

DIY

For the most advanced do-it-yourselfer, planning the construction of specialized audio equipment could begin at the Patent Office. This issue, Scott Varner tells you about the multi-channel-sound patents on file and how to get them.

UNCLE SAM'S DEPARTMENT OF QUAD -- R. Scott Varner

Actually, the title lies -- but I did want to get you attention. There is no government department by this name, but it is how I have come to think of the Commissioner of Patents Office. In the September 1980 issue of The QUAD Quarterly, Brian Moura casually mentioned that patent copies pertaining to Paramatrix techniques were available. I've been a hooked patent watcher ever since. There is an abundance of information from this source (and cheap!) just waiting to be taken advantage of.

The Patent Act of 1790 started it all. President Washington created legislation designed to protect inventors' ideas. At that time a staff of only twelve people handled it all, and only fifty-five patents were granted in the first three years. Today the efforts of twelve hundred employees pass sixty thousand patents annually. In return for government-assured protection, there is another equally important side and that is called "disclosure of techniques". The inventor is obligated to make public accurate details of his invention's operation. Obviously, the intent is to aid further progress by sharing ideas. For the interested audiophile, it serves to explain in depth the systems that re-create our music. Here you can find exactly how "Tate" differs from "Paramatrix", investigate Peter Scheiber's early techniques or learn about the several different forms of Vario-Matrix.

Another interesting point is who has patents on what. For example, Sony was known mainly for its SQ logic decoders, but they also invented a QS/SQ variable matrix circuit (#3,786,193) (Figures 1A and 1B). Shibarua Electric (whomever they are!) owns patent #3,864,193 for a Tate-like decoding system; compare it and the Tate DES in Figures 2 and 3. The research was committed to a Scheiber encoding formula but could have been used for others. Ben Bauer had a multitude of patents for CBS, including an encode/decode system different from SQ (#3,708,631), shown in Figure 4. The formula is quite close to what is currently used for cinema surround sound but ultimately was just a gain-controlled Hafler diamond.

Of course, JVC is there with their CD-4 techniques (#3,686,471) and so are others with even more bizarre surround-sound approaches. A good example is Berkovitz's patent #3,718,773. I'm still trying to wade through this one! It starts with conventional Pair-Wise-Mixing microphone techniques, eventually used to generate an Ambisonic type "B" format and continues to use relays as a demonstrative decoder! Another one is Motorola's "Gain Modified Multi-Channel Audio System" (#3,772,479). This grand-sounding method did not even try to re-create an intended soundfield. It allowed the log value of the left channel to modulate the right channel, and vice versa. One four-channel embodiment fed the original left total and right total signals to all four speakers and used the log value of left minus right to modulate the rear channels.

Readers of MCS Review are lucky; it is a source of news and

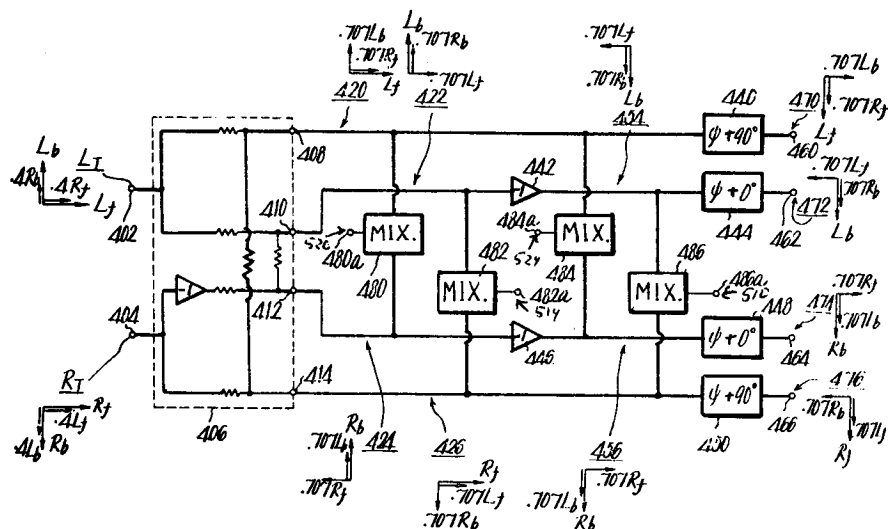


Figure 1A. Sony QS variable matrix decoder.

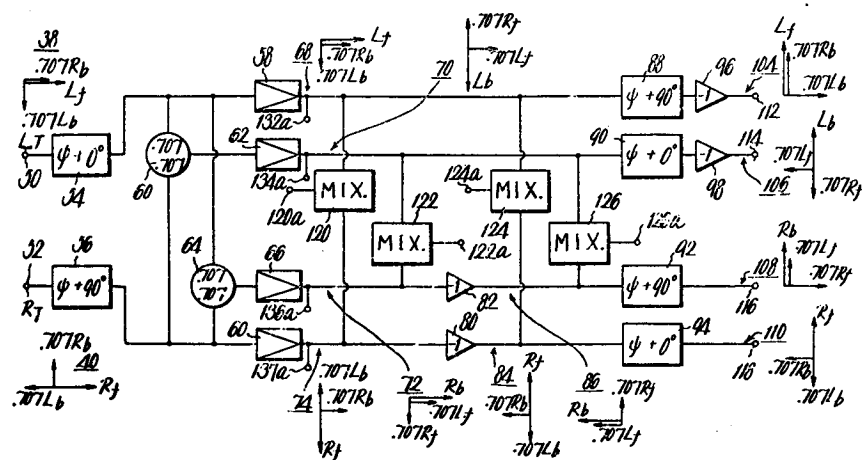


Figure 1B. Sony SQ variable matrix decoder.

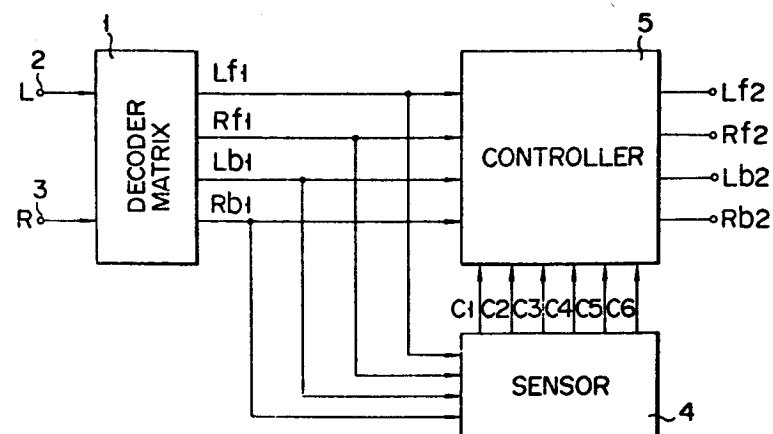


Figure 2. Shibarua Tate-like matrix decoder.

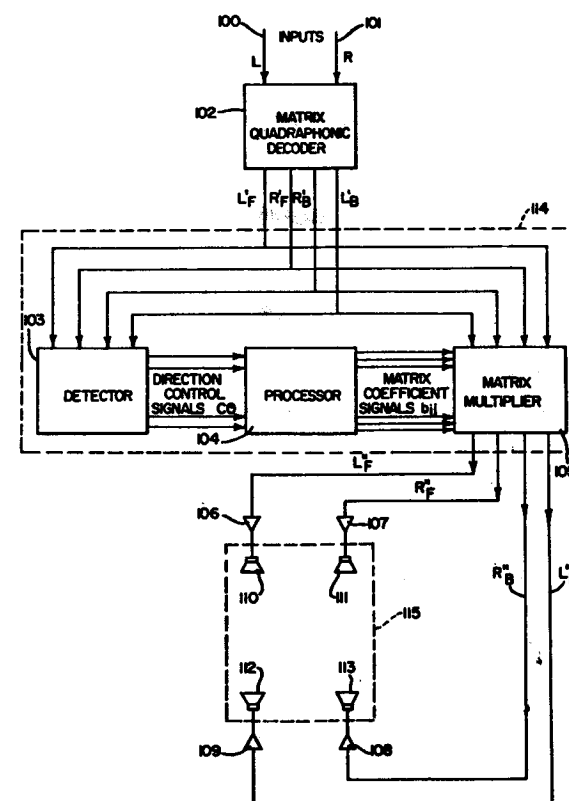


Figure 3. Tate Directional Enhancement System.

Multi-Channel Patents in the U.S. Patent Office

- ✓ #3,632,886 Scheiber: Quadrasonic Sound System
- ✓ #3,646,574 Holzer: Compatible Stereo Generator
- ✓ #3,684,835 Orban: Four Channel Stereo Synthesizer
- ✓ #3,686,471 Takahashi: System for Recording/Reproducing Four Channels on a Record Disc (CD-4)
- ✓ #3,708,631 Bauer: Quadraphonic Reproducing System with Gain Control
- ✓ #3,718,773 Berkovitz: Four Channel Recording and Reproducing System
- ✓ #3,746,792 Scheiber: Multi-Directional Sound System
- ✓ #3,772,479 Hilbert: Gain Modified Multi-Channel Audio System
- ✓ #3,786,193 Tsurushima: Four Channel Decoder with Variable Mixing of the Output Channels
- ✓ #3,794,781 Bauer: Four Channel Decoder with Improved Gain Control
- ✓ #3,798,373 Bauer: Apparatus for Reproducing Quadraphonic Sound
- ✓ #3,812,295 Bauer: Quadraphonic Reproducing System with Gain Riding Logic
- ✓ #3,821,471 Bauer: Apparatus for Reproducing Quadraphonic Sound
- ✓ #3,825,255 Bauer: Matrix Decoders for Quadraphonic Sound Systems **3,835,255**
- ✓ #3,825,684 Ito: Variable Matrix Decoder
- ✓ #3,892,615 Hiramatsu: Quaternary Stereophonic Sound Reproducing Apparatus **3,829,615**
- ✓ #3,836,715 Ito: Decoder for Use in 4-2-4 Matrix Playback System
- ✓ #3,864,516 Kameoka: Four Channel Sound Reproducing System
- ✓ #3,943,287 Gravereaux: Apparatus and Method for Reproducing Four Channel Sound (CRS paramatrix system)
- ✓ #3,944,735 Willcocks: Directional Enhancement System for Quadraphonic Decoders
- ✓ #3,971,890 Bauer: Quadraphonic Enhancement of Stereophonic Signals
- ✓ #4,018,992 Olson: Decoder for Quadraphonic Playback
- ✓ #4,063,032 Willcocks: Constant Power Balance Controls for Stereophonic and Quadraphonic Systems

* WRONG PATENT #

current information in the field of surround sound, and it is here where patent data is lacking. Most patents offer information in the historical sense, the only recent ones pertaining to the Tate system. Ambisonics is a currently developing area, but they seem to hide their patents for no good reason. (C'mon! Anybody out there with patent numbers for Ambisonics?) Despite these drawbacks, if you would like to order some copies, it is extremely easy. Send the patent number plus fifty cents for each one (which includes air mail postage) to: Commissioner of Patents, Washington, D.C. 20231. Normal Waiting time is about two to four weeks.

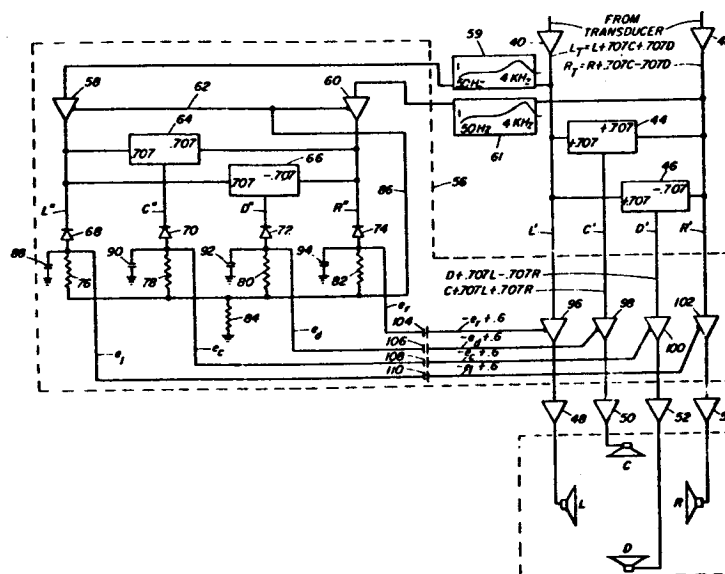


Figure 4. Early Bauer system.

Now I'd like to mention another highly valuable source of information apart from the Patent Office. This is the anthology on Surround Sound compiled by the Audio Engineering Society. Titled Quadraphony, it has two hundred and sixty-four pages relating to quad up to the mid-seventies. This is a great place to read about Duane Cooper's BMX (UD-4) system, the replies of Michael Gerzon (of Ambisonics fame), or discover there was a system called the "New Orleans Matrix" by Ben Bauer. FM broadcasting is well-covered, as is CD-4. Also of interest are the many tests made on hearing in regards to phase, amplitude and time. For non-members the price is rather steep at \$22.00 including postage. Order copies from: The Audio Engineering Society, 60 East 42nd Street, New York, NY 10165.

Most audiophiles are not that interested in the intimate workings of circuitry, as it is most fun just to buy based upon manufacturers' claims and listen to records. The payoff for invested effort comes when you make a knowledgeable purchase. After all, you might be able to spend \$500 on a decoder, but can you afford to lose it on one that doesn't do what you expected?
