16 Channel Remote Control Receiver

FEATURES

- 16 channels including 12 storbed (KB outputs), an on/off signal, one unstrobed output and 2 signals (up/down) for control of an analog function
- The 12 strobed outputs are in a 3 x 5 matrix format for direct parallel connection to a local keyboard
- On-chip oscillator using a 4.4336MHz TV crystal
- Compatible with AY-5-8450 or SAA 1024 transmitters

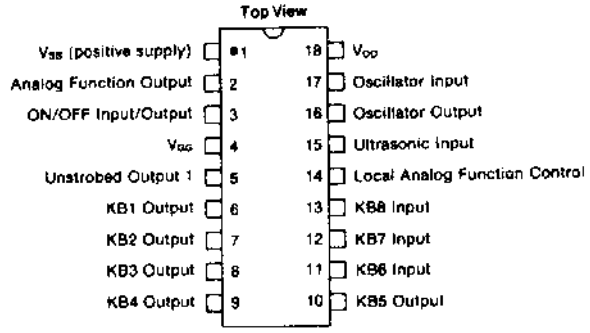
DESCRIPTION

The AY-5-8460 is a 16 channel ultrasonic remote control receiver designed to be compatible with the GI Omega TV and Stereomega Hi-Fi digital tuning systems, or any system which requires the use of a local keyboard in parallel with a remote control receiver. 12 of the received signals are output in a 1 of 5 code on lines KB1-5 upon application of the corresponding strobe on input lines KB6-8. This operation simulates the function of a mechanical 3 x 5 matrix keyboard. Additionally for other requirements, an on/off control and one unstrobed output is provided. The AY-5-8460 also recognizes two analog function controls to vary the mark/space ratio of an analog function output.

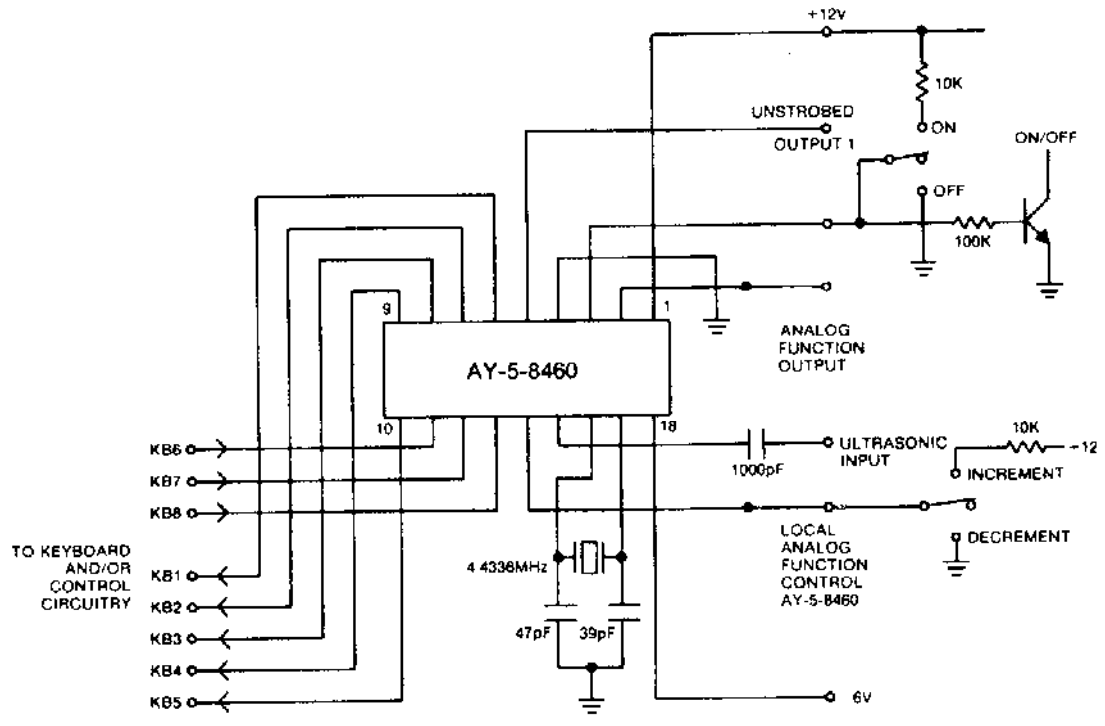
The AY-5-8460 can be operated by the AY-5-8450 remote control transmitter.

PIN CONFIGURATIONS

18 LEAD DUAL IN LINE
AY-5-8460



SYSTEM DIAGRAM



ENTERTAINMENT

Table 1 FREQUENCY ALLOCATIONS

Frequency Hz	Output Code	Frequency Hz	Output Code
37,062	KB1/KB6	39,833	KB5/KB6
37,409	Unstrobed Output	40,180	KB1/KB7
37,755	On/Off Output	40,526	KB2/KB7
38,101	KB4/KB8	40,872	Analog Function Down (AY-5-8460)
38,448	KB2/KB6	41,219	KB3/KB7
38,794	KB3/KB6	41,565	KB4/KB7
39,141	KB4/KB6	41,912	KB5/KB7
39,847	KB5/KB8	42,258	Analog Function Up (AY-5-8460)

PIN FUNCTIONS

Pin No.	Name	Functions
1	V_{SS}	Positive power supply.
2	Analog Function Output	This output is in the form of a pulse, the mark to space ratio of which can be changed in 125 steps from 1:126 to 126:1, the repetition frequency being 8.73kHz. The mark space ratio is incremented by one step about 115 msec after the start of an ultrasonic command, thereafter it is incremented every 46.2 msec. At power ON the output is normalized to a mark space ratio of 63:64. The output is also controlled by pin 14.
3	ON/OFF Output/Input	This output is toggled ON and OFF by reception of the corresponding ultrasonic command. At power up the output is set to the OFF state. When in the OFF state the Analog Function output is prevented from changing and the KB outputs are at logic '1'. The output may be turned ON by connecting it to V_{SS} via a 10kOhm resistor for 10μs, it may be turned OFF by connecting it to V_{GG}. The Ultrasonic command must be present for at least 0.7 sec to activate the output.
4	V_{GG}	This pin is externally maintained at V_{DD} +(6V ± 5%), to serve as a ground reference for logic signals.
5	Unstrobed Output 1	This output is unstrobed and is at logic '0' for the duration of the corresponding ultrasonic command.
6	KB1 Output	A 3×5 matrix keyboard may be connected to the same pins. Maximum capacitance between intersecting matrix lines is 20pF.
7	KB2 Output	
8	KB3 Output	
9	KB4 Output	
10	KB5 Output	
11	KB6 Input	
12	KB7 Input	
13	KB8 Input	
14	Local Analog Function Control	This is a tristate input which provides local control of the Analog Function Output, pin 2. Connecting this pin to V_{SS} (V_{DD}) via a 10kOhm resistor causes the mark space ratio to increment (decrement). The input must be activated for 23 msec. before the Output begins to change. This input has priority over the ultrasonic command for Analog Function Up/Down.
15	Ultrasonic Input	The ultrasonic signal should be capacitively coupled and be at least 500mV peak to peak. The first incoming pulse triggers a 23.1ms timer and after a delay of this period, two measurements of the ultrasonic signal are made over the following two 23.1ms periods. If the measurements produce a comparison an output is generated after a further pause of 46.2ms. The outputs are present for the duration of the ultrasonic command. During the complete receiving time the period of the ultrasonic signal is measured. If it is less than 18μsec or greater than 36μsec the signal is rejected and the receiver is set back to the start condition and a new measuring cycle commences. The input signals need not be completely accurate for satisfactory reception. At the lowest frequency an error of ±0.51% can be tolerated and at the highest ± 0.39%.
16	Oscillator Output	This is the output of the clock oscillator. One side of the crystal is connected to this pin.
17	Oscillator Input	This is the input of the clock oscillator. The other side of the crystal is connected to this pin.
18	V_{DD}	Negative power supply.

ELECTRICAL CHARACTERISTICS

Maximum Ratings*

Voltage on any pin with respect to V_{SS} pin ..... +0.3 to -20 Volts
Storage temperature range ..... -65°C to +150°C
Ambient operating temperature range ..... 0°C to +70°C

*Exceeding these ranges could cause permanent damage. Functional operation of these devices at these conditions is not implied—operating ranges are specified below.

Standard Conditions (unless otherwise noted)

V_{SS} = +12V ± 10%
V_{GG} = 0V
V_{DD} = V_{GG} — (6V ± 5%)
T_{amb} = 0°C to +70°C

Characteristic	Min.	Typ	Max.	Units	Conditions
Clock Oscillator Frequency	—	4.4336	—	MHz	
Ultrasonic Input					
Sensitivity	500	—	25	mVp-p	
Impedance	10	—	—	kΩ	
Inputs KB6-8					
Pull up resistance	—	—	200	kΩ	to V_{SS}
Logic '0'	—	—	V_{SS} -8	V	
Logic '1'	V_{SS} -1.5	—	—	V	
Analog Function Control Input (AY-5-8460)					
Increment Up	V_{SS}-1	—	V_{SS}	V	10K to V_{SS}
Increment Down	V_{GG}	—	V_{GG} +0.5	V	Short to V_{GG}
No Movement	—	—	—	—	Open Circuit
ON/OFF Input					
ON	V_{SS} -1	—	V_{SS}	V	Load 10K to V_{SS} & 100K to V_{GG}
OFF	V_{GG}	—	V_{GG} +0.5	V	Short to V_{GG}
Outputs KB1-5					
Logic '0'	V_{GG}	—	V_{GG} +0.5	V	Load 100K to V_{SS}
Logic '1'	V_{SS} -1	—	V_{SS}	V	
Unstrobed Outputs					
Logic '0'	V_{GG}	—	V_{GG} +0.5	V	Load 100K to V_{SS}
Logic '1'	V_{SS} -1	—	V_{SS}	V	
Analog Function Output (AY-5-8460)					
On Level	V_{SS} -1	—	V_{SS}	V	Load 68K to V_{GG}
Off Level	V_{GG}	—	V_{GG} +0.5	V	
Pulse Frequency	—	8.73	—	kHz	
ON/OFF Output					
Off	V_{GG}	—	V_{GG} +0.5	V	Load 100K to V_{GG}
On	V_{SS} -1	—	V_{SS}	V	
Supply Current	—	30	40	mA	V_{SS}—V_{DD} = 18V

ENTER-TAINMENT

Table 2
The table below illustrates the use of the AY-5-8460 R/C receiver with the AY-5-8450 R/C transmitter for the GI Omega TV and Stereomega Hi-Fi digital tuning systems.

R/C Transmitter AY-5-8450 Key/Matrix	Frequency (Hz)	R/C Receiver Output	Omega Function	Stereomega Function (Suggested Only)
2/X1 Y2	37,062	KB1/KB6	0	—
3/X1 Y3	37,409	Unstrobed Output 1	Recall	AM/FM Bandswitch
4/X1 Y4	37,755	On/Off Output	On/Off	On/Off
5/X1 Y5	38,101	KB4/KB8	Channel Down	Station #5
7/X2 Y2	38,448	KB2/KB6	1	—
8/X2 Y3	38,794	KB3/KB6	2	Search Stereo
9/X2 Y4	39,140	KB4/KB6	3	Search AM/FM
10/X2 Y5	39,487	KB5/KB8	Channel Up	Station #4
12/X3 Y2	39,833	KB5/KB6	4	Scan
13/X3 Y3	40,180	KB1/KB7	5	—
14/X3 Y4	40,526	KB2/KB7	6	—
15/X3 Y5	40,872	Analog Function Down	Volume Down	Volume Down
17/X4 Y2	41,219	KB3/KB7	7	Station #3
18/X4 Y3	41,565	KB4/KB7	8	Station #2
19/X4 Y4	41,912	KB5/KB7	9	Station #1
20/X4 Y5	42,258	Analog Function Up	Volume Up	Volume Up

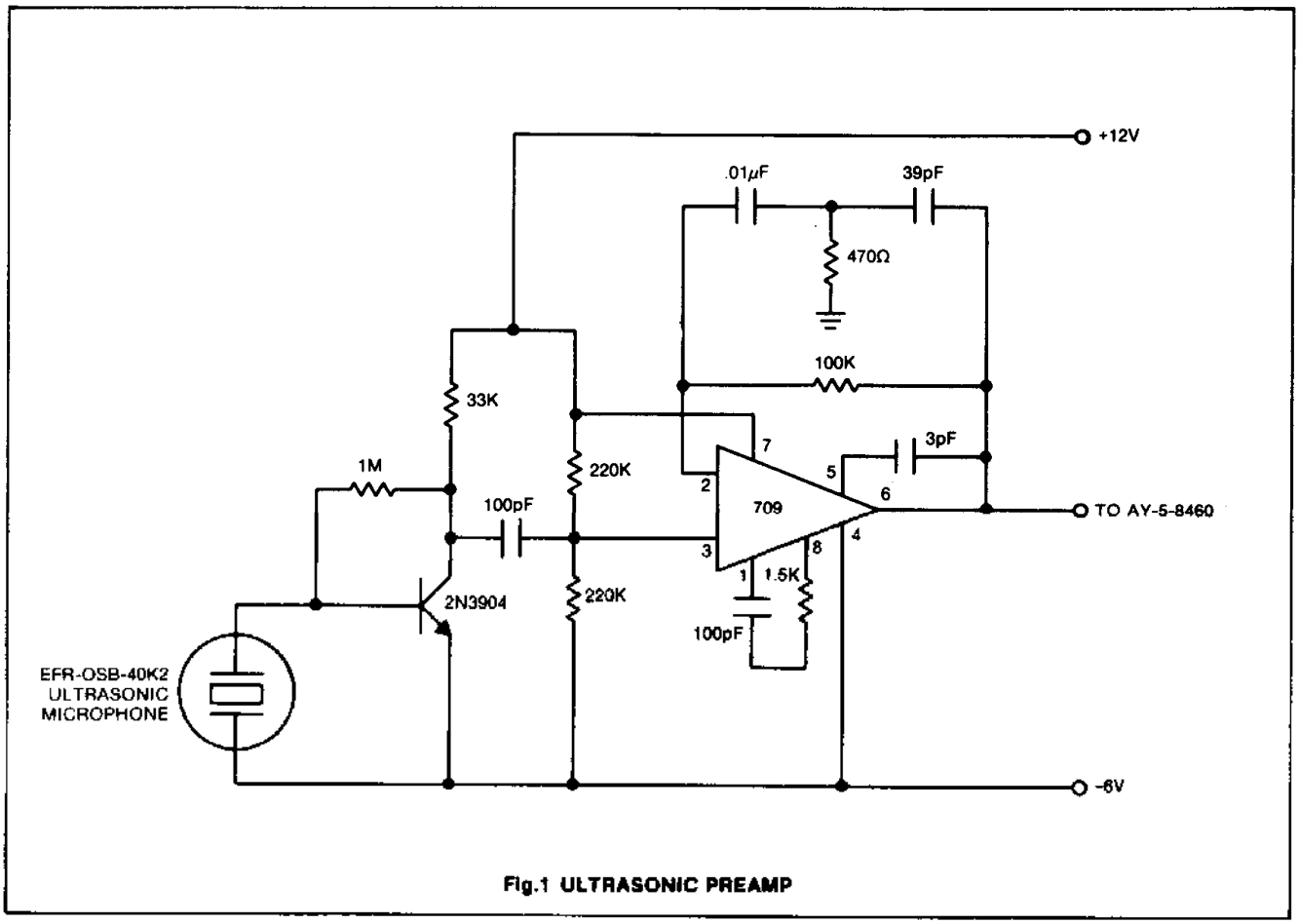


Fig.1 ULTRASONIC PREAMP