

**A Technical Overview of the  
Spilsbury SBX-11 SSB Transceiver.**

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June 1989.**

## **SBX-11 PRODUCT OVERVIEW**

The Spilsbury SBX-11 portable transceiver described herein is best portrayed as a simple, easily operated and easily serviced transceiver. It has formed part of the Spilsbury lineup for almost twenty years, and in that time has developed a reputation as one of the toughest radios in the business. It has been chosen to provide vital communications links in some of the worlds most remote locations, from the deserts of Iran to expeditions to the North Pole.

Part of the SBX-11's success can be attributed to solid engineering principles and an attitude that "simpler is better". This same philosophy still carries on in Spilsbury's products today. The radio makes use of low current, high reliability discrete components in all sections of the transceiver, with ease of replacement, excellent interchangeability and sturdy construction foremost in the implementation of the complete package.

The unit is entirely self contained, with only a connection to an outside antenna necessary for reliable communications. Power is supplied by nine standard alkaline "D" cells, (13.5V) with communications possible down to a supply voltage of 9 volts. An accessory plug is also supplied in the event that the unit is used in a location where external 12V supplies are available.

The transmitter is designed to operate into an unbalanced 50 ohm load, but is extremely tolerant of high Standing Wave Ratios under a variety of conditions. It is not uncommon for operators to report satisfactory performance when feeding the transmitter into a piece of wire or some other metallic object that happens to be handy. This is not normally recommended, but it certainly has occurred.

The SBX-11 is painted with a special corrosion resistant powder paint to resist environmental damage, and is waterproof when the top cover is in place. The unit is constructed entirely of aluminum sheet, with no plastic found anywhere in its supporting structure.

All front panel controls are laid out in such a way as to minimize operator training, with only volume, clarifier and channel selection knobs present and adjustable. The unit includes an attached microphone which has proven almost indestructible and impossible to lose. Antenna tuning (when needed) is accomplished by a simple pushbutton for carrier re-insertion, and a upward deflecting meter indicates a correct antenna match.

## **TECHNICAL OVERVIEW**

This section will focus primarily on the technical implementation of the SBX-11, with emphasis on the operation of the entire package as opposed to minute details. The overall design has changed little since its introduction in 1969, and its technical changes have leaned toward natural evolution rather than revolution. Some of our customers report that they have many units still in service that were originally sold twenty years ago, and are pleased to know that a ready supply of spares is still available.

### **TRANSMITTER**

The transmitter section of the radio is based upon the use of a low frequency I.F. stage to generate the required baseband SSB signal. The appropriate sideband is taken from a double balanced diode ring mixer which combines incoming audio with a 456KHz input carrier, with the resultant sidebands amplified and passed onto a steep mechanical filter. A mechanical filter is used due to its compact footprint and ready availability. This filter has excellent out of band rejection, and provides most of the carrier and unwanted sideband suppression. This 456 KHz SSB signal is then amplified and applied to the TX mixer where it is combined with the Local Oscillator signal which originates from the Transmit Crystal Oscillator. The output is passed through a series of high Q LC filters to remove any spurious responses, and transferred on to an IC Driver stage. This stage runs in a class B configuration and has extremely low current drain under quiescent conditions. The output is filtered once again, and finally passed onto the Power Amplifier stage.

### **POWER AMPLIFIER**

The power amplifier used here is a very conventional push-pull design which has been updated to utilize the latest generation of silicon power transistors. The transistors are conservatively rated at almost 4 times their required output power, and it is very rare that any damage ever occurs to them. The output from the PA is held constant by a current and voltage sensing ALC circuit, and any temperature changes are taken care of by a simple bias compensation section. The RF output is then coupled to the antenna by a pi-network output stage which adjusts to each individual channel frequency. The receiver, transmitter and intermediate stages benefit from the use of plug-in replaceable coils to attenuate spurious responses while allowing the use of very low IF frequencies.

## **RECEIVER**

The receiver used in the SBX-11 has changed little from its predecessors. It is a very stable, single conversion superhetrodyne which shares much of its circuitry with the TX section. The incoming signals are filtered, amplified, and applied to the same mixer which is used in the transmitter. Here it is combined with the receiver local oscillator to convert the incoming signal to a 456KHz IF where it is amplified and demodulated. Typical current drain on receive is approx. 20 mA, and a fully charged set of batteries can last a number of days when on standby. This is certainly one of the reasons that the radio has been so successful, there are few competitors which can last as long on a self contained power supply. The receiver is extremely sensitive, as it is commonly used with antennas that are less than optimum. Typical sensitivities are on the order of .25uV @ 12dB SINAD. This level has been found to be ideal for quiet locations in northern climates where atmospherics are not a problem.

## **GENERAL CONCLUSIONS**

The Spilsbury SBX-11 SSB transceiver has proven itself reliable and trouble free in over 20 years of continuous use. The design has been updated several times during its lifetime and continues to fill the needs of personnel requiring reliable communications in remote locations. The design is simple, easy to maintain, and has a history of trouble-free operation. It is the radiotelephone of choice for many expeditions and has a continuous sales record to match. Although it would appear that the overseas market would be an obvious choice for such a radio, a serious effort has yet to be undertaken to try and market the radio outside of the Canadian North. In the coming months it is anticipated that a serious effort will be made to sell the unit in the export market.