



## TECHNICAL BULLETIN NUMBER 4003

### Sideband Converters TMC Models SBC



TMC MODEL SBC-1

TMC Models SBC sideband converters are IF type receiving adapters which provide optimum reception of SSB or ISB signals, with or without Automatic Frequency Control. The AFC will function with up to 30 db carrier suppression and may be disabled for the reception of fully suppressed carrier signals.

Model SBC-1 provides two discrete audio output channels for independent sideband operation. Independent AGC for each channel allows complete flexibility in reception of independent sideband information, such as speech on one sideband and multichannel information on the other sideband, where the levels of each sideband is different. Model SBC-2 incorporates a dual voice frequency demultiplexer, TMC Model RMX-2, which provides four 3 kc outputs for ISB multiplex operation.

Either Model SBC may be used with an appropriate Communications Receiver and carrier terminal equipment such as the AN/FGC-29, AN/FGC-60, TMC Model TTS, TMC Model TTM or AN/FGC-61.

## Sideband Converters

The Models SBC feature newly developed electronic circuits packaged on a building block principle to provide maximum flexibility. The Model SBC-1 consists of two major rack mounted units, the Model AFC-2, Automatic Frequency Control, and the Model SBS-1, Sideband Selector. The Model SBC-2 adds a third unit, the Model RMX-2 Demultiplexer.

The Model AFC-2 features a unique dual loop electronic frequency control system. The first loop provides a fast response time for small frequency errors while the second loop corrects for larger errors. Both loops are coupled to an electronic memory circuit. This combination provides ease of tuning by means of a  $\pm 50$  cps capture range and will remain synchronized over a drift range of  $\pm 1000$  cps while the memory circuit holds the wanted frequency during normal carrier fades or signal interruption.

The Model SBS-1, Sideband Selector, consists of four plug-in IF amplifier/sideband filter channels, each with its own AGC system. Two discrete detector/audio amplifier channels may be switched to any one or any combination of the IF channels. Standard channels provided are 7.5 kc upper and lower sideband, 3 kc upper and lower sideband. Intermediate frequencies of 6 kc upper and lower sideband, and 1 kc, 6 kc and 15 kc symmetrical, are available on special order.

The Model RMX-2 Demultiplexer is a dual unit consisting of two Model RMX-1 Demultiplexers (TD-411/UGC) which provides four 375 to 3025 cps audio channels by means of frequency division. This is used on independent sideband circuits where each sideband is divided into two independent voice frequency circuits.

The Model SBC-1 is a modern replacement for the CV-157/URR and the Model SBC-2 replaces the CV-157/TD-98 combination.

### TECHNICAL SPECIFICATIONS: Models AFC-2 and SBS-1

TYPES OF DETECTION:	SSB, ISB, with full carrier or up to 30 db carrier suppression with AFC, or SSB, ISB, AM, CW, MCW with AFC disabled.
SIDEBAND SELECTION:	Upper sideband, lower sideband, or independent sideband by means of a front panel switch.
INPUT FREQUENCY:	455 kc. (others available on special order).
INPUT IMPEDANCE:	50 ohms nominal, also high impedance.
INPUT TUNING RANGE:	$\pm 3$ kc electrical bandspread tuning is provided.
INPUT VOLTAGE RANGE:	50 ohms: 1 millivolt to 1 volt Hi-Z: Up to 3 volts.
CARRIER REINSERTION:	A. Reconditioned carrier. B. Local carrier or oven controlled crystal oscillator.
CARRIER SUPPRESSION:	Will operate with carrier suppression of 0 db to -30 db.
UNWANTED SIDEBAND REJECTION:	Undesired sidebands, removed more than 250 cps from the carrier, are rejected by a minimum of 60 db.
INBAND DISTORTION:	-40 db.

- CROSS CHANNEL DISTORTION: -60 db.
- AGC SYSTEM: The Model SBC-1 has provision to control the receiver gain from an AGC voltage derived from the upper sideband, lower sideband or the carrier, independently selectable by front panel switch. The AGC system has a fast attack time and an adjustable release time.
- AGC CONTROLS: Channel A plus B  
Channel A only  
Channel B only  
Carrier only  
Manual
- IF BANDWIDTHS: A. Normally supplied.  
1.  $\pm 1.5$  db 250 to 7500 cps, USB  
2.  $\pm 1.5$  db 250 to 7500 cps, LSB  
3.  $\pm 1.5$  db 250 to 3300 cps, USB  
4.  $\pm 1.5$  db 250 to 3300 cps, LSB  
B. Available on special order.  
1.  $\pm 1.5$  db 250 to 6000 cps, USB  
2.  $\pm 1.5$  db 250 to 6000 cps, LSB  
3.  $\pm 1.5$  db 1 kc symmetrical  
4.  $\pm 1.5$  db 6 kc symmetrical  
5.  $\pm 1.5$  db 15 kc symmetrical
- AFC ACCURACY: Less than 1 cycle error over the entire AFC control range.
- AFC CHARACTERISTICS: The AFC system will synchronize with a 30 db suppressed carrier which has an error of  $\pm 50$  cps and will follow a maximum drift rate of  $\pm 10$  cps/Second. The system will stay synchronized over a minimum frequency range of  $\pm 1,000$  cps from the center frequency.
- AFC CORRECTION: The AFC circuit will maintain the frequency of the audio output within a residual error of less than 1 cycle of the transmitted intelligence.
- STABILITY: The stability of the SBS-1, without AFC, is within 1 cycle.
- DRIFT ALARM: A drift alarm light indicates when the carrier error is greater than  $\pm 750$  cps.
- FADE ALARM: A fade alarm circuit is incorporated which provides a visual indication when the carrier is interrupted or fades below a predetermined level. Connections for a remote fade alarm indicator are available on rear apron.

## Sideband Converters

MONITORING:	A separate monitoring circuit is provided to permit headphone monitoring of either audio channel without disturbing the audio output circuits.
THRESHOLD:	A continuously adjustable threshold control is provided on the front panel of the AFC to reduce the system sensitivity when excess noise is encountered.
AUDIO OUTPUTS:	A. High Level. Two 0 to 1 watt balanced 600 ohm audio channels. B. Low Level. Two 0 to 100 milliwatt balanced 600 ohm audio channels.
AUDIO RESPONSE:	The amplitude response of the audio amplifier is $\pm 1.5$ db over the frequency range of 100 to 22,000 cps.
AUDIO DISTORTION:	-45 db.
METERING:	A. Independent VU indicators are provided to monitor each low level 600 ohm channel. B. AFC drift indicator. C. Carrier level indicator.
HUM OUTPUT:	-50db.
ENVIRONMENT:	The Model SBC-1 is designed for continuous duty within a temperature range of 0 to 50 degrees C, and any value of humidity up to 90%.
ORIENTATION:	Any
INPUT POWER:	SBC-1: 115/230 volts AC, 50/60/400 cps, single phase, approx. 320 Watts. SBC-2: 115/230 volts AC, 50/60/400 cps, single phase, approx. 328 Watts.
SIZE:	SBC-1: 10 1/2" h $\times$ 19" w $\times$ 17" d AFC-2 3 1/2" h $\times$ 19" w $\times$ 17" d SBS-1 7" h $\times$ 19" w $\times$ 17" d SBC-2: 15 3/4" h $\times$ 19" w $\times$ 17" d
INSTALLED WEIGHT (Approx.):	SBC-1 50 lbs. SBC-2 72 lbs.
SHIPPING WEIGHT AND CUBE (Approx.):	SBC-1 85 lbs. 6.3 cu. ft. SBC-2 120 lbs. 11.8 cu. ft.
COMPONENTS AND CONSTRUCTION:	All equipment manufactured in accordance with JAN/MIL specifications wherever practicable.

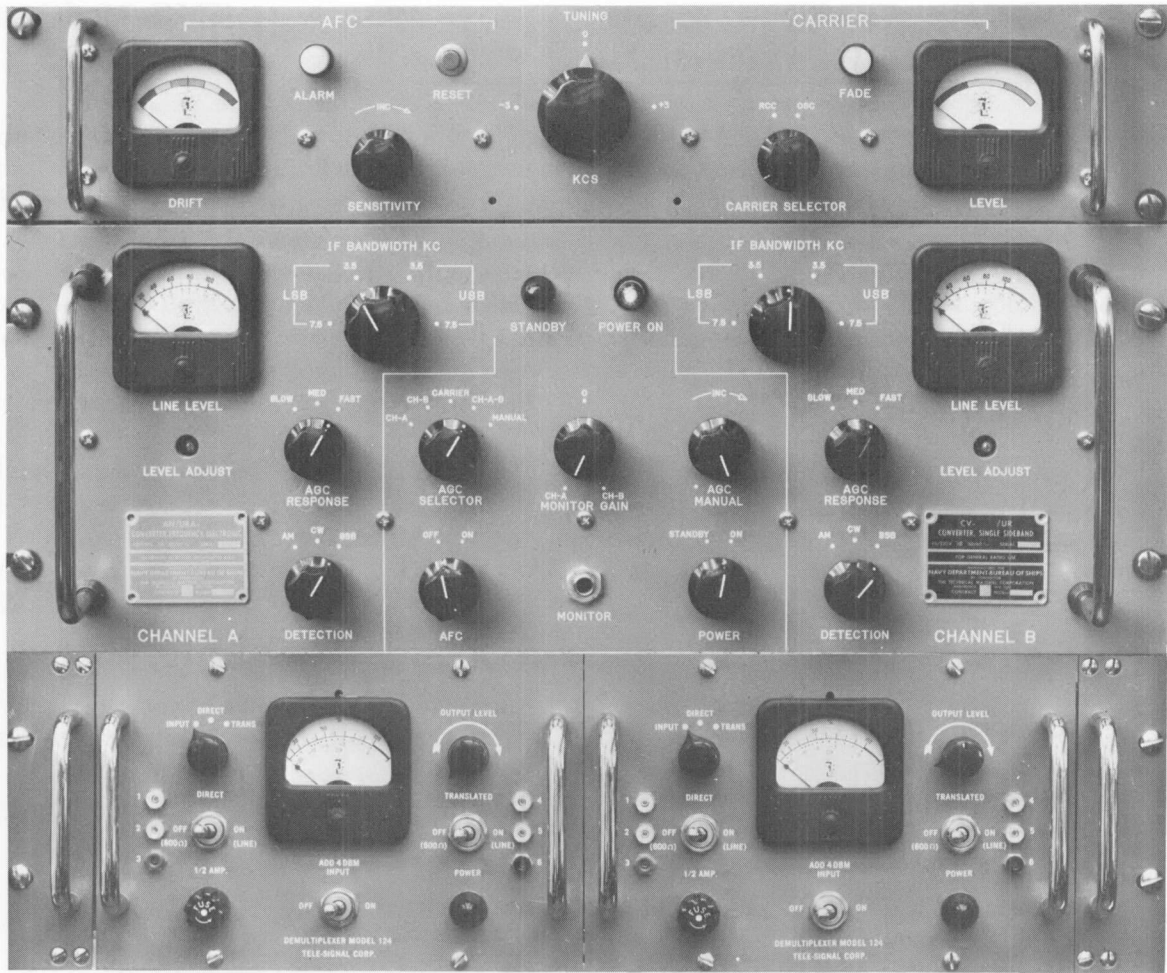
\* RMX-2 is also available to meet International requirements of 250-3000 cps and 250-6000 cps in accordance with CCIR specifications.

TECHNICAL SPECIFICATIONS: Model RMX-2

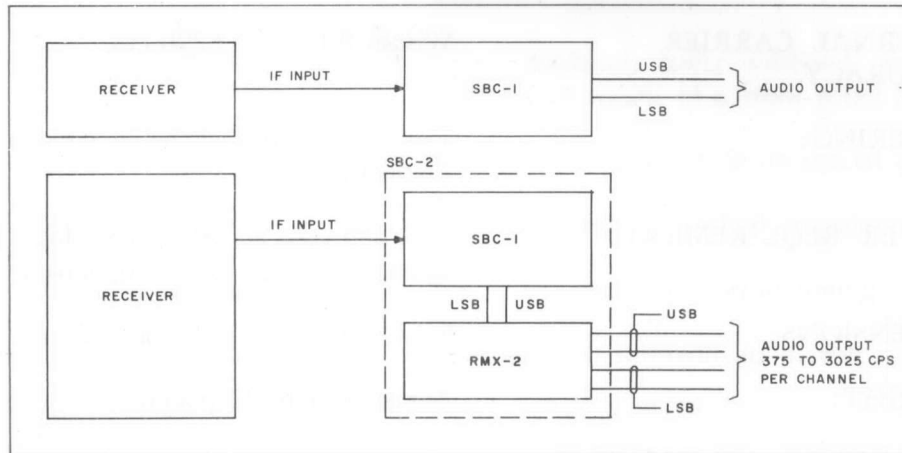
NUMBER OF INPUTS:	Two.
INPUT BANDWIDTH:	375 to 5915 cps. *
INPUT IMPEDANCE:	600 ohms balanced.
NUMBER OF OUTPUTS:	Four.
OUTPUT BANDWIDTHS: (per channel)	375 to 3025 cps. *
OUTPUT IMPEDANCE:	600 ohms balanced.
INPUT LEVEL:	
TELEPHONE:	-15 to +4 dbm.
FACSIMILE:	-15 to +4 dbm.
TELEGRAPH (16 channel)	-25 to +4 dbm per channel.
NOMINAL OUTPUT LEVELS:	
TELEPHONE:	-4 dbm.
FACSIMILE:	0 dbm.
TELEGRAPH (16 channel)	-10 dbm per channel.
MAXIMUM OUTPUT LEVEL: (single frequency)	+16 dbm.
INTERNAL CARRIER STABILITY:	Approximately 1 part in $10^6$ per degree C.
INTERNAL CARRIER ACCURACY:	Within 0.1 cps at 6290 cps.
METERING:	Two VU meters. Switchable to either input or output channels.
POWER REQUIREMENT:	115/230 volts ac, 50/60 cps, single phase, Approximately 8 watts. (400 cps optional)
DIMENSIONS:	5 1/4" h × 19" w × 11 1/2" d.
WEIGHT:	Approximately 22 pounds.
TRANSISTOR COMPLEMENT:	15 each 2N414 or equivalent. 4 each 2N156 or equivalent. 3 each 2N1284 or equivalent.
COMPONENTS AND CONSTRUCTION:	All equipment is manufactured in accordance with JAN/MIL specifications wherever practicable.

\* RMX-2 is also available to meet International requirements of 250-3000 cps and 250-6000 cps in accordance with CCIR specifications.

# TMC Models SBC



TMC MODEL SBC-2



SIMPLIFIED BLOCK DIAGRAM\*

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## THE TECHNICAL MATERIEL CORPORATION

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