

feared); for others, such economy lines as Camden, Richmond, and Telefunken are the answers for wants satisfied.

Some reconsiderations are clearly in order, in order to maintain a substantial support to a superstructure now in transition; as the old names are replaced by new, as a new public comes of age and its buying preferences mature the senseless duplication of the repertory should at least be resisted within corporate entities (EMI's divisions, for example, or the Columbia-Epic affiliation, if it persists, or by RCA on its own label where three B flat Concertos of Brahms appeared in less than as many years), if only out of self-interest. For the repertory is the only real perpetual property, and over-exploiting it is as sure a way to exhaust the soil as planting the same crops again and again.

The same self-interest should, sooner or later, lead to the inescapable conclusion that the present oversupply is intolerable for everybody—save, perhaps, the Bamberg Symphony, the NWDR Orchestra, or others who participate in the performances. The producers are hard put to match each other in getting to market with their “latest” before it is overreached by somebody else’s even “later”; the retailer cannot possibly maintain an inventory covering half the “available” or listed duplications of Beethoven, Brahms, Tchaikovsky, or Mozart, with the result that the consumer is often frustrated in his true wants and must settle for something else, or goes away unsatisfied.

It is, finally, the public that will determine the course of events. *SR* invites those with a buyer's view of the situation to express it through the Recordings Editor. Perhaps such collective wisdom will produce some answers not available to the best individual brains.

Meanwhile, isn't it in order for someone to echo the English pub cry on behalf of the industry and say “Time, gentlemen!”?

## Stereo Comes to FM: Part II

By JAMES CARROLL

SINCE publication of Part I of “Stereo Comes to FM” (*SR*, May 27, 1961), inquiries regarding the new system of Multiplex FM Stereo Broadcasting recently approved by the Federal Communications Commission have pyramided with each passing week. No doubt the promise that this type of broadcast, long awaited, was about to become a reality has stimulated the appetite of those disposed toward both FM and music.

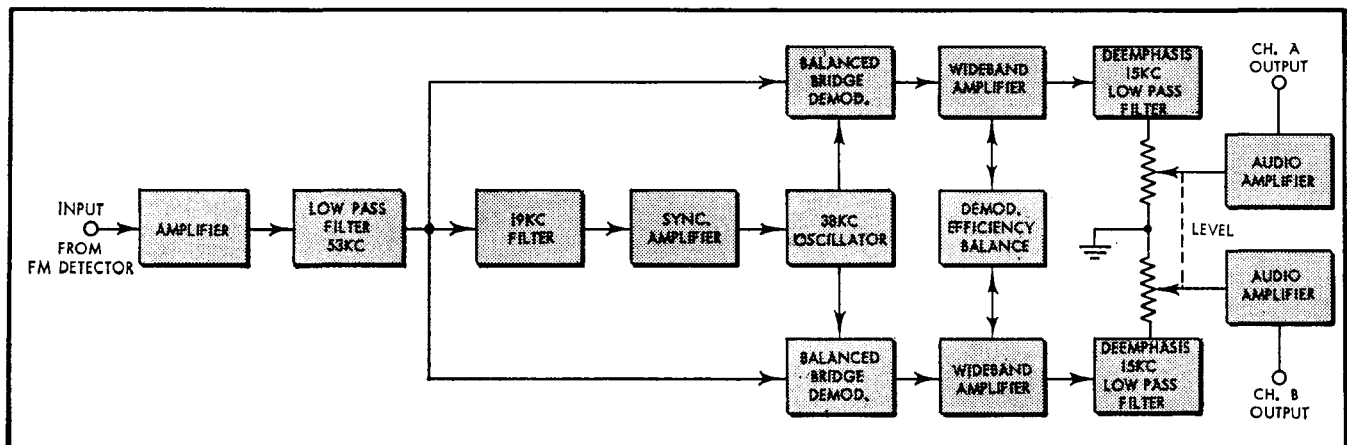
Indeed, a historic moment was achieved on June 1, at 12:01 a.m., when WGFM, the Schenectady, New York, station of General Electric, went on the air for the first time with an FM multiplex transmission as approved by the FCC. The Radio Corporation of America is only one of several manufacturers that have prepared equipment for use by FM stations that want to add multiplexing to their services, and it is certain that more and more will be providing programs as the months pass. An interesting feature of the RCA system, as announced, is that it will provide, from one stereophonic source, a multiplex FM broadcast signal, a monophonic FM signal, and also a signal for AM.

The new MPX (the approved abbreviation for multiplexing) method of broadcasting allows, for the first time, the transmission and reception of perfectly balanced FM stereo sound. FM, as we have always known it, has been preferred for quality broadcasting because of its full frequency band pass

of 15,000 cycles, the approximate hearing range of the human ear (at its most acute, before deterioration incident to aging sets in). It is also virtually free of all man-made intrusive noises, the familiar producers of static and intrusions on AM such as air conditioners, refrigerators, fans, electric shavers, etc.

It must be remembered that, because of the nature of our hearing mechanism, what is heard in the left ear (in point of quality) is also heard in the right ear. That is why it is so important that in broadcasting, both channels should be transmitted and received in identical form. Previous experiments with broadcasts of stereo were unsatisfactory because—for reasons of limitations of equipment, both for broadcasting and reception—one channel was distributed on AM, the other on FM. The limitation of this was inherent in the factors just mentioned: noise on the AM side, plus the limited frequency band pass that was in the area of 7,500 cycles rather than the 15,000 available to FM.

The reason this FM-AM method was even experimentally used is that many stations already had both transmitters in operation. It merely meant having the panel program material on both carriers transmitted simultaneously. One notable example of this was the New York *Times* radio station, WQXR in New York. The Crosby System is another method tried in stereo broadcasting. It uses FM on both channels, but unfortunately, like the AM method, it fell short of proper sensitivity on the monophonic signal. It must then become



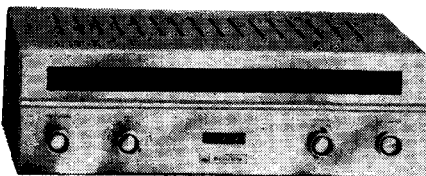
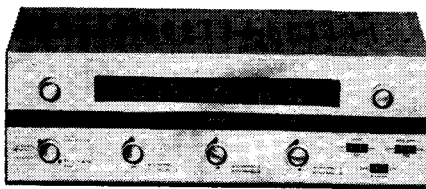
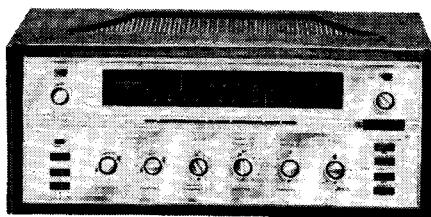
Circuit Diagram for a Multiplex Adapter.

apparent to the reader that some improved stereo broadcasting method had to be developed. This is where the new General Electric-Zenith System comes in. It has an FM signal on both channels. The frequency band pass is 15,000 cycles on both channels and has excellent channel separation. This is vitally important for the stereo effect. The diagram accompanying this article shows how this new signal is transmitted and then received in your radio.

The hi-fi owner who is already equipped to play stereo tapes and records can now add stereo broadcast to his system. The simple addition of a multiplexer coupled to his present FM tuner will bring this about. The MPX then becomes the second channel in the stereo tuner. At this point great care must be taken in the selection of the proper MPX unit, so as to create an exact match. It is much like buying an automobile tire. If your car calls for a 600x16 tire you cannot use a 700x15.

In the many brands now coming on the market, there are marked differences. Some are preset and can be attached to the FM tuner and then tucked away out of sight; others have specialized controls with blending circuits, automatic MPX signal lights, on-off switches, and must therefore be in view.

The over-all general size is somewhat smaller than your present FM tuner. The cost will also differ between



Three models of AM-FM stereo tuners with Multiplex circuits built in (all by Bogen). Nos. 1 and 2 are completely self-contained tuner-amplifier units. No. 1, Model RP 40A, has 22 watts output in each channel, frequency response to 30,000 cycles (\$399.95). No. 2, Model RP 200, has 20 watts output in each channel, with frequency response to 20,000 cycles (\$299.95). No. 3, Model TP 200, is an FM-AM tuner only, with frequency response to 18,000 cycles (\$199.95).

brands, ranging from \$39.95 to about \$100. (See the chart for a listing of companies already in production that are either making delivery now or are contemplating doing so in the next thirty to sixty days. Some of the big names in audio are still working on prototypes, or are considering some changes in automatic controls—names such as McIntosh, KLH, Dynaco, and others.)

Some new words will appear in the language of the lay person when speaking of stereo FM, words such as "pilot sub-carrier," "cross-talk," "stereo sub-channel and sub-carrier," "L+R signal and L-R signal."

As time goes on the actual meaning will become more and more important, because the user will become sensitive to what this new signal is like and also to how it comes about. Much will be written about this new medium from now on. It no doubt will have a great effect on our musical listening habits. Hi-fi enthusiasts will now be able to look forward to many hours of unsupervised listening. The "live" opera and symphonic broadcast and the once-in-a-lifetime show can be now enjoyed (also tape-recorded) in full stereo sound. This will prove an extra boon to owners of good stereo recorders. It will now be possible for radio stations to play their vast libraries of stereo records and tapes, whereas in the past they were limited to the monophonic type only.

Brand	Price	Size	Exposed Face	*Front Controls	Self-Powered	Automatic
Bogen PX 60	\$69.50	4-1/16 x 3 3/4 x 8-1/16	yes	yes	yes	no
Crosby MX 101	\$69.95	5 1/4 x 4 1/4 x 9	yes	pilot light 3 controls	yes	no
Scott #335	\$99.95	5 1/4 x 7 x 13	yes	2 pilot lights 3 controls	yes	no
Pilot #200	\$79.50	5 x 3 x 14	yes	pilot light	yes	fully
Pilot #100	\$49.50	4 1/2 x 5 x 9	yes	on-off	yes	no
Fisher MPX 100	\$89.50	4 1/4 x 4 1/4 x 12	yes	2 pilot lights 2 controls	yes	fully
GE MA2G	\$39.95	3 x 2 1/4 x 10	no	none	yes	no
Sherwood S3MX	\$69.50	5 1/4 x 4 x 10 1/2	yes	yes	yes	no
Sherwood A3MX	\$49.50	tube style	no	no	plug-in	yes
Sargent- Rayment	\$79.50	3 3/4 x 9 x 4 1/2	yes	3 controls	yes	no

\*Control features appearing on different face panels constitute

- a) on-off switches
- b) filters for main- and sub-carrier signals
- c) blend and volume controls
- d) signalling plus pilot lights

} Manufacturers' brochures show all these in detail

# Quality Standards for Broadcasters

By JOEL TALL

**T**APE enthusiasts have been complaining for years about the poor quality of radio broadcasts while at the same time recording broadcasts that appealed to their fancies. Now that the Zenith-GE version of multiplex FM broadcasting has been approved by the FCC, our brethren in tape will presumably begin to gripe about the quality of what is called—with more or less truth—stereo broadcasts. The question now before the house is whether the recording of stereo will impose any new difficulties on us and, more important, whether it is worth while.

There is not much that is new about recording stereo sound on tape from a tuner. Where you had one of everything before, you now have two—and record *two* tracks of sound in the same space where *one* was recorded before. There is less room now for sloppy design in the tape recorder—especially in the drive—and less latitude in recording at proper sound levels. However, if you know how to record from a single tuner you should have no difficulty recording in tandem from what is essentially two tuners: the FM tuner and the multiplex adapter that extracts the complementary stereo signal from the composite FM broadcast.

Stereo, I think, is worth while, because any improvement in listening quality gives us more pleasure, even though the improvement may prove, in some cases, minuscule. Some people seem, however, to be under the misapprehension that with stereo they will be transported aurally to the concert hall itself. That is not true, and advertising writers do us no service by implying that it is the case. Listening to stereo, even with ideal loudspeakers ideally spaced in an ideal room, cannot be the same as listening in the concert hall. Listening to stereo broadcasts through earphones could be appreciably more realistic, but that is another situation entirely.

The real point at issue is not whether stereo gives us that old concert-hall feeling but whether it satisfies our sense of hearing. It does, to me, but only if over-all distortion is low. Of course anything that changes sound in any way from its original form can

be called distortion. Good music itself could be called the product of several kinds of distortion. Completely “pure” tones are not created by musical instruments and are not a pleasure to listen to.

But, on the other hand, once the music is created, additional changes distort it and these additional distortions should be reduced or eliminated for the greatest listening pleasure. Some distortions we ourselves can control by erecting good antennas, by tuning receivers exactly, by choosing good components and using them properly, by getting good acoustical properties in the listening room.

Before proceeding, there's another mistaken idea I'd like to scotch: namely, that an inexpensive recorder, running at slow speed, can give good results for music. Tape flutter, which produces a kind of distortion, is *least* at the recorder's *highest* tape speed. You can't get something for nothing, in tape recording or in anything else. Use the highest tape speed for the best possible recording and reproduction. Just by doubling the speed of the tape you can reduce distortion by more than half.

It is said that the average ear is not disturbed by approximately 5 per cent distortion. In a good system, beginning with the tuner and ending with the loudspeaker, you are skirting the edge of recognizable distortion. FM, incidentally, does not appreciably reduce any distortions but one, that of frequency distortion. FM gives us all frequencies alike, where AM is restricted because of its nature to a comparatively narrow audio-frequency band.

I have predicated the above amount of distortion upon live FM broadcasting, properly originated. That means local transmitter broadcasting of live sound originating in a well-designed studio or hall and sent to the transmitter via a high-quality line. I take it for granted that there will be a qualified broadcast audio technician controlling what is broadcast and that the quality of the sound is not additionally distorted by an automatic level-controlling amplifier. Audio quality of this nature seems to be rare in this country and getting rarer every year. Even when listening to local FM transmissions, one's hearing is abused by

music broadcast in poor acoustical surroundings, by tapes poorly recorded or reproduced, or by discs that should have been discarded. At a distance from the live sources audio quality has deteriorated to the point, sometimes, where distortions are unbearably high and where music, especially, bears little relation to the original sound.

It seems to me that there has been a general deterioration—not universal, but general—of the quality of sound broadcasts in this country. Some of it, I am informed, is due to poor quality lines for the transmission of radio programs across the country. It appears to me that our Federal Government, in its quest for ways to improve our broadcasting, should not overlook the fact that millions of people are being deprived of their rights to listen to high-quality broadcasts, regardless of the distance from the source, within the country. “Live” stereo with TV, for example, will have to contend with limitations in the telephone lines available at present.

**T**HIS unfortunate situation is partly due to the cost of top-quality program lines. Radio broadcasting is a business that no longer, it appears, can afford the luxury of buying the best possible facilities for the transmission of sound. Yet the public certainly is entitled to get the best there is, and just because one lives 2,000 miles from New York one should not be penalized by having to listen to distorted music being broadcast from New York and transmitted over inferior lines.

The only way out of this impasse that I can see is for the Federal Government to provide a radio transmission service free of charge for, at least, educational and musical broadcasts, if not all broadcasts. Any one, or more, of several methods could be employed:

1. Point-to-point FM transmission on several bands that could also function in emergencies as an additional radio warning service.
2. Best quality (low phase, frequency, and harmonic distortion) circuits to regional FM Transmitters.
3. Use of TV video lines during TV off hours to permit top quality tape recording of programs for delayed retransmission by local FM stations—and AM stations too, for that matter.

I have merely outlined the evils of the present system. If we ever are to get high-quality broadcasting all over the country—stereo or monaural, FM or AM—broadcasting that is worth recording on tape for home or educational use, the system has to be considerably improved overall.