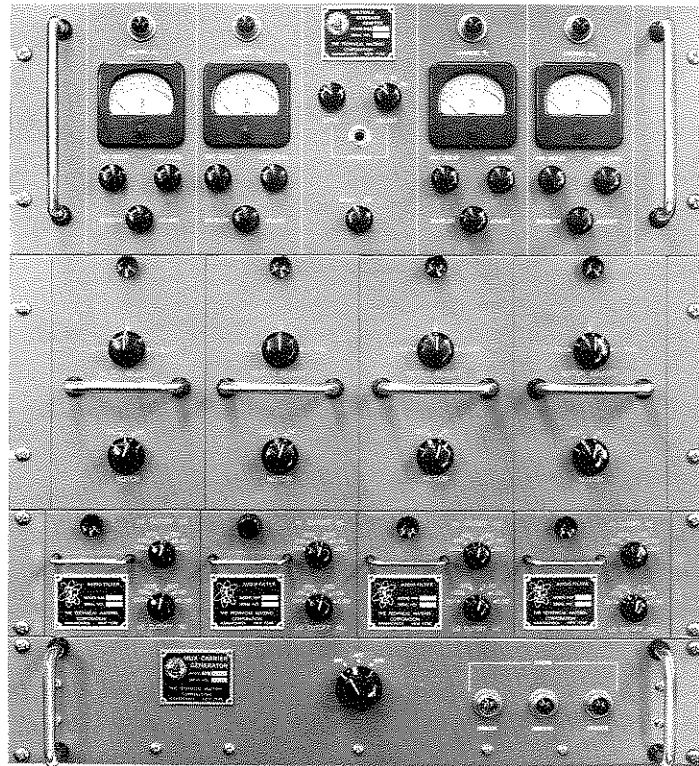


## TECHNICAL BULLETIN NUMBER 4004

Independent AGC Receiving System

TMC Model MSG()-1



Model MSG()-1

The Technical Materiel Corporation's Independent AGC Receiving System, Model MSG()-1, is a compact four channel IF receiving adaptor that provides AGC action separately within each channel of a 12 or 15 kc multiplexed signal, when used with an appropriate RF tuner/amplifier. The 60 db AGC control is derived solely from the intelligence level within each 3 kc IF channel after demultiplexing, thereby minimizing effects of multipath fade as well as allowing more efficient distribution of transmitter power to emphasize important channels while still providing uniform channel output at the receiver.

Tunable IF notch filters and audio filters, for each communication channel, may be incorporated into the system.

This Independent AGC Receiving System has been engineered to operate with a wide variety of communication receivers. A separate AFC chassis is available for providing precise reception without regard to receiver stability. CCIR bandpass requirements are readily accommodated by this system.

A brief functional description of the components of the system follows. A functional block diagram appears on the back page.

## Independent AGC Receiving System

Multiple Sideband Adapter, Model MSA-1, accepts a 1.75 mc input from its associated DDR-5 RF tuner, or a 455 kc IF input from any standard communication receiver. Conversion frequencies are provided from one of three sources: the HFS-1 synthesizer, the AFC automatic frequency control unit, or the multiplex carrier generator, Model MCG-1. Complete processing of the signal from its composite IF level to four discrete audio output channels is accomplished in this unit. Demultiplexing of each independent sideband signal is accomplished by injection frequencies provided by the multiplex carrier generator, Model MCG-1. Coaxial connections on the rear panel are provided to connect both the tunable notch filters and the audio filters if desired by the customer.



Multiple Notch Filter, Model MNF-1, provides up to four plug-in filters, each filter being tunable across one individual 3 kc channel. Each notch filter provides at least 60 db attenuation at 20 cycles to an interfering signal appearing within the passband of its IF channel.



Multiple Audio Filter, Model MAF-1, is a passive filter device with four separate plug-in drawers to provide audio bandpass in steps of 100, 250, 500, 1000 and 2500 cycles to each of the four individual audio output channels. Facilities are available on the front panel of Model MAF-1 to bypass the filter.



Multiplex Carrier Generator, Model MCG-1, contains a secondary standard with a frequency stability of at least 1 part in  $10^7$  for the ISB demultiplexing frequencies. For emergency operation, the unit also contains oven control crystals with a stability of at least 1 part in  $10^6$  for IF translation frequencies. Two outputs are provided from each crystal so that this unit may be used to control two multiple sideband groups operating in a diversity receiver combination.



Automatic Frequency Control Unit, Models AFC, accept a 1.75 mc (or 455 kc) IF input signal and provide automatic frequency control with up to 25 db carrier suppression. The AFC is optional in this system and is priced separately.

### TECHNICAL SPECIFICATIONS, MODEL MSA-1

INPUT FREQUENCY:	1.75 mc or 455 kc.
INPUT IMPEDANCE:	50 ohms nominal.
CARRIER REINSERTION:	1. Oven controlled crystal oscillator. 2. Reconstructed carrier from AFC 3. From HFS-1 synthesizer.
CARRIER COMPRESSION:	Less than 1 db.
INPUT VOLTAGE RANGE:	0.3 to 300 millivolts.

UNWANTED SIDEBAND REJECTION:	Undesired sideband, removed more than 250 cps from the carrier, are suppressed a minimum of 60 db.
INTERMODULATION:	Intermodulation products are down 60 db from the maximum tone in the desired sideband as a result of two signals in the unwanted sideband.
SELECTIVITY:	No less than 20 db of attenuation to the carrier frequency as a result of sideband selection filters.
IF BANDWIDTHS:	Nominal 3 kc.
STABILITY:	Stability is a function of the operating modes as follows: <ol style="list-style-type: none"> <li>1. Synthesized operation — 1 part in <math>10^8</math>.</li> <li>2. AFC operation — resultant audio output within 1 cycle of transmitted intelligence.</li> <li>3. Crystal control — at least 1 part in <math>10^6</math>.</li> </ol>
AGC CHARACTERISTICS:	Fast attack time, the decay time is variable from 1 to 10 seconds by front panel control on each channel.
MONITORING:	A monitoring circuit is provided to permit headphone monitoring of any audio channel without affecting the audio output (line) circuits.
AUDIO OUTPUTS:	0 to 100 milliwatts into balanced and center tapped 600 ohm audio per channel.
AUDIO RESPONSE:	The amplitude response of each audio channel is $\pm 1.5$ db over the frequency range of 50 to 10,000 cps.
METERING:	Independent VU meters are provided to monitor each 600 ohm audio channel.
AF DISTORTION:	Intermodulation products better than 50 db below full output through the audio channel.
HUM LEVEL:	-50 db below full audio output.
ENVIRONMENT:	Designed for continuous duty with a temperature range of 0 to 50° C and any value of humidity up to 90%.
ORIENTATION:	Any.
INPUT POWER:	Obtains operating voltages from HFP-1, Power Supply.
SIZE:	7" h $\times$ 19" w $\times$ 17" d.
INSTALLED WEIGHT:	30 lbs.
COMPONENTS AND CONSTRUCTION:	All equipment manufactured in accordance with JAN/MIL specifications wherever practicable.

TECHNICAL SPECIFICATIONS, MODEL MCG-1

CRYSTALS:	<i>Demultiplexing</i> Assembly containing crystal in secondary standard oven that provides stability of at least 1 part in $10^7$ . Crystals: 6.290 kc for National Standard Demultiplexing. 6.250 kc for CCIR Standard
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## Independent AGC Receiving System

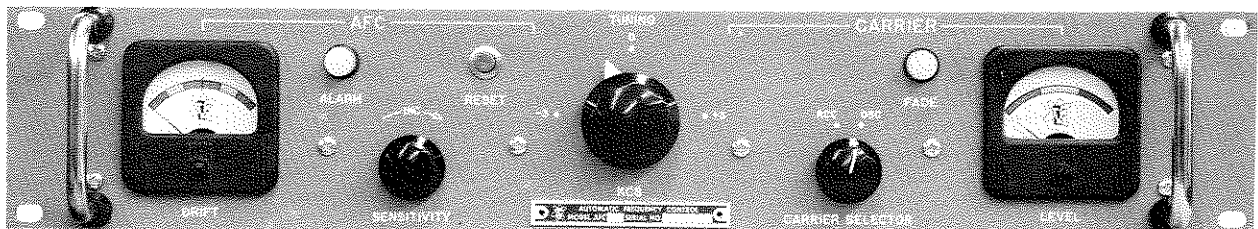
	<i>IFO</i>
	1 CR-27/U
	1 CR-47/U
	Oven controlled, minimum stability 1 part in $10^6$ .
OUTPUT:	1 volt rms into 50 ohms nominal (2 outputs for each crystal frequency).
POWER:	Obtains operating voltages from HFP-1, Power Supply.
SIZE:	3½" h × 19" w × 12" d.
INSTALLED WEIGHT:	8 lbs.

### TECHNICAL SPECIFICATIONS, MODEL MNF-1

INPUT AND OUTPUT IMPEDANCE:	50 ohm nominal per channel.
BAND REJECTION:	± 82 cps at 1 db down. ± 10 cps at 60 db down.
FRONT PANEL CONTROLS:	ON/OFF switch. Tuning.
TUNING:	± 1.5 kc, each channel.
SIZE:	7" × 19" × 15"
WEIGHT:	Approximately 30 lbs.
POWER:	Obtains operating voltages, from HFP-1, Power Supply.

### TECHNICAL SPECIFICATIONS, MODEL MAF-1

IMPEDANCE IN AND OUT:	1000 ohms.
CUT-OFF FREQUENCIES:	100, 250, 500, 1000 and 2500 cps.
WEIGHT:	20 lbs.
SIZE:	3½" × 19" × 14".
POWER:	None required.

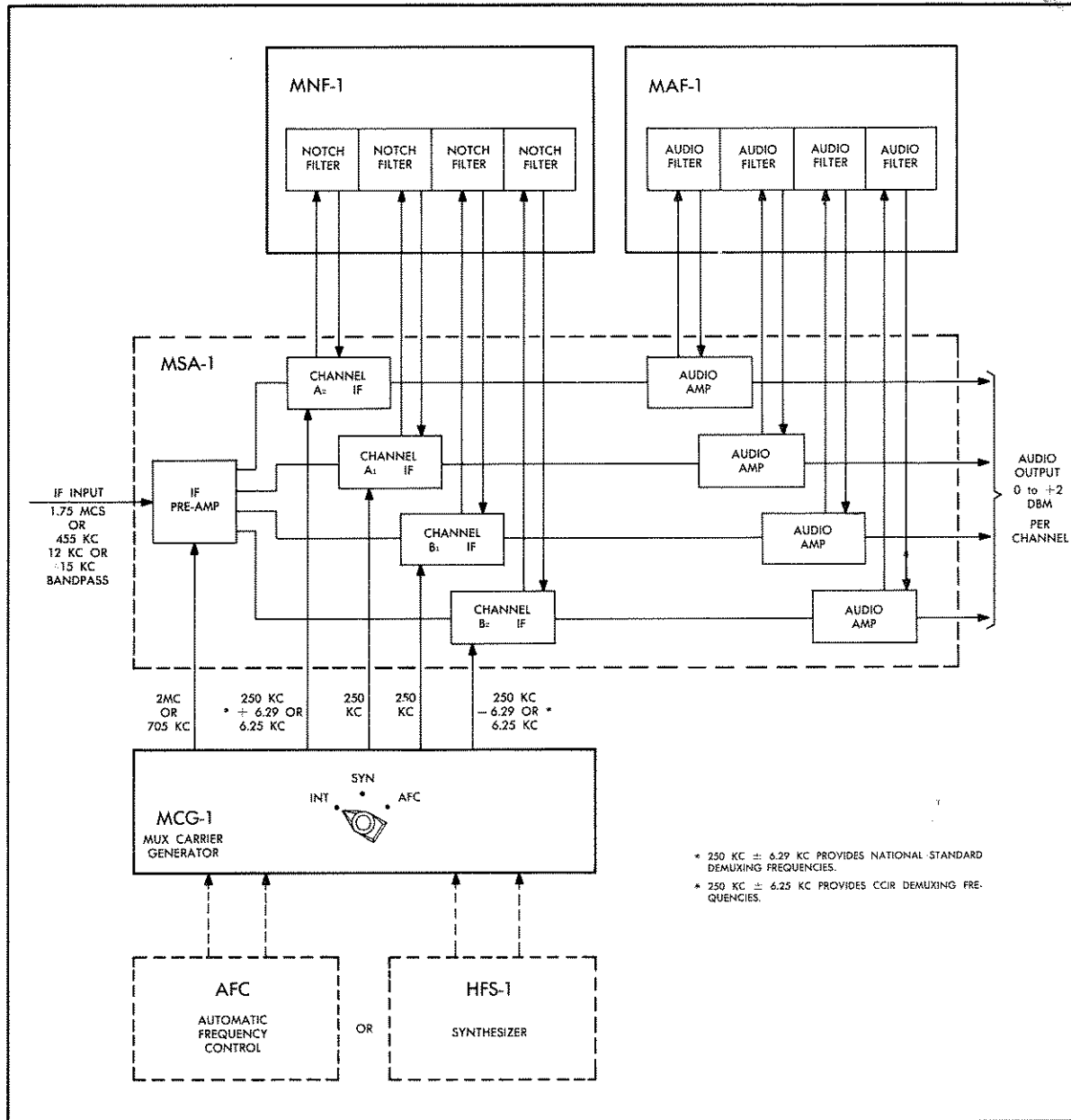


Model AFC Automatic Frequency Control Unit

TECHNICAL SPECIFICATIONS, MODELS AFC

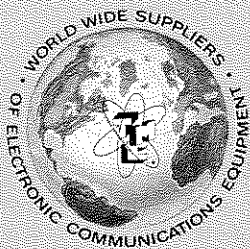
CARRIER SUPPRESSION:	0 db to -25 db.
CARRIER INSERTION:	Reconstructed or local carrier output to MSA-1.
CARRIER COMPRESSION:	Less than 1 db.
INPUT TUNING RANGE:	$\pm 3$ kc electrical bandspread tuning is provided.
AGC SYSTEM:	Provides AGC for external control voltage derived from the carrier.
ACCURACY:	Less than 1 cycle error over the entire AFC control range.
AFC CHARACTERISTICS:	The AFC system synchronizes with a 25 db suppressed carrier which has an error of $\pm 50$ cps and follows a maximum drift rate of $\pm 10$ cps/per second. The system remains synchronized over a minimum frequency range of $\pm 750$ cps from the center frequency.
AFC CORRECTION:	The AFC circuit maintains accurate frequency control so that the audio output of the associated units will have a residual error of less than 1 cycle of the transmitted intelligence.
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 of carrier interruption or fading below a predetermined level. Connections for a remote fade alarm indicator are available on rear apron.
THRESHOLD:	A continuously adjustable threshold control is provided on the front panel to reduce the system sensitivity when excess noise is encountered.
METERING:	A. AFC drift indicator B. Carrier level indicator
TEMPERATURE & HUMIDITY:	Models AFC are designed for continuous duty within a temperature range of 0 to 50° C and any value of humidity up to 90%.
ORIENTATION:	Any.
INPUT POWER:	120 watts from HFP-1, Power Supply.
SIZE:	3½" × 19" × 17"
INSTALLED WEIGHT:	16 lbs.
SHIPPING WEIGHT & CUBE: (Approximate)	28 lbs., 1.3 cu. ft.
COMPONENTS AND CONSTRUCTION:	All equipment manufactured in accordance with JAN/MIL specifications wherever practicable.

# TMC Model MSG()-1



FUNCTIONAL BLOCK DIAGRAM MSG()-1

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