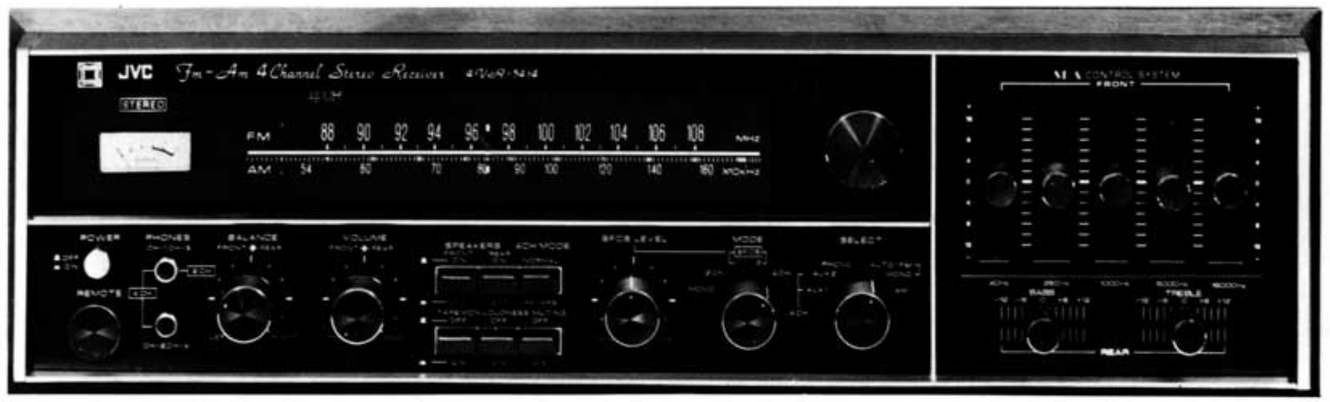
4 CHANNEL STEREO

JVC



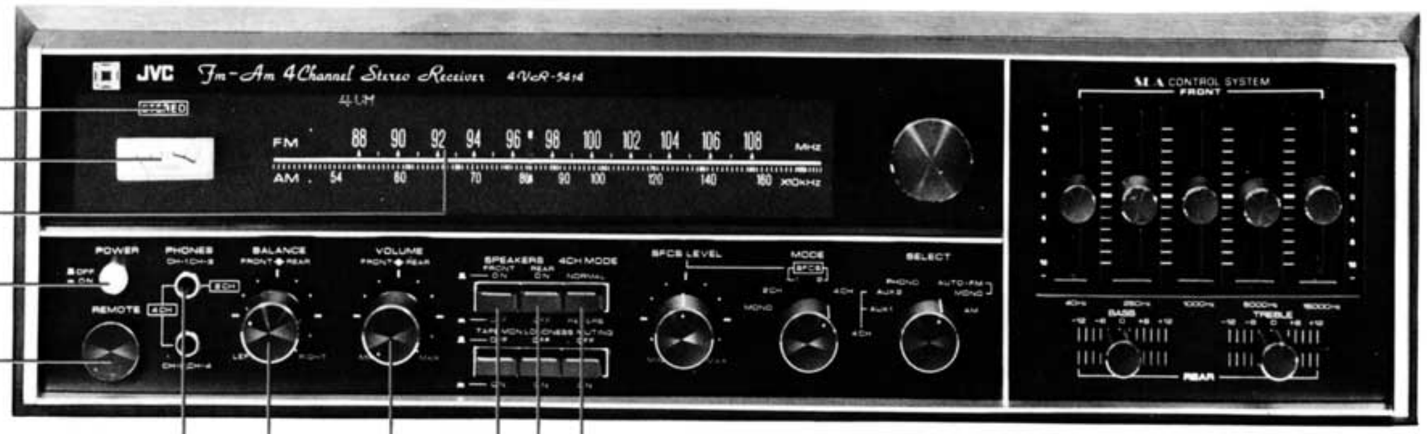
INSTRUCTION MANUAL
FOR
FM-AM 4-CHANNEL RECEIVER
MODEL 4VR-5414

CONTENTS

FEATURES

* 120 Watts output 4-channel stereo receiver
* SFCS (Simulated Four Channel System) circuit built in for 4-channel stereo sound from 2-channel sources
* IC and 3-mechanical IF stage filters for extra high selectivity and excellent capture ratio
* Large FM/AM tuning meter and dial pointer with Bull's Eye pinpoint tuning.
* Remote control for easy four-dimensional channel balancing (Model 5911 Remote control unit. : Optional)
* Automatic protective circuit
* 2CH, 4CH Indicator
* Equalizer Amplifier with 2IC's
* S.E.A. control system with 2IC's
  FM detector output for future 4-channel FM reproduction
* BTL circuit for greater power 2-channel operation
* 4-channel mode button for instanteneous switching Front channels and Rear.

DESCRIPTION OF FRONT PANEL



FM Stereo indicator:
STEREO is illuminated in red when the FM program being received is stereo.

Tuning meter:
In receiving both FM and AM stations, the TUNING knob is finely adjusted until the pointer of the tuning meter deflects to its maximum extent.

Dial pointer with Bull's Eye:
The pointer glows red as it reaches every station in FM tuning operations.

POWER switch:
When switch is pressed, dial is illuminated to indicate that the 4VR 5414 is on.

4CH REMOTE jack:
The remote control unit JVC Model 5911 supplied as an optional accessory, is connected here after removing the plug from the jack. For details of the remote control unit, refer to "Remote Control Unit" on page 6.

PHONES jacks:
4-channel headphones are connected here, with the front two channels to the FRONT jack and the rear two channels to the REAR jack. 2-channel headphones can also be connected.

BALANCE control:
This balance control consists of two friction-coupled knobs. When the inner front knob is turned clockwise, the volume of the right front channel is increase, counter-clockwise, the volume of the left front channel is increased. Only the front channel volumes are balanced by turning the inner knob with one hand while holding the outer (rear) knob with the other. Only the rear channel volumes are balanced by turning the outer knob with one hand while holding the inner knob with the other.

VOLUME control:
This control consists of two friction-coupled knobs. When the knobs are turned together the volumes of all four channels are adjusted at the same time. The volumes of the front two channels are simultaneously adjustable by turning the inner knob with one hand while holding the outer (rear) knob with the other. The volumes of the rear two channels are simultaneously adjustable by turning the outer knob with one hand while holding the inner knob with the other.

SPEAKERS buttons:

FRONT: Press the FRONT button when you wish to silence the front speakers.

REAR: Press the REAR button when you want to silence the rear speakers.

PHONES: To hear the headphones only, press both of the FRONT and REAR buttons.

4CH MODE: If you want to hear the rear speaker system as the front speaker system or vice versa, press the 4CH MODE button. The position of sounds will be changed by 180° and the sounds reproduced from the front and rear speaker systems will change places with each other.

DESCRIPTION OF FRONT PANEL

S.E.A. CONTROL SYSTEM (FRONT):
Controls the tone quality of the two channels reproduced through the speaker systems connected to the FRONT SPEAKER terminals on the rear panel. For information regarding the individual control knobs, refer to the item describing the S.E.A. CONTROL SYSTEM. For information on the S.E.A. Control System, refer to "What is S.E.A.? on page 11.

TONE CONTROL (BASS and TREBLE) SYSTEM (REAR):
Controls the tone quality of the two channels reproduced through the rear speaker systems, connected to the REAR SPEAKER terminals on the rear panel.

TUNING knob:
For tuning in both FM and AM stations.

TAPE Monitor button:
Reproduces the sound being recorded on the tape deck connected to the TAPE MON. terminals on the rear panel. Also used for tape playback.

LOUDNESS button:
With this button depressed, best tonal quality is attained at low volume, without readjusting tone controls.

FM MUTING button:
With this button depressed, severe noise between FM stations is suppressed. The button should be in the OFF position when receiving a weak station.

SFCS LEVEL control:
Adjusts the output level of the SFCS circuit. Provided the MODE knob is in the SFCS 4CH position.
(For information on the SFCS refer to "What is SFCS" on page 12.)

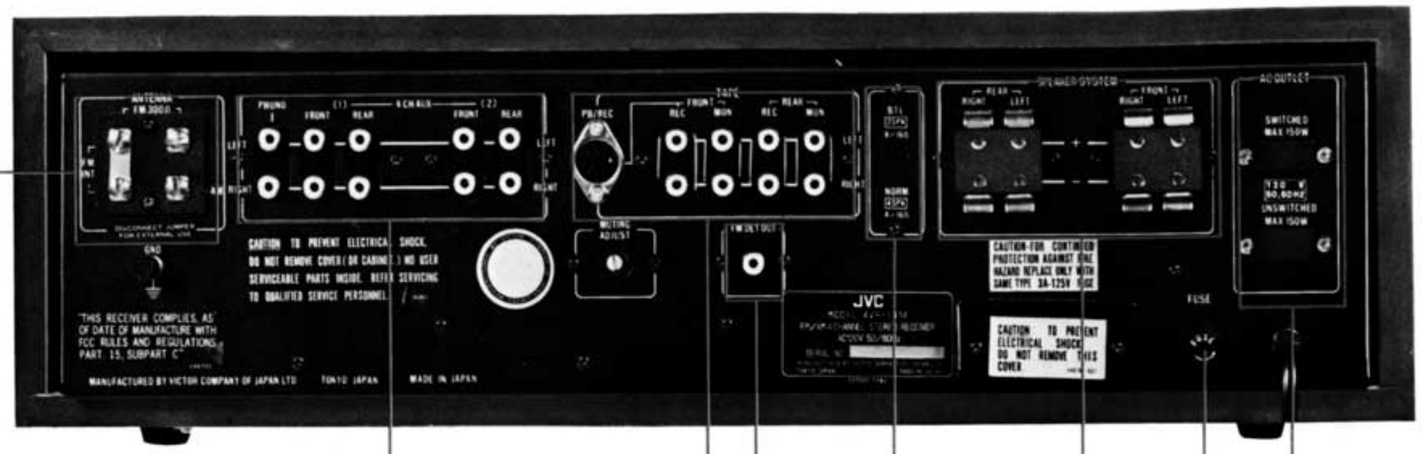
MODE selector:

MONO	All programs are reproduced in mono.
2CH STEREO	2-channel and 4-channel stereo programs are reproduced in 2-channel stereo.
SFCS1 4CH SFCS2	2-channel stereo programs are synthesized into 4-channel stereo sound through the built-in S.F.C.S. circuit.
4CH STEREO	4-channel stereo programs are reproduced in 4-channel stereo.

Function SELECT knob:

4CH AUX 1, 2	The signals fed through the 4CH AUX 1,2 terminals on the rear panel are reproduced.
PHONO	The signals fed through the PHONO terminals on the rear panel are reproduced.
FM AUTO	Stereo and mono FM programs are selected automatically. STEREO is illuminated above the tuning meter when the program is stereo.
FM MONO	Stereo and mono FM programs are reproduced in mono.
AM	AM programs are received.

DESCRIPTION OF REAR PANEL



ANTENNA terminals:
Refer to "Antennas" on page 6.

PHONO terminals:
A 2-channel stereo turntable equipped with a magnetic-type cartridge is connected here.

4CH AUX 1, AUX 2 terminals:
A 4-channel turntable is connected here through a 4-channel record adapter. For 4-channel FM programs, the FM DET OUT jacks are connected here through a 4-channel FM decoder.

TAPE jacks:
A 4-channel tape deck is connected here. A 2-channel stereo tape deck may be connected to the FRONT terminals. The DIN connectors are convenient if the tape deck is provided with similar DIN-type connectors.

FM DET OUT jack:
Refer to "FM Detector Output" on page 7.

BTL (balanced transformerless) switch
Model 4VR-5414 contains four channels of power amplifiers as mentioned before. When using Model 4VR-5414 for driving full-range speaker systems in 2-channel stereo reproduction, the four power amplifiers may be effectively utilized in two pairs with an increased power output-respectively.
The effective use of the four power amplifiers can be done as 2-channel amplifier by turning this switch to BTL position.

SPEAKER terminals:
Four speaker systems for respective channels are connected as marked. Model 4VR-5414 uses the BTL system; when using it as a 2-channel stereo receiver with an increased power output through one pair of FRONT channel speaker systems.
CAUTION: For the BTL use, speaker's impedance should be more than 8 ohms.

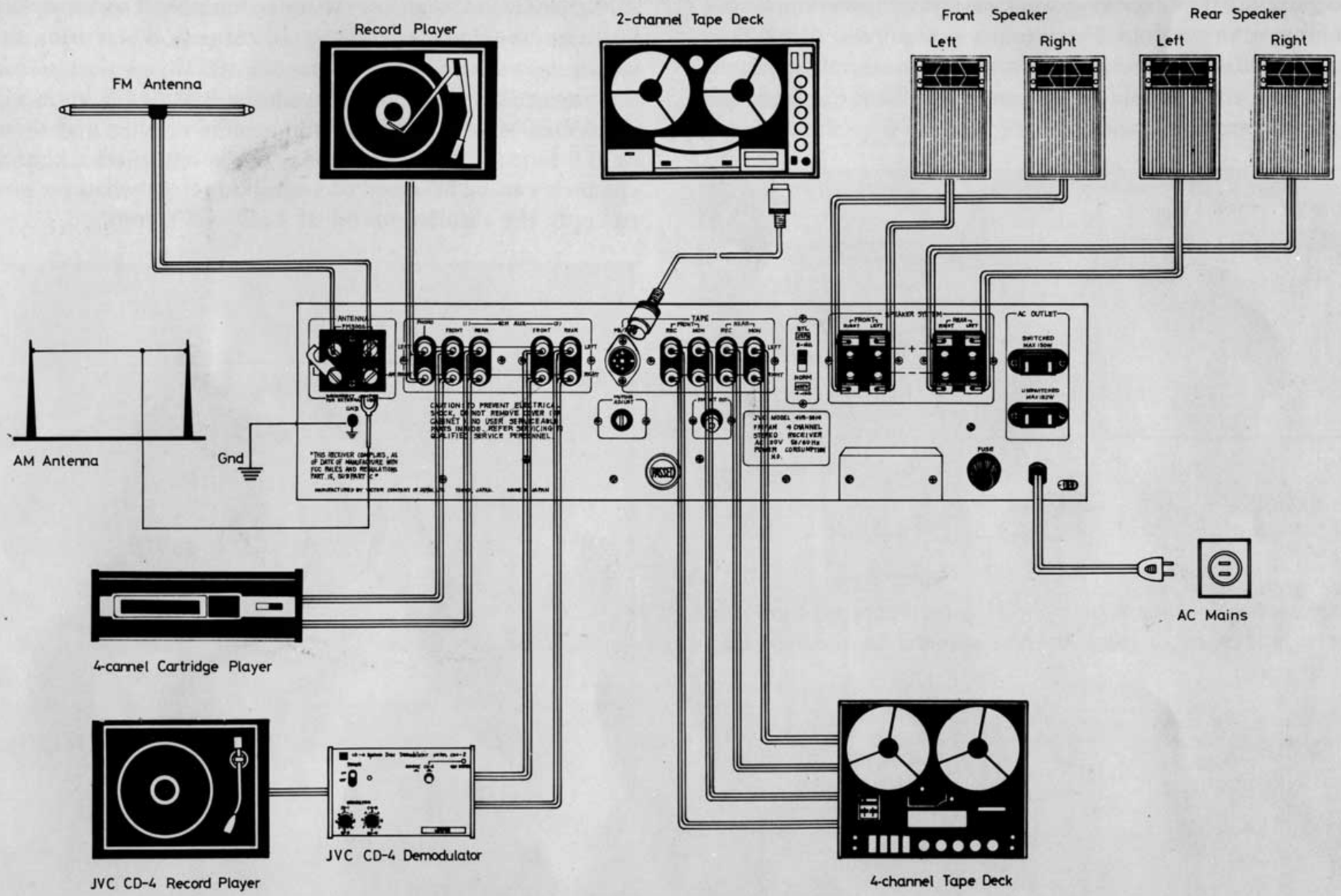
FUSE socket:
3A Fuse.

AC OUTLETS:

SWITCHED (Max 150W)	The power supplied from this outlet is turned on and off as the POWER switch/SPEAKERS selector knob is operated on the front panel.
UNSWITCHED (Max 150W)	The power supply from this outlet is continuous without regard to the operation of the POWER switch/SPEAKERS selector knob on the front panel.

CONTROL OPERATION CHART

BTL CONNECTION



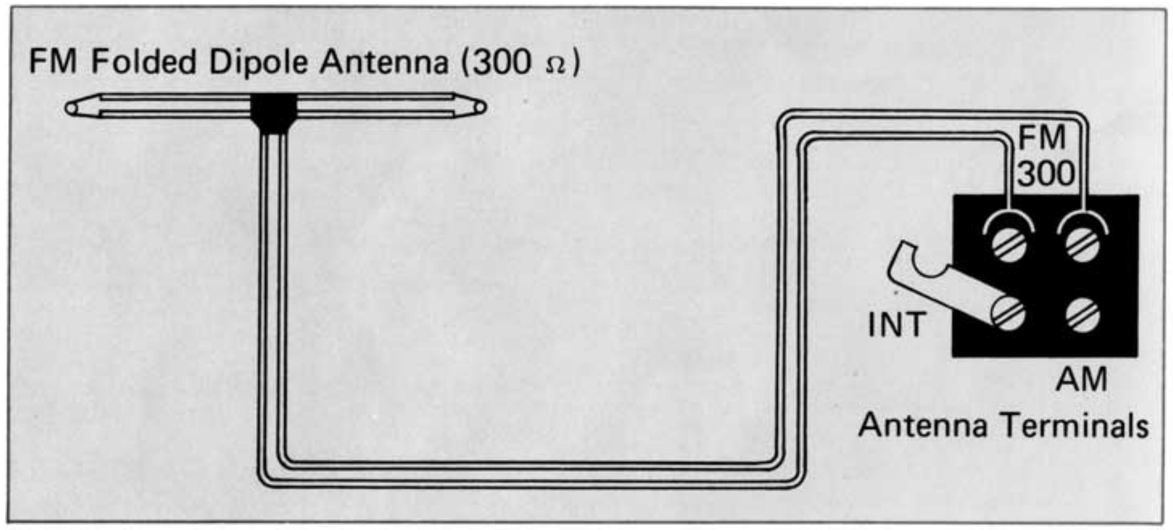
When you wish to operate the VR-5414 amplifier with only two speakers use the BTL system as follows.

1. Set the BTL/NORM switch to BTL.
2. Set the SPEAKERS selector knob to FRONT + REAR(BTL).
3. Connect the source to the front channels.

ANTENNAS , REMOTE CONTROL UNIT

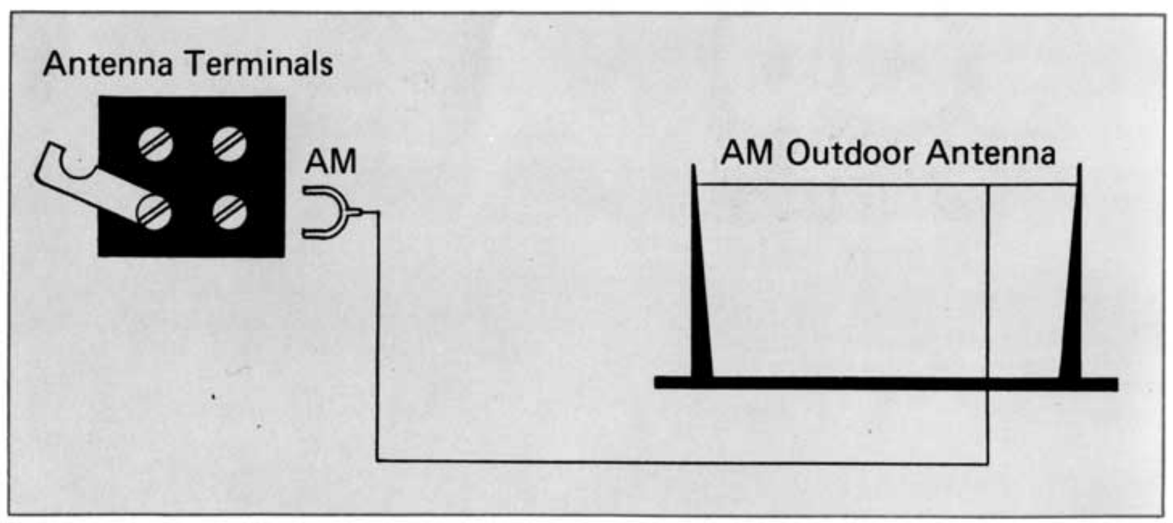
FM antenna:

An FM antenna is built-in. For receiving weak stations, however, a simple indoor dipole antenna or an outdoor FM antenna is required. A 300-ohm balanced FM antenna can be connected to the FM 300Ω terminals on the rear panel. The jumper strip should be disconnected from the terminals before connecting an external antenna.



AM antenna:

A sensitive ferrite core AM antenna is built-in. If good reception cannot be attained, connect a lead wire or outdoor AM antenna to the AM EXT terminals on the rear panel.



Remote Control Unit

A 4-channel remote control unit is supplied as an optional accessory to facilitate two-dimensional balance control. When using the remote control unit, remove the plug from the REMOTE jack on the front panel, connect the remote control unit there, set the BALANCE knob to about center, set the VOLUME knob for a little greater volume, and then depress the REMOTE button. Now, with the remote control stick, the volumes of all four channels can be balanced to your liking from whatever position you choose to enjoy the thrilling sound of 4-channel stereo.

PROTECTIVE CIRCUIT, FM DETECTOR OUTPUT

Protective Circuit

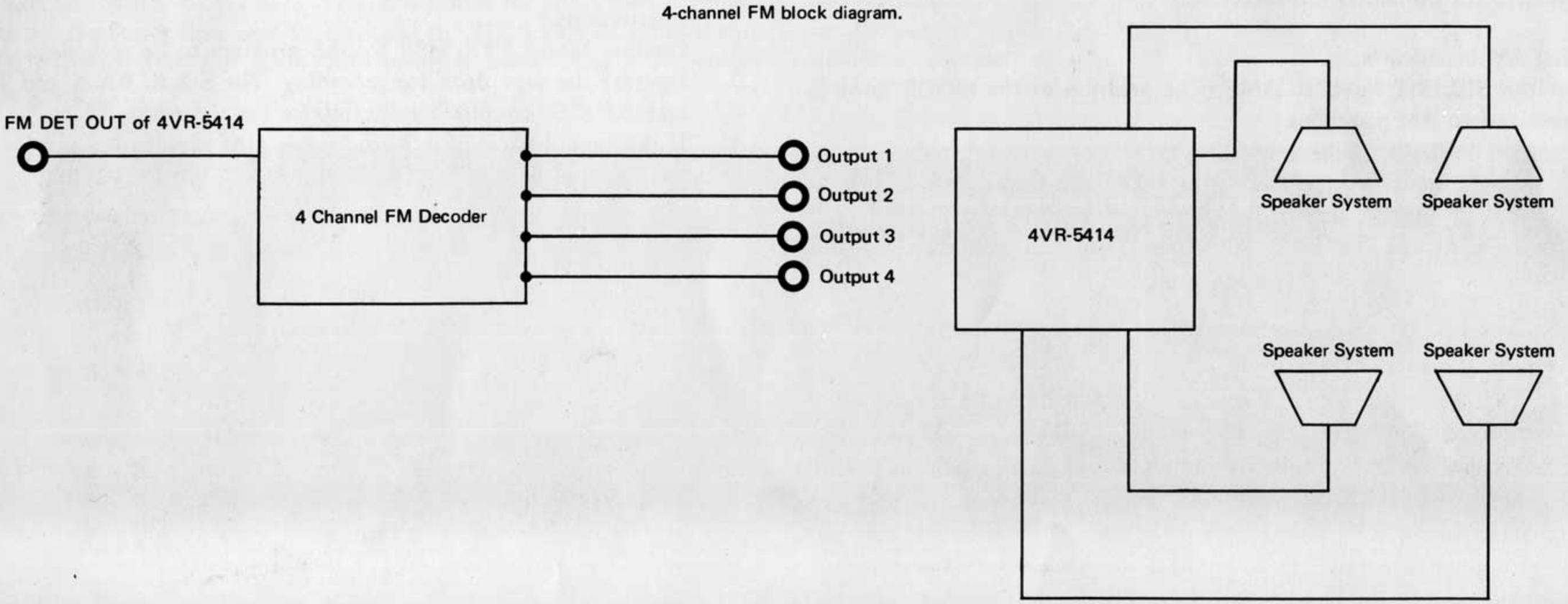
A newly developed automatic protective circuit is incorporated in Model 4VR-5414. If a short circuit occurs in the speaker circuit, the protector is automatically actuated to keep the transistors from possible damage. When the protective circuit is actuated, sound reproduction is intermittent at intervals of a few seconds. Turn off the power supply, check and repair the speaker circuit, and turn on the power supply again.

FM Detector Output

FM detector output jacks are provided on the rear panel. The FM DET OUT jacks are for the convenience of reproducing future 4-channel FM programs. By connecting the jacks to a 4-channel FM decoder, and connecting the four channel outputs of the adapter to the 4CH TAPE MON. terminals, exciting 4-channel FM programs can be enjoyed.

Note: Output level of FM DET OUT: 300mV ± 3dB (at 75KHz DEV)
Input Impedance of adaptor: More than 3K

4-channel FM block diagram.



OPERATING PROCEDURE

Receiving FM broadcasts:

1. Set the SELECT knob to FM AUTO.
2. Set the MODE knob to 2CH STEREO or SFCS1 or SFCS2 4CH.
3. Turn the POWER switch on.
4. Tune in the desired station with the aid of the tuning meter and Bull's Eye. If the program is stereo, STEREO is illuminated in red above the tuning meter. With a weak station, better reception may be attained by setting the SELECT knob to FM MONO. Mono FM programs are reproduced in mono regardless of the position of the MODE knob.
5. Adjust the VOLUME knob, BALANCE knob and desired buttons as appropriate.
6. Adjust the S.E.A. CONTROL SYSTEM knobs for the Front Channels, and for the Rears, Bass and Treble. Use the SFCS LEVEL knob if the MODE knob is in the SFCS 4CH position. (The SFCS circuit is ineffective for monaural reproduction.)

Receiving AM broadcasts:

1. Set the SELECT knob to AM. (The position of the MODE knob is unrelated to AM programs.)
2. Turn the POWER switch on.
3. Tune in the desired station with the aid of the tuning meter.
4. Adjust the VOLUME knob, BALANCE knob.
5. Adjust the S.E.A. CONTROL SYSTEM knobs as desired for the Front Channels and for the Rears, Bass and Treble.

Playing records:

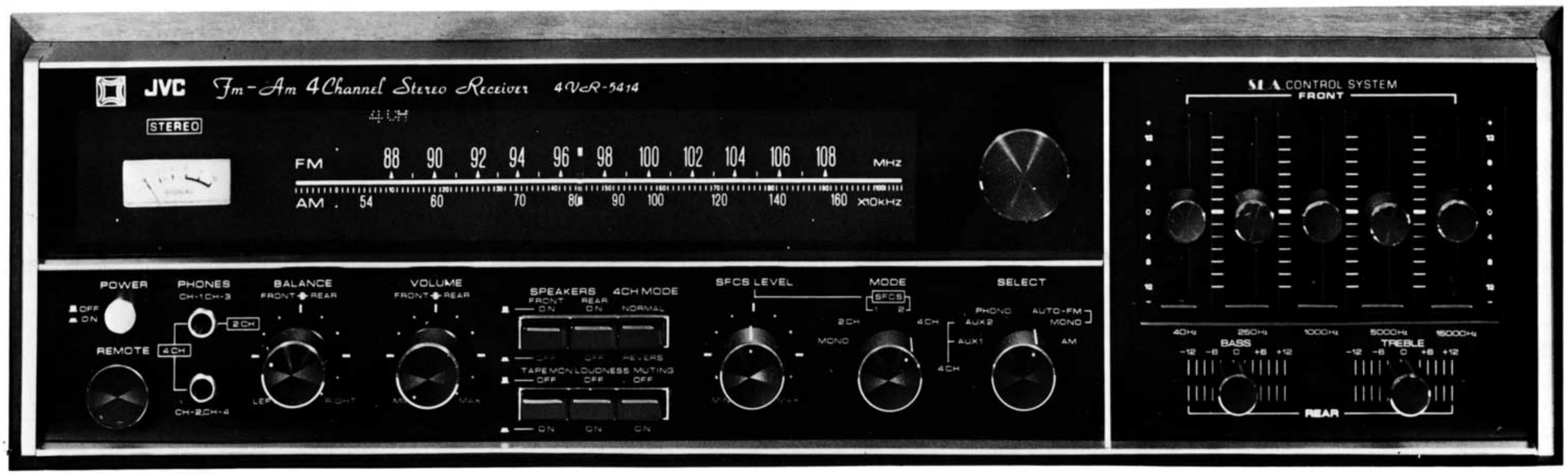
1. 4-channel records:
   a. Connect a 4-channel turntable to the 4CH AUX 1 or AUX 2 terminals on the rear panel through a 4-channel record adapter.
   b. Set the SELECT knob to 4CH AUX 1 or AUX 2 and the MODE knob to 4CH STEREO.
   c. Turn the POWER switch on.
   d. Start the turntable.
   e. Adjust the VOLUME knob, BALANCE knob.
   f. Adjust the S.E.A. CONTROL SYSTEM knobs as desired for the Front Channels and for the Rear, Bass and Treble.
2. 2-channel records:
   a. Connect a 2-channel turntable with a magnetic-type cartridge to the PHONO jacks on the rear panel.
   b. Set the SELECT knob to PHONO, and the MODE knob to 2CH STEREO or SFCS1 or SFCS2 4CH.
   c. Turn the POWER switch on.
   d. Start the turntable.
   e. Adjust the VOLUME knob, BALANCE knob.
   f. Adjust the S.E.A. CONTROL SYSTEM knobs, and the SFCS LEVEL knob if the MODE knob is in the SFCS 4CH position.

Tape recording:

1. Connect a 4-channel tape deck to the TAPE terminals on the rear panel. (When using a 2-channel tape deck, connect it to the TAPE FRONT terminals. Select the controls according to the following instructions.)
2. Operate Model 4VR-5414 for the program to be recorded.
3. Operate the tape deck for recording. The S.E.A. BASS and TREBLE and S.F.C.S. circuits are ineffective for recording.
4. If the tape deck is of a 3-head type, tape monitoring can be effected by pressing the TAPE MONITOR FRONT buttons on the front panel.

Tape playback:

1. Connect a 4-channel tape deck to the TAPE jack on the rear panel. (When using a 2-channel tape deck, connect it to the TAPE FRONT jack on the rear panel. Select the controls according to the following instructions.)
2. If the tape deck is connected to the TAPE jacks on the rear panel, depress the TAPE MONITOR FRONT and REAR buttons while the TAPE A-B button is in the A position (projecting). If the tape deck is connected to the TAPE MONITOR FRONT and REAR jacks on the front panel, depress the TAPE A-B button to the B position in addition to the FRONT and REAR buttons.
3. Turn the POWER switch on, and operate the tape deck for playback.
4. Adjust the VOLUME knob, BALANCE knob.
5. Adjust the S.E.A. CONTROL SYSTEM knobs for the Front Channel and for the Rear, Bass and Treble. (and the SFCS LEVEL knob if the MODE knob is in the SFCS 4CH position when using a 2-channel tape deck).



WHAT IS S.E.A. ?

What is S.E.A.?

All of the receivers from JVC incorporate the new JVC Sound Effect Amplifier (SEA) system. Until the company popularized it by incorporating it into a receiver for consumers, this type of tone control system was restricted to use in professional sound studios. With the SEA system, today's stereo enthusiast has more freedom and control over the sound he hears than was ever possible before. The advantages of the SEA system are:

1. It gives the listener complete control of sound throughout the entire frequency range.
2. It enables the listener to create entirely new sounds.
3. It allows the listener to compensate for vagaries in room acoustics.
4. It permits the listener to compensate for sound characteristics peculiar to such components as turntables, tape decks and speaker baffles.

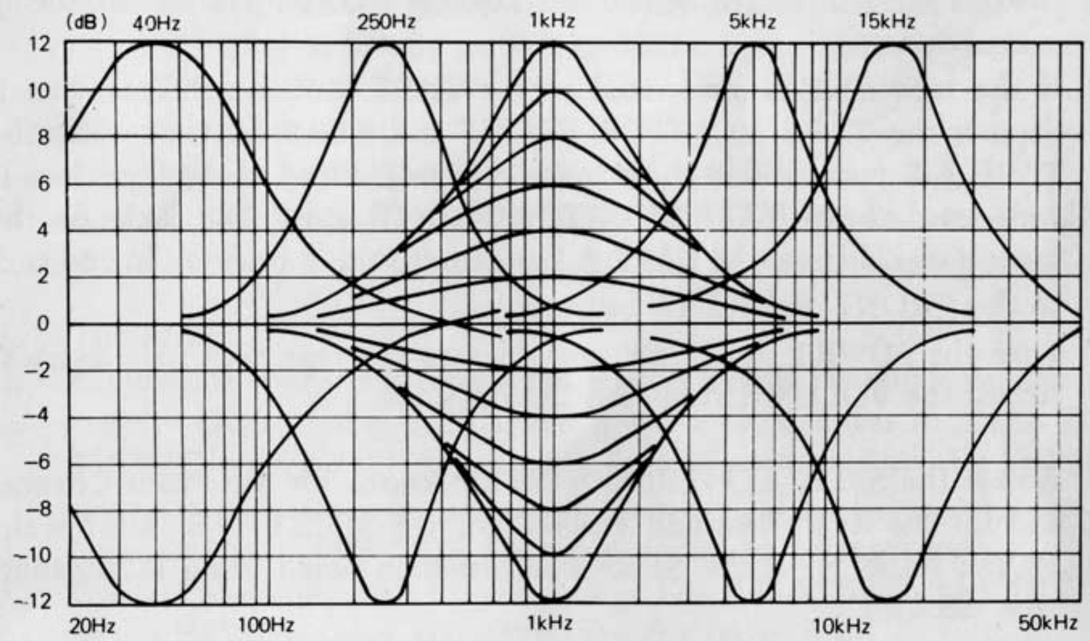
Unlike the conventional tone controls found on most better receivers, the SEA system divides the receiver's total frequency range into 5 different frequency zones. This permits more variation in the complex frequency characteristics of individual frequency zones within the total frequency range. As you can see by the graph, the SEA system permits a sharp slope to be obtained from the very start. With ordinary tone controls, this slope is limited to 6db/oct. Another advantage of the SEA system is that each independent frequency zone can be increased or decreased within a very narrow range from 10 to 12db/oct. Perhaps the largest advantage of all is the SEA system's ability to control the difficult midranges. Ordinary tone controls can only handle the extreme high and low ends.

In the case of the 5-zone SEA system, the operator has independent control of the 40, 250, 1,000, 5,000 and 15,000Hz ranges. When a 7-zone SEA system is utilized, the range is split up into even narrower zones.

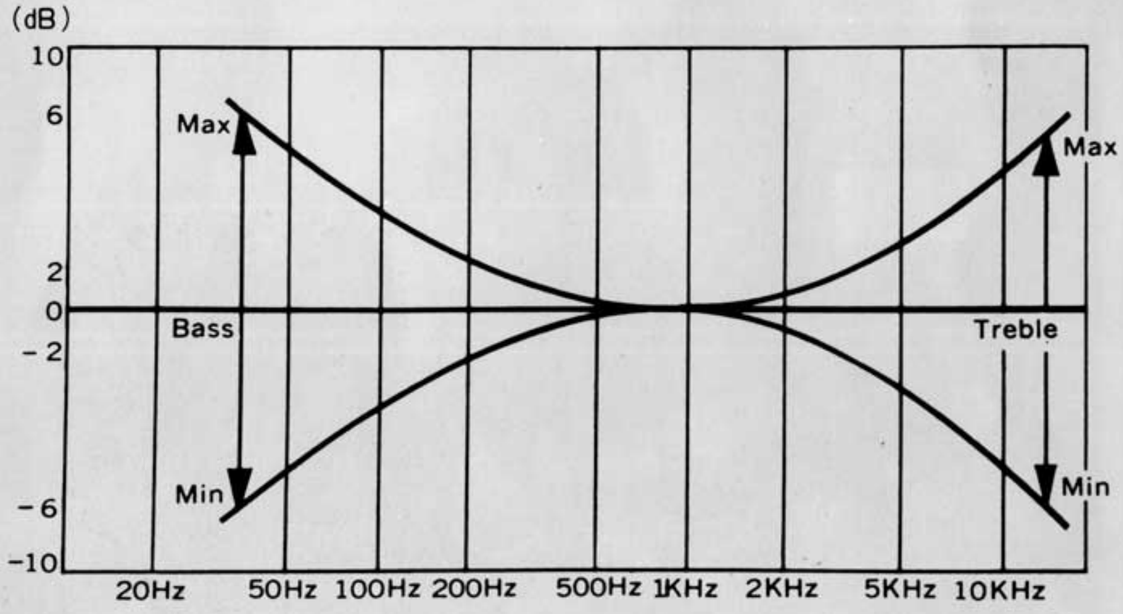
How the SEA System Works

When listening to regular program sources, if the operator wants to boost the low frequency response, all that is required is to boost the 40Hz or 250Hz control. To bring out the important midrange—the ones closest to that of the human voice—the 1,000 or 5,000Hz control should be boosted. To increase extremely high end response, the 15,000Hz control can be boosted. Conversely, all of these ranges can be lowered by deemphasizing the response in each range.

Frequency Control Characteristic of SEA



Frequency Control Characteristic of Conventional Bass & Treble Tone Controls



WHAT IS S.E.A. ?

How It Compensates for Components

Nearly all the moving magnet (MM) type phonograph cartridges on the market have resonance peaks between 10,000 and 15,000Hz which cause harsh, gravel-like noise to be played back in the high frequency ranges. By utilizing the SEA system's high frequency controls, this annoyance is greatly reduced and the sound is heard more naturally.

Because of recording techniques, phonograph records between various recording companies also differ in sounds reproduced. The SEA system enables the user to match the sounds of one record to that of another.

In most small bookshelf speaker systems, the lows as a rule are unduly attenuated under 200Hz. The SEA system allows these lows to be easily reproduced by correcting the low frequency characteristics of the speaker system.

On many vocal recordings, the phenomena of voice fading and being masked by instruments occur. The voice can easily be drawn out by emphasizing the 1,000 and 5,000Hz controls of the SEA system. Ordinary tone controls cannot do this.

How It Can Create New Sounds

Most stereo systems have a turntable or record changer and some kind of taping device as program source components. By utilizing these components with the SEA system, the sounds from the record can be mixed or altered and re-recorded in an altogether new form.

How It Compensates For Room Acoustics

Even when using the same stereo equipment, tone characteristics change when the equipment is moved to different acoustic environments such as large rooms, small ones, heavily furnished or sparsely furnished rooms. The SEA system allows practically every kind of room to be turned into an ideal listening environment. In the average size room, harmful standing wave occurs at approximately the 100 to 300Hz range which causes sound to become blurred and sound intensity to rise.

This is quickly eliminated by utilizing the proper SEA system controls.

Listening Environment

In small rooms, the high end response is generally emphasized. Whenever it is too high howling occurs, a particularly annoying type of noise to most listeners. This is also quickly adjusted by using the proper SEA system controls.

Low end response is generally emphasized in large rooms or halls. If it becomes too exaggerated, it can be corrected quite simply by the SEA system.

Distortion of the medium to high tones often occurs in rooms with a lot of sound-absorbent materials, such as drapes, carpets, stuffed furniture, etc. Again, this can be swiftly corrected by utilizing the SEA system.

THIS IS WHAT S.E.A. CAN DO

40 Hz

Cut to eliminate hum or rumble. Boost to emphasize lowest bass at low volume levels.

250 Hz

Cut to reduce speaker boom. Boost to add clarity to upper base sound.

1000 Hz

Most effective in emphasizing voices.

5000 Hz

Effects upper mid range. Gives greater power and clarity to brass and string.

15000 Hz

Cut to eliminate scratch and hiss. Boost to retain good level of highs in low volume playback.

WHAT IS SFCS ?

What is SFCS?

SFCS (Simulated Four Channel System)

The SFCS is JVC's newly developed circuit for reproducing the matrix 4-channel records. It can reproduce all the matrix 4-channel records on the world's market now. It can also change any conventional 2-channel source (e.g. records, tapes and FM broadcasts) into a simulated 4-channel sound.

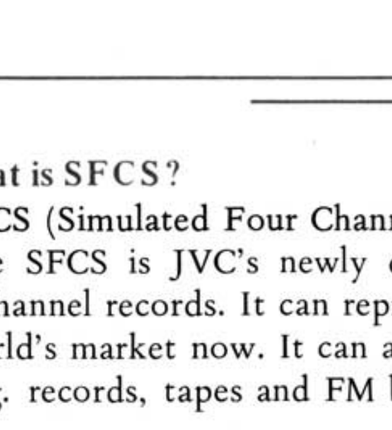
SFCS (see the figure on the right)

SFCS 1 Set the FUNCTION knob to this position when you reproduce conventional 2-channel stereo as a simulated 4-channel sound. This enables you to enjoy a surrounding stereo sound without missing the extension of right and left sounds.

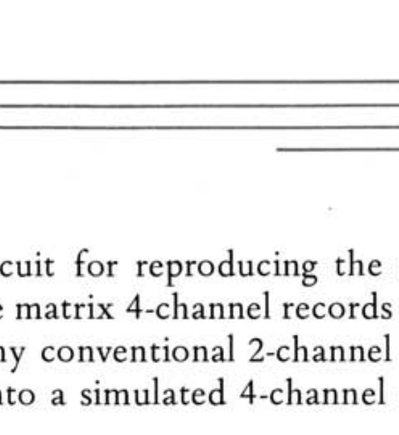
SFCS 2 Set the knob to this position when you play the matrix 4-channel sources. All the matrix 4-channel sources can be reproduced.

Matrix 4-channel reproduction

According to the SHAIBER System, the levels and phases of the front left and rear right channels are as follows:



Levels at which the orientation of sound to the front left channel can be attained.



Sound is orientated to the rear right channel, but the channel 2 is opposite-phase.

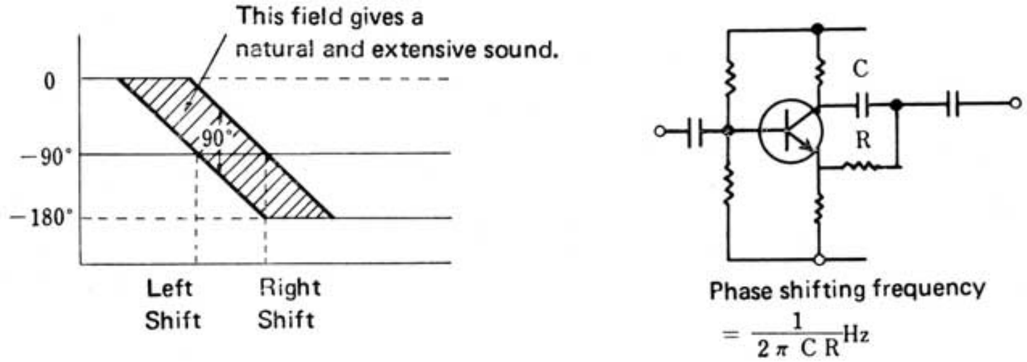
The figures contrary to the above apply to the front right and rear left channels. So you can orientate the sounds of the four channels. This will be better understood from the following equations:

CH-1: $0.92L + 0.38R = 1.0F_L + 0.7F_R + 0.7R_L + 0R_R$
CH-2: $0.92L - 0.38R = 0.7F_L + 0F_R + 1.0R_L - 0.7R_R$
CH-3: $0.92R + 0.38L = 0.7F_L + 1.0F_R + 0R_L + 0.7R_R$
CH-4: $0.92R - 0.38L = 0F_L + 0.7F_R - 0.7R_L + 1.0R_R$

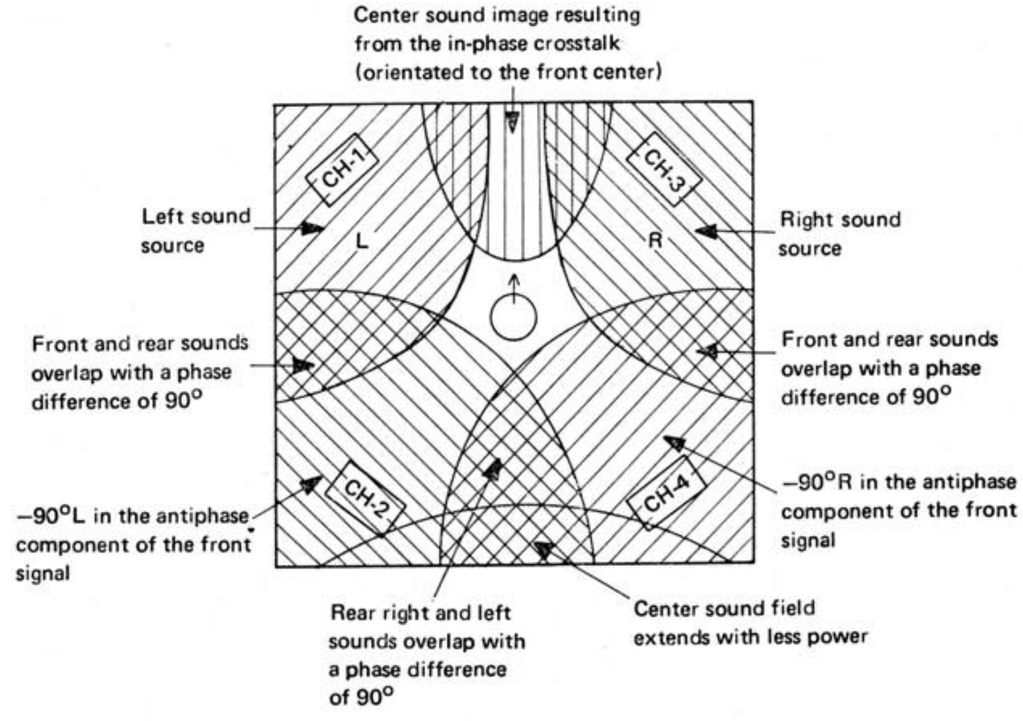
The reproduction according to the SHAIBER System is problematic especially in that the phase difference between the rear right and left channels is 180°. This causes the extention of sound to be unnatural to the human ear. With the SFCS the front two channels get an in-phase crosstalk there-between and an antiphase crosstalk between the respective rear channels, so that the phase difference between any two channels is 90°, which results in a natural integral sound.

Simulated 4-channel reproduction

The SFCS, with its phase characteristic as shown below, displays its ability when it reproduces any 2-channel source as a simulated 4-channel sound.



Schematic view illustrating the sound reproduction by the SFCS



SPECIFICATIONS

4-CHANNEL RECEIVER

Audio Section

Total dynamic power	:	120W (30W+30W+30W+30W) IHF 4Ω
	:	112W (28W+28W+28W+28W) IHF 8Ω
	:	130W (65W+65W) 8Ω BTL
Continuous power	:	80W (20W+20W+20W+20W) 4Ω
(All channel driven)	:	60W (15W+15W+15W+15W) 8Ω
	:	70W (35W+35W) 8Ω BTL
Load impedance	:	4 – 16Ω
BTL connection	:	8 – 16Ω
Harmonic distortion at rated power	:	0.5% at 1 kHz
IM distortion at rated power	:	0.8%
Power band width	:	20 – 30 kHz
Frequency response	:	15 – 50 kHz –1dB
Channel separation	:	50dB at 1 kHz
Input sensitivity for rated output	:	Phono 3.0mV, Aux 150mV, Tape play 150mV
Equalizer	:	RIAA (Phono input)
S.E.A. control range	:	±12dB
S.E.A. center frequencies		40, 250, 1000, 5000, 15000 Hz
Signal to noise ratio	:	Phono 65dB, Aux 70dB
Bass control	:	± 10dB at 60 Hz for Rear Channel
Treble control	:	± 10dB at 10 kHz for Rear Channel
Loudness control	:	10dB at 50Hz, 6dB at 10kHz
Damping factor	:	Greater than 30

Control Section

Selector	:	4 Ch AUX-1, 2, Phono, FM Auto, FM mono, AM
Volume	:	Front/Rear
Balance	:	Front/Rear
Mode	:	Mono, 2CH, SFCS1, SFCS2, 4CH
S.E.A. system	:	(Front)
Tone control	:	Rear (Bass & Treble)
Loudness	:	4CH (Front/Rear) Push-button
FM Muting	:	Push-button
Tape Monitor	:	Front, Rear
Speaker SW	:	Front, Rear, 4CH reverse (180 degrees)

Jacks & Terminals

Headphones	:	4CH. Jacks (Front and Rear)
Tape monitor	:	4CH. RCAPin Jacks (Front and Rear)
Tape out & P/B DIN. type Socket	:	DIN Socket (FRONT)
Phono	:	2CH
4CH AUX 1, 2	:	4 CH x 2
FM-out	:	FM Det-out
Speaker output	:	4 CH
Remote control jack	:	Yes (w/Remote Control SW)

Indicators

FM stereo	:	Yes
Tuning meter	:	Yes
Fine tuning	:	Yes, w/dial needle (Bull's Eye)
Antenna terminal	:	FM (300Ω), FM Int. AM
AC outlets	:	Switched x 1, Unswitched x 1

FM Tuner Section

Tuning range	:	88 – 108MHz
Usable sensitivity	:	2.0μV
IF amplifier	:	5 stages
Image rejection	:	60dB
T.H.D.	:	0.5% at 1 kHz. 100% Mod.
IF rejection	:	90dB
Capture ratio	:	2.0dB
Selectivity	:	65dB
Signal to noise ratio	:	65dB
AM suppression	:	50dB

FM Multiplex Section

Separation	:	Better than 35dB at 1kHz
Distortion	:	1% at 1kHz
Carrier leak	:	50dB
SCA rejection	:	50dB

AM Tuner Section

Tuning range	:	535 – 1605 kHz
Usable sensitivity	:	30μV
Image rejection	:	45dB
IF rejection	:	50dB
Selectivity	:	20dB
Antenna	:	Built-in Ferrite Core Antenna
Power Source	:	AC 120V, 50/60Hz
Power Consumption	:	140W
Dimensions	:	Height 5-7/8", Width 19-3/8", Depth 14-3/8"
Weight	:	27.8 lbs.