

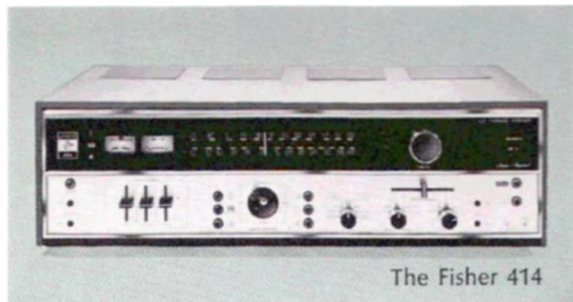
The Fisher 514

Strapped Amplifiers

The Fisher "14" series receivers offer the possibility of combining, or "strapping" the outputs of the four amplifier channels in pairs, eliminating the waste of half the power when only two channels are in use. Why "strapping"? When the rear speakers are switched off, the front speakers get all the power that formerly went to the rear speakers. Previously, the rear-speaker amplifier channels contributed no output under those conditions. Combining amplifier outputs and the engineering behind the switching is vitally important. The characteristics of the outputs of transistor amplifiers make it very risky to connect them in parallel to work together into the same load. The usual result is that one amplifier tries to "drive" the other instead of the speaker, with disastrous results for both. Fisher connects the amplifier outputs in *series*, thereby making sure that neither amplifier could short-circuit the other. Now a twist of a front-panel switch lets you go from full four-channel operation to two-channel operation with twice or even more than twice the power per channel you'd normally get (as long as you use 8-ohm speakers on the front left and right channels).

Joystick

All models use a sophisticated device for adjusting the balance between speakers during four-channel operation. Called the joystick, this single-lever master balance control offers perfect control over the relative volume levels of the four speakers. Set in the center, the joystick feeds equal signal levels to each speaker. In the up position, only the front speakers get sound. In the down position, only the rear speakers get sound. In the left or right positions, only the two left or two right speakers, respectively, are on. But of course, any intermediate position is available, making it possible to locate the virtual sound source anywhere in the room.



The Fisher 414

The CD-4 System

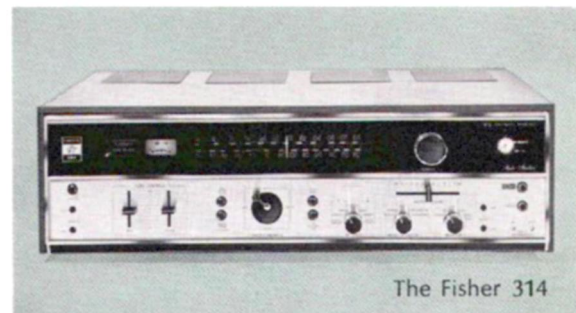
The CD-4 system now reproduces recorded music from CD-4 discs with a beauty, fidelity and naturalness never before possible from a phonograph record. It provides excellent performance because of its solid-state design, wide frequency response and low distortion.

The CD-4 discrete 4-channel disc is a revolutionary recording medium that reproduces surround-sound, the quality so necessary for the faithful reproduction of music as it is heard at a live performance.

The Fisher "14" Series 4-Channel Receivers

An essential part of the CD-4 system is the Disc Demodulator, which receives the four discrete recorded signals from the disc, processes their modulated components, and reproduces them through four separate speakers. Keeping the signals fully separated throughout the recording and playback process gives the CD-4 disc the unique "live" sound, not possible with other 4-channel systems.

The CD-4 system makes your audio system completely 4-channel/2-channel compatible. In the CD-4 mode, a logic circuit examines the incoming signal and demodulates it only if it is from a CD-4 disc. This means you can stack and play 2-channel and 4-channel records together. A small indicator glows when a CD-4 disc is being played. In the 2 CH mode the signals from the record player bypass the demodulator completely.



The Fisher 314

SQ Decoder System

These Fisher receivers employ the SQ four-channel system, developed by CBS Laboratories. Besides recovering four-channel audio with excellent channel separation from properly encoded sources (records, tapes, FM broadcasts), the SQ system extracts hidden ambience information from most current two-channel material and feeds it to the rear channels. The SQ system is at the present moment the most viable and the most nearly technically perfect. Many requirements have to be met by a four-channel record/reproduce system destined for home-entertainment use. Among the most important are compatibility with existing two-channel systems, fidelity, channel separation, and practicability, which covers a mixture of cost, simplicity of use, complexity of equipment, and related things. Most other four-channel systems either sacrifice playing time in order to achieve increased separation between channels, or they depend on having pickup cartridges with upper-frequency limits that are difficult to achieve and maintain. Many comparative listening tests have indicated that SQ-encoded material is hard to distinguish from discrete four-channel material. In every respect—freedom from distortion, frequency response, dynamic range, compatibility and simplicity—the SQ system seems to be entirely worthy of becoming a standard. All three receivers contain complete four-channel audio systems, making them usable for any type, discrete or encoded, now or in the future. Two-channel sources can be played through SQ-equipped four-channel sys-

tems and are usually enhanced by being reproduced through four speakers, or the rear channels can be switched off and the program enjoyed through the two front speakers alone. On the other hand, SQ-encoded material can be used without loss of quality with any two-channel system, which simply combines the information intended for the rear speakers with the front information, thus folding the sound into stereo.

Conservative Fisher Ratings

All receivers are rated for continuous (RMS) power output with all four channels driven simultaneously into 4 and 8-ohm loads. This power is available over the entire audio spectrum, from 20 to 20,000 Hz. Fisher includes the total power available at 1kHz, and the less rigorous IHF music power figures, to indicate the performance of its receivers compared to the equipment of other manufacturers. The unusual power-output capabilities of these receivers require substantial power supplies. To that end, the power transformers have twice the volume and weight of those in previous models, and the electrolytic filter capacitors have four times the capacitance.

Midrange Tone Control

A new kind of tone control has been incorporated on the 414 and 514. It affects the relative loudness of program material in a range centered around 1,500 Hz—an area where the conventional bass and treble controls have no audible effect. A midrange tone control is a most useful addition to the standard tone controls, providing more flexibility without the complexity of octave-band controls.

Further Audio Conveniences

What the tape monitor does is to "split" the amplifier after preamplification and choice of program source, but before the volume and tone controls, whenever the tape monitor switch is set to "on" or "monitor." Whatever program source has been selected still goes unaffected to the tape output jacks, allowing it to be recorded even though the amplifier's (or receiver's) volume or other controls may be set low or high. Meanwhile, the monitor or playback signal from a tape recorder with separate record and play heads can be reintroduced into the monitor jacks, and heard like any other program source through the speakers, altered as desired with volume and tone controls. Returning the tape monitor switch to "off" or "normal" restores the internal link from preamp and program selector switch to the rest of the amplifier.

An unusual feature is available which permits owners of four-channel tape recorders to record the four-

channel output of the SQ decoder directly. Output jacks are on the front panel for this purpose. It is of course possible to record either two-channel or encoded four-channel audio in the conventional way as well.

The Fisher 514 offers a unique Audio Display consisting of a cluster of four lights on the front panel. The brightness of each light indicates the relative proportion of audio intensity in the corresponding channel.

High and low filters on the 414 and 514 reduce noise in all program material when necessary. The high filter attenuates tape hiss and record surface noises; the low filter cuts turntable rumble and other low-frequency noises.

An added feature on the 514 is the Reduced Volume button. When pressed, it reduces the sound volume by 20 db. This is convenient for lowering the volume without changing the settings.

Outstanding FM Performance

Fisher was the first to use gain-controlled dual-gate "MOSFETs" in FM front-ends. These transistors offer high amplification with exceptionally low noise, and equally important, very low susceptibility to cross-modulation because of signal overload. Fisher receivers can accept signal strengths of up to 3,000,000 microvolts.

The I.F. (Intermediate-Frequency) and detector sections are also unusual. Fisher chose "lumped selectivity" instead of the more common approach using several tuned circuits alternated with stages of amplification. A single, highly selective ladder-type ceramic filter passes all the relevant signal information while sharply rejecting unwanted interference. This filter is followed by extremely high amplification and "hard limiting," which chops off all variations in the intensity of the signal.

What arrives at the detector for extraction of the audio signal is an unvarying signal of "pure FM"—in which all useful program information is carried by momentary variations in frequency. A double-tuned quadrature-type detector using an integrated circuit now interprets the frequency-modulated signal to recover the original program, complete with 2- or 4-channel stereo information if present, and free of any audible noise or distortion. Actual stereo decoding is accomplished by an advanced circuit based on the *phase-locked loop*, a highly stable, reliable and distortion-free method adapted from techniques used in satellite-tracking operations. The PLL circuit deserves much of the credit for the exceptional 38 db channel separations (at 1 kHz), and for the long-term frequency and temperature stability of the multiplex decoder.

Advanced AM Circuitry

The AM section of the receivers is also marked by highly evolved circuitry. The input stage uses two transistors connected in such a way as to provide high sensitivity without the overload susceptibility which usually accompanies it. AM reception will not be marred by interference from strong local stations. The AM I.F. section uses ladder-type ceramic filters, which account for the high selectivity so important when listening to more distant stations, especially at night. An AM antenna is mounted internally.

Models 414 and 514 have two tuning meters—center-of-channel and signal strength—to aid in precise tuning of AM and FM signals. Model 314 has only a signal-strength meter. The FM tuning dial scale is linear and is unusually precise and easy to read. The entire tuning dial is handsomely backlit in blue. When the unit is turned off, the dial markings almost disappear, leaving only the tuning knob and the Fisher emblem in relief against a black background, framed in the deeply sculptured panel.

All three receivers are housed in decorator styled cabinets. Four black ventilating louvers toward the rear top of the cabinet provide excellent air circulation inside the receiver, and lend a distinctive look to the component when seen from above.



Technical Specifications for the Fisher "14" Series 4-Channel Receivers

Amplifier and Audio Section*		314		414		514	
Model		stereo†	4-channel	stereo†	4-channel	stereo†	4-channel
4 channels operating		20 Hz to 20 kHz	20 kHz	20 Hz to 20 kHz	20 kHz	20 Hz to 20 kHz	20 kHz
Full power bandwidth		12 Hz to 30 kHz	30 kHz	10 Hz to 35 kHz	35 kHz	8 Hz to 40 kHz	40 kHz
IHF power bandwidth							
Total continuous sine-wave power (20 Hz-20,000 Hz)							
4 ohms		76W (38/38W)	80W (20/20/20/20W)	82W (41/41W)	112W (28/28/28/28W)	100W (50/50W)	160W (40/40/40/40W)
8 ohms		76W (38/38W)	60W (15/15/15/15W)	88W (44/44W)	88W (22/22/22/22W)	180W (90/90W)	128W (32/32/32/32W)
Total continuous sine-wave power (at 1 kHz)							
4 ohms		100W (50/50W)	112W (28/28/28/28W)	104W (52/52W)	144W (36/36/36/36W)	110W (55/55W)	200W (50/50/50/50W)
8 ohms		96W (48/48W)	80W (20/20/20/20W)	110W (55/55W)	112W (28/28/28/28W)	220W (110/110W)	160W (40/40/40/40W)
Total IHF music power (at 1 kHz)							
4 ohms		134W	156W	150W	200W	120W	320W
8 ohms		120W	100W	166W	152W	360W	200W
Total harmonic distortion (THD)							
at rated power, 4 ohms		0.5%		0.5%		0.5%	
THD at rated power - 3 db		0.15%		0.15%		0.15%	
IM dist. (60 and 7,000 Hz, 4:1)							
at rated power, 4 ohms		0.8%		0.8%		0.8%	
IM dist. at rated power - 3 db		0.3%		0.3%		0.3%	
Damping factor (4-channel operation, 4 ohms)		> 30		> 30		> 30	
(4-channel operation, 8 ohms)		> 30		> 30		> 30	
[> = greater than]							
Input sensitivity (for rated music power output into 4 ohms at 1 kHz)							
Phono		2.7 mV		2.7 mV		2.7 mV	
Auxiliary		200 mV		200 mV		200 mV	
Monitor		300 mV		300 mV		300 mV	
Accessory		300 mV		300 mV		300 mV	
Recorder output (30% FM modulation)		350 mV		350 mV		350 mV	
Hum & noise (below rated rms output, volume control at minimum)							
Phono		56 db		56 db		56 db	
Auxiliary		65 db		65 db		65 db	
Accessory/monitor		65 db		65 db		65 db	
Frequency response							
Phono (RIAA equalized, ±2 db)		30-15,000 Hz		30-15,000 Hz		30-15,000 Hz	
Auxiliary input, ±2 db)		20-20,000 Hz		20-20,000 Hz		20-20,000 Hz	
Monitor/Accessory inputs, ±2 db)		20-20,000 Hz		20-20,000 Hz		20-20,000 Hz	
Maximum input signal (rms) (at 1% THD and 1 kHz)							
Phono		60 mV		60 mV		60 mV	
Auxiliary		5 V		5 V		5 V	
Monitor		4.5 V		4.5 V		4.5 V	
Accessory		4.5 V		4.5 V		4.5 V	
Input impedance							
Phono		47 Kohms		47 Kohms		47 Kohms	
Auxiliary		100K min		100K min		100K min	
Monitor		100K min		100K min		100K min	
Accessory		100K min		100K min		100K min	
Volume control tracking (0 to -40 db)		within 3 db		within 3 db		within 3 db	
Separation (at 1 kHz L to R, R to L)							
Phono		45 db		45 db		45 db	
Auxiliary		50 db		50 db		50 db	
Monitor/Accessory		50 db		50 db		50 db	
Bass control range (at 50 Hz)		±15 db		±15 db		±15 db	
Midrange control (at 1.5 kHz)		-		±8 db		±8 db	
Treble control range (at 10 kHz)		±12 db		±12 db		±12 db	
Balance control range		set by volume controls		+0 -30 db		+0 -30 db	
High-frequency filter		-		-10 db at 10 kHz		-10 db at 10 kHz	
Low-frequency filter		-		-10 db at 20 Hz		-10 db at 20 Hz	
Loudness contour (at 30 db below max volume)		+8 db at 100 Hz +3 db at 10 kHz		+8 db at 100 Hz +3 db at 10 kHz		+8 db at 100 Hz +3 db at 10 kHz	
CD-4 Disc Demodulator							
Frequency response		20 to 15,000 Hz		20 to 15,000 Hz		20 to 15,000 Hz	
Output level (nominal)		300 mV		300 mV		300 mV	
Output impedance		5 k ohms		5 k ohms		5 k ohms	
Input sensitivity (for nominal output)							
Base-Channel (2-channel, 1 kHz)		1.7 mV		1.7 mV		1.7 mV	
Sub Channel (4-channel, 1 kHz)		1 mV / ±1.3 kHz		1 mV / ±1.3 kHz		1 mV / ±1.3 kHz	

	314	414	514
Input impedance	100 k ohms	100 k ohms	100 k ohms
Signal-to-noise ratio			
2-channel	54 db	54 db	54 db
4-channel	60 db	60 db	60 db
FM tuner section			
Tuning range	88 - 108 MHz	88 - 108 MHz	88 - 108 MHz
Antenna input impedance	300 ohms balanced	300 ohms balanced	300 ohms balanced
Usable sensitivity (IHF standard)	1.8 μ V	1.8 μ V	1.8 μ V
Harmonic distortion			
(at 400 Hz, 100% modulation)			
Mono	0.2%	0.2%	0.2%
Stereo	0.3%	0.3%	0.3%
Signal-to-noise ratio			
(at 100% mod. & 1 mV input)	70 db	70 db	70 db
Selectivity (IHF method)			
(alternate channel)	60 db	60 db	60 db
Max. antenna input level			
(for 0.5% THD)	3 volts	3 volts	3 volts
AM suppression			
(1 mV, 100% FM, 30% AM)	55 db	55 db	55 db
Spurious response rejection (at 88 MHz)	94 db	94 db	94 db
Image frequency rejection (at 88 MHz)	65 db	65 db	65 db
IF rejection (at 88 MHz)	100 db	100 db	100 db
FM stereo separation ((at 1 kHz)	38 db	38 db	38 db
FM subcarrier suppression	50 db	50 db	50 db
Capture ratio (IHF at 1 mV)	1.2 db	1.2 db	1.2 db
AM tuner section			
Tuning range	510-1,620 kHz	510-1,620 kHz	510-1,620 kHz
Usable sensitivity (IHF standard)			
20db signal-to-noise ratio			
Loop ant., 1 kHz	200 μ V/m	200 μ V/m	200 μ V/m
Selectivity (at 1 MHz & \pm 10 kHz)	50 db	50 db	50 db
Image frequency rejection (at 1 MHz)	47 db	47 db	47 db
Signal-to-noise ratio (30% mod.)	60 db	60 db	60 db
IF rejection (at 1 MHz)	40 db	40 db	40 db
3 db bandwidth (at 1 MHz)	4.0 kHz	4.0 kHz	4.0 kHz
General			
Dimensions (W \times H \times D)	23 $\frac{1}{4}$ " \times 6 $\frac{7}{8}$ " \times 17"	23 $\frac{1}{4}$ " \times 6 $\frac{7}{8}$ " \times 17"	23 $\frac{1}{4}$ " \times 6 $\frac{7}{8}$ " \times 17"
Incl. contr. panel & cabinet			
Weight (lbs.)	40	42	44
Power requirement	120(110-125) V	120 (110-125) V	120 (110-125) V
	50 to 60 Hz	50 to 60 Hz	50 to 60 Hz
Power consumption (average)	120 W	200 W	280 W

*Fisher Studio Standard series receivers are rated for continuous power, all channels driven, across the stated full power bandwidth, and at rated distortion and impedance. These measurements are the most accurate indication of an amplifier's performance. For comparison with other products, continuous power ratings at 1 kHz and IHF music power ratings are provided.

†All 4 amplifiers operating, 2 in each channel.

Specifications subject to modification without notice.

Fisher 

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