AF200A Rear Panel Connectors

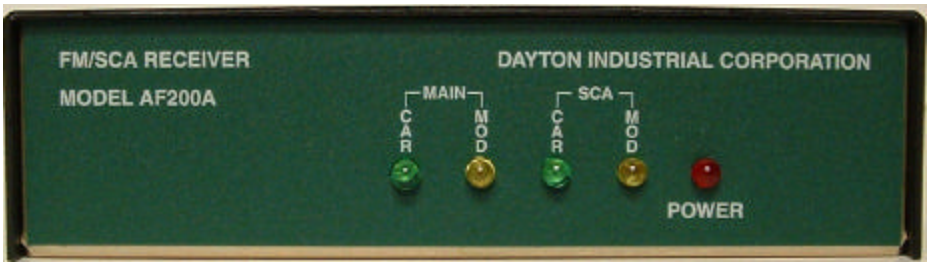


Figure 3.0 AF200A FRONT PANEL DIAGRAM

3.0 **FRONT PANEL INDICATORS:** The front panel indicators are shown in Figure 3.

3.1 **POWER:** Red LED indicator that is bright whenever power is applied to the receiver at the rear panel, 12VDC, 300 mA input power receptacle.

3.2 **MAIN:** These indicators indicate the operation of the MAIN FM receiver portion of the AF200A.

3.2.1 **CAR:** Green LED indicator that is bright whenever the FM Main carrier is received at a signal strength that exceeds a limit set by an internal control. This control (RV2) is set to –100 dBm at the factory.

3.2.2 **MOD:** Yellow LED indicator that flashes in proportion to the audio modulation detected in the Main portion of the receiver. No indication by this indicator indicates no modulation is being received on this carrier. A constant "on" condition most likely represents that only noise is present on the carrier.

3.3 **SCA:** These indicators indicate the operation of the FM/SCA portion of the AF200A receiver.

3.3.1 **CAR:** Green LED indicator that is bright whenever the SCA carrier is received at a signal strength that exceeds a limit set by an internal control. This control (RV3, SCA Mute) is set to –80dBm at the factory.

3.3.2 **MOD:** Yellow LED indicator that flashes in proportion to the audio modulation detected in the SCA portion of the receiver. No indication by this indicator indicates no modulation is being received on this carrier. A constant "on" condition most likely represents that only noise is present on the carrier.

4.0 **INTERNAL JUMPERS, CONTROLS:** All selectors/controls are located on the AF200A printed circuit board (Figure 4). To access these controls, the receiver top cover has to be removed. Do not adjust any receiver coils or capacitors as performance will be degraded.

4.1 **SPKR AUDIO SOURCE:** The input to the SPKR amplifier and SPKR RCA output jack is selected by positioning a two pin jumper on J13 on the top of the AF200A receiver printed circuit board. The jumper is positioned between the center pin and MAIN for selecting the MAIN FM audio. The jumper is positioned between the center pin and SCA to select the SCA modulation.

4.2 **SUBCARRIER OPERATING FREQUENCY SELECTION:** The AF200A has a two pin jumper selector for selecting either 67kHz or 92kHz sub carrier demodulation. This jumper is J8 located on the AF200A printed circuit board and marked as "67" and "92". Positioning the jumper between the center pin and "67" will select the 67kHz sub carrier demodulator portion of the receiver. Positioning the jumper between the center pin and "92" will select the 92 kHz sub carrier de-modulator portion of the receiver.

4.3 **MAIN DE-EMPHASIS:** A jumper (J11) is provided for selecting 75 or 50 microsecond de-emphasis for the MAIN FM received signal. The jumper is factory set to the 75 microsecond (standard) de-emphasis at the factory. Removing the jumper eliminates the de-emphasis.

4.4 **SCA DE-EMPHASIS:** A jumper (J14) is provided for selecting either 150 or 225 microsecond de-emphasis for the SCA received signal. This de-emphasis is set to 225 microseconds at the factory.

4.5 **SCA MUTE CONTROL:** The SCA MUTE control is located on the AF200A printed circuit board (RV3, "SCA MUTE"). This control sets the point at which the receiver SCA channel is automatically muted. It operates based on the SCA carrier being present and above a set level. The SCA Mute control is set at the factory to -80dBm.

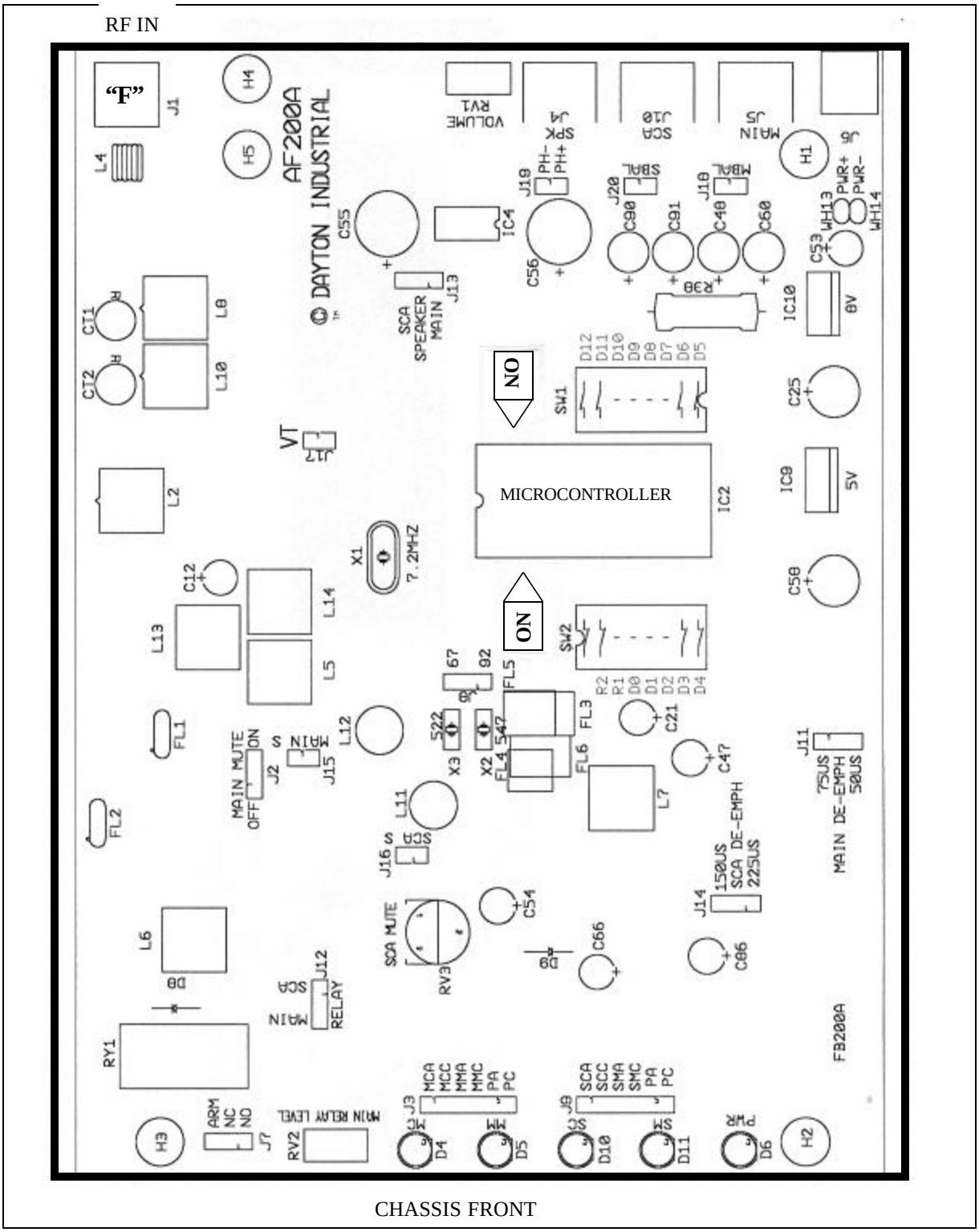
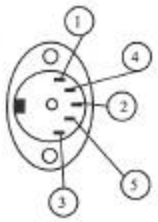


Figure 4.0 AF200A Printed Circuit Layout

FREQ	D0	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
106.1	0	0	0	0	1	0	0	1	0	0	1	0	0
106.3	0	1	0	0	1	0	0	1	0	0	1	0	0
106.5	0	0	1	0	1	0	0	1	0	0	1	0	0
106.7	0	1	1	0	1	0	0	1	0	0	1	0	0
106.9	0	0	0	1	1	0	0	1	0	0	1	0	0
107.1	0	1	0	1	1	0	0	1	0	0	1	0	0
107.3	0	0	1	1	1	0	0	1	0	0	1	0	0
107.5	0	1	1	1	1	0	0	1	0	0	1	0	0
107.7	0	0	0	0	1	0	0	1	0	0	1	0	0
107.9	0	1	0	0	1	0	0	1	0	0	1	0	0

OPTION –R: CARRIER OPERATED RELAY

The carrier operated relay output is available at the rear panel mounted DIN connector, at pins 1, 2, and 3. The carrier level operating adjustment is made using the circuit board mounted potentiometer (RV2), marked "CAR LEVEL". This adjustment is made at the factory to operate at approximately –90 dBm.



REAR PANEL VIEW
RECEPTACLE

1. (COM) Armature, Carrier relay
2. NO Contact, Carrier relay
3. NC (No Power Applied) Contact, Carrier relay
4. Balanced Audio output (+)
5. Balanced Audio output (-)

96.7	0	1	0	0	1	1	0	0	0	0	1	0	0
96.9	0	0	1	0	1	1	0	0	0	0	1	0	0
97.1	0	1	1	0	1	1	0	0	0	0	1	0	0
97.3	0	0	0	1	1	1	0	0	0	0	1	0	0
97.5	0	1	0	1	1	1	0	0	0	0	1	0	0
97.7	0	0	1	1	1	1	0	0	0	0	1	0	0
97.9	0	1	1	1	1	1	0	0	0	0	1	0	0
98.1	0	0	0	0	0	0	1	0	0	0	1	0	0
98.3	0	1	0	0	0	0	1	0	0	0	1	0	0
98.5	0	0	1	0	0	0	1	0	0	0	1	0	0
98.7	0	1	1	0	0	0	1	0	0	0	1	0	0
98.9	0	0	0	1	0	0	1	0	0	0	1	0	0
99.1	0	1	0	1	0	0	1	0	0	0	1	0	0
99.3	0	0	1	1	0	0	1	0	0	0	1	0	0
99.5	0	1	1	1	0	0	1	0	0	0	1	0	0
99.7	0	0	0	0	1	0	1	0	0	0	1	0	0
99.9	0	1	0	0	1	0	1	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	1	0	0	0	0	1	0	0
100.3	0	1	1	0	1	1	0	0	0	0	1	0	0
100.5	0	0	0	1	1	1	0	0	0	0	1	0	0
100.7	0	1	0	1	1	1	0	0	0	0	1	0	0
100.9	0	0	1	1	1	1	0	0	0	0	1	0	0
101.1	0	1	1	1	1	1	0	0	0	0	1	0	0
101.3	0	0	0	0	0	1	1	0	0	0	1	0	0
101.5	0	1	0	0	0	1	1	0	0	0	1	0	0
101.7	0	0	1	0	0	1	1	0	0	0	1	0	0
101.9	0	1	1	0	0	1	1	0	0	0	1	0	0
102.1	0	0	0	1	0	1	1	0	0	0	1	0	0
102.3	0	1	0	1	0	1	1	0	0	0	1	0	0
102.5	0	0	1	1	0	1	1	0	0	0	1	0	0
102.7	0	1	1	1	0	1	1	0	0	0	1	0	0
102.9	0	0	0	0	1	1	1	0	0	0	1	0	0
103.1	0	1	0	0	1	1	1	0	0	0	1	0	0
103.3	0	0	1	0	1	1	1	0	0	0	1	0	0
103.5	0	1	1	0	1	1	1	0	0	0	1	0	0
103.7	0	0	0	1	1	1	1	0	0	0	1	0	0
103.9	0	1	0	1	1	1	1	0	0	0	1	0	0
104.1	0	0	1	1	1	1	1	0	0	0	1	0	0
104.3	0	1	1	1	1	1	1	0	0	0	1	0	0
104.5	0	0	0	0	0	0	0	1	0	0	1	0	0
104.7	0	1	0	0	0	0	0	1	0	0	1	0	0
104.9	0	0	1	0	0	0	0	1	0	0	1	0	0
105.1	0	1	1	0	0	0	0	1	0	0	1	0	0
105.3	0	0	0	1	0	0	0	1	0	0	1	0	0
105.5	0	1	0	1	0	0	0	1	0	0	1	0	0
105.7	0	0	1	1	0	0	0	1	0	0	1	0	0
105.9	0	1	1	1	0	0	0	1	0	0	1	0	0

FREQUENCY OF OPERATION AND DIP SWITCH SETTINGS													
MHz	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	0	0	0
88.1	0	0	1	1	1	0	1	1	1	1	0	0	0
88.3	0	1	1	1	1	0	1	1	1	1	0	0	0
88.5	0	0	0	0	1	1	1	1	1	1	0	0	0
88.7	0	1	0	0	1	1	1	1	1	1	0	0	0
88.9	0	0	1	0	1	1	1	1	1	1	0	0	0
89.1	0	1	1	0	1	1	1	1	1	1	0	0	0
89.3	0	0	0	1	1	1	1	1	1	1	0	0	0
89.5	0	1	0	1	1	1	1	1	1	1	0	0	0
89.7	0	0	1	1	1	1	1	1	1	1	0	0	0
89.9	0	1	1	1	1	1	1	1	1	1	0	0	0
90.1	0	0	0	0	1	1	1	1	1	1	0	0	0
90.3	0	1	0	0	1	1	1	1	1	1	0	0	0
90.5	0	0	1	0	1	1	1	1	1	1	0	0	0
90.7	0	1	1	0	1	1	1	1	1	1	0	0	0
90.9	0	0	0	1	1	1	1	1	1	1	0	0	0
91.1	0	1	0	1	1	1	1	1	1	1	0	0	0
91.3	0	0	1	1	1	1	1	1	1	1	0	0	0
91.5	0	1	1	1	1	1	1	1	1	1	0	0	0
91.7	0	0	0	0	0	0	0	0	0	0	1	0	0
91.9	0	1	0	0	0	0	0	0	0	0	1	0	0
92.1	0	0	1	0	0	0	0	0	0	0	1	0	0
92.3	0	1	1	0	0	0	0	0	0	0	1	0	0
92.5	0	0	0	1	0	0	0	0	0	0	1	0	0
92.7	0	1	0	1	0	0	0	0	0	0	1	0	0
92.9	0	0	1	1	0	0	0	0	0	0	1	0	0
93.1	0	1	1	1	0	0	0	0	0	0	1	0	0
93.3	0	0	0	0	1	0	0	0	0	0	1	0	0
93.5	0	1	0	0	1	0	0	0	0	0	1	0	0
93.7	0	0	1	0	1	0	0	0	0	0	1	0	0
93.9	0	1	1	0	1	0	0	0	0	0	1	0	0
94.1	0	0	0	1	1	0	0	0	0	0	1	0	0
94.3	0	1	0	1	1	0	0	0	0	0	1	0	0
94.5	0	0	1	1	1	0	0	0	0	0	1	0	0
94.7	0	1	1	1	1	0	0	0	0	0	1	0	0
94.9	0	0	0	0	0	1	0	0	0	0	1	0	0
95.1	0	1	0	0	0	1	0	0	0	0	1	0	0
95.3	0	0	1	0	0	1	0	0	0	0	1	0	0
95.5	0	1	1	0	0	1	0	0	0	0	1	0	0
95.7	0	0	0	1	0	1	0	0	0	0	1	0	0
95.9	0	1	0	1	0	1	0	0	0	0	1	0	0
96.1	0	0	1	1	0	1	0	0	0	0	1	0	0
96.3	0	1	1	1	0	1	0	0	0	0	1	0	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	1	0	0

AF200A FM/SCA Receiver Frequency Switch Settings

5.0 **INSTALLED OPTIONS:** The AF200A has provisions for a number of options that may be installed.

5.1 **CARRIER OPERATED RELAY:** If selected as an option, a relay is installed that operates based on either the MAIN or SCA carrier level. The relay contacts NO, NC and COM are made available at a rear panel DIN connector. (See DIN connector diagram furnished with this option for pin designations.)

The selection as to whether the MAIN or SCA carrier level is used is made at the jumper J12, marked "MAIN","RELAY", "SCA". A two pin jumper selects either the center pin and "MAIN" for the Main carrier operation or the center pin and "SCA" for the SCA carrier operation. The level at which the relay operates is adjusted by the potentiometer RV2, "RLY LEVEL" located on the printed circuit board. The level is normally adjusted at the factory based on customer instructions or set to operate at the same level as the front panel CAR indicators.

5.2 **BALANCED AUDIO OUTPUT:** In addition to the RCA unbalanced line level outputs, the AF200A can be configured (option) to provide balanced line level outputs for both the MAIN and SCA audio outputs. These outputs are made available at a multi-pin DIN connector available at the rear panel. (See DIN connector diagram furnished with this option for pin designations.)

6.0 **OPERATION ON EVEN FREQUENCIES:** Operation on even frequencies (100 kHz spacing) can be programmed in the AF200A. Select the operating frequency from Table 1.0 that is lower than the one desired, for example if the desired operating frequency is 100.4 MHz, set the receiver to operate on 100.3 MHz and then switch "ON" the D0 switch for operation at 100.4 MHz. The D0 switch is the number 4 switch position of the SW1 DIP switch.

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