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AMPEX

Comments by Mark Durenberger 6/7/03

My guess is that the WCCO Master Control (“M-C”) photo was taken late 50's or early 60's. The Ampex 350's would set the date; they were probably new when this photo was shot; the metal reels in use were early versions. (A few years later, WCCO engineers milled the tape reel hubs a few millimeters narrower, to eliminate tape wrap.)

You can see only 7 of the 12 racks in Master Control. The first two unseen racks containe monitor and control gear for the Western-Electric Doherty transmitters, including a custom-built remote-control system. They also held what was cleverly called the “Y-Amp”…what today we call a ‘1 x 2 D.A’. These fed separate phone lines to the transmitter. The audio left the studios at a nominal +24 DBM! (WCCO had an understanding with the phone company ☺.)

The first few racks also contained several bays of RCA tube amplifiers (these were the guys with the chrome-plated transformers). These amplifiers supported the various passive studio-based mixers. Note that the amplifier bay swing-down doors are made by RCA…but have tiny "CBS" labels. Those tube-amplifier bays were replaced in the mid 60's with RCA “BA-series” solid-state amplifiers; that ‘upgrade’ meant less down-time for tube testing…but it was the first step toward adding serious grunge to the audio.

Rack 4 held the famous "Studio 5" mixer you see just above the table. “Studio 5” was the name for both the main announce booth and the “studio mixer” that was the heart of the station. The Studio 5 mixer had 3 mike faders; one in a news booth and two in the main announce booth. One fader was CBS Radio, one was an "ET Bus," the others were for remotes and telephone. The mixer itself was passive; electronics were in adjacent racks. I'll come back to the ET bus; it's pretty interesting. Again…this was all passive; support electronics are above the mixer.

Beneath the first three lever keys (the mikes) were on-off switches, overriding the booth mike controls. Urban Legend: These switches were known as “Union Controls” or “Defense Overrides”. Engineers could shut off mikes if need be….the concern may have been guarding against a takeover of the studios by ‘hostile entities. End of Urban Legend Why not just turn down the faders?

Astute viewers will note the difference between the M-C photo and a latter-day view of the Studio 5 mixer. A dedicated fader replaced “Master” with an input from the State Fair, where WCCO had a seasonal studio. The “Monitor” fader was replaced by a white “telephone bus” sometime in the late 1960’s. This phone bus was pretty unique for its (pre-hybrid) time; it allowed entry to the phone system from several sub-consoles. This meant you could mix a show from one studio with programming from another, adding the phone, without further assignments or patching.

Rack 5 (with the clock) held the output distribution “Pre-selector” and controls for the three main monitors in the control room. The monitors were physically separated across the room so as to be available for either foreground or background monitoring, dependin on the duties of the moment.

Beneath the monitor controls is the 6 x 5 “Pre-selector”. This was a passive switching matrix used to assign up to 6 sources to up to 5 outputs. You could "pre-select" a scheduled feed-combination of several studios to several outputs, and at the "take" moment you'd push a single button, for a salvo switching to the new feed combinations. The 4 VU meters and their attenuators monitored outbound trunks fed by the "studios" grabbed by the pre-selector. Nothing new here; this idea was in use at many other stations and is the basis for modern routers’ “salvo” technology.

“Channel 1” from the Pre-selector was the feed to the transmitters. During the Conelrad/Civil Defense days there was an interrupt amplifier located in the newsroom; a newsman could lift a mike off its pedestal and interrupt Channel 1, going directly to air.

Note the absence of any audio processing. Programming was fed “barefoot” to the transmitter where it was protected by General-Electric BA3 and BA-5 limiters. The only other audio modification was a 50 hz. high-pass filter at the transmitter that kept DC clicks and thumps from dumping the Dohertys. Eventually a Gates “Level-Devil” was trie (ouch!) and that was replaced by the venerable CBS Audimax.

Rack 6 contains the remote-loop selectors and equalizers. Note the passive equalizers near the top where you could 'dial in' "L" and "R" using the rotary switches. At the very top was an assignable band-pass filter and pad. The white rectangle was a ‘note pad’ where you’d post your settings for the next guy to use on that same remote.

Using three-way lever keys, 12 telco trunks could be fed “program cue” or used as the inbound channels. Associated keys allowed you to ‘group’ remote lines so that for example you could associate a “cue” line with an inbound program line…as well as (ancient history) a “go-ahead” dry pair…this from the days when a telegraph key would b used to transmit the famous go-ahead “K”. The selected inbound loop(s) could be equalized and assigned to either the "X" bus or the "Y" bus. The "X" Bus appeared on the Green fader on Studio 5; the "Y" Bus was meant for off-air pre-alignment but could also be patched to air. 12 trunks was more than enough for us to handle; the phone company test board had dozens of others ready to be "funneled down" to these 12.

At the bottom of rack 6 is a row of telephone trunk keys complete with ring-down arrangements. Push a key UP to grab one of the handsets beneath the table; pull down t grab the other. "Ring-down" push-buttons allowed you to instantly connect to the local telco test board. It wasn’t unusual during a remote set-up to have a phone in each ear. (And I remember those were HEAVY handsets!).

Also...speaking of phone loops...you can't see the several "monitor" amplifiers that drove telco dry pairs to various agency and sponsors' offices around town. These offices had a monitor amp/speaker, sometimes used not for off-air listening but to 'preview' (and approve?) a show originating in one of the studios.

In the days before adaptive hybrids, WCCO did a lot of pioneer work in what was known as "balanced-level" phone-mixing. We actually re-created AT&T's telco repeater technology; even called them by their geographical ports (Repeater East" and "Repeater West"). We got very good at mixing mike and phone to air. It required constant gain-riding, but the phone quality could be very good. In fact, engineers pushed hard to get reporters to use special screw-on "mouthpieces" to further improve phone quality.

Rack 7 has some test gear below the Ampex; top to bottom: an attenuator panel, oscillator and passive distortion bridge. Rack 8 MAY have held an input panel for the M-C disc cutters replaced by the Ampexes. You can also see some meters that were used to test tube conditions in the amplifiers without taking them off-line.

The gear in the top half of rack 8 is a mystery to me. But directly between the Ampex electronics can be seen the panel with tape-input selectors, "on-air" "B-Keys" and separate cue/monitor controls.

At the very bottom of rack 8 is a typical "A/B" switch that transferred the rack's DC control voltage from 'regular' to 'emergency.' (I have to tell a short story: That switch go us in serious trouble one night in 1967 when we lost power during a tornado. The janitor had bumped a similar switch under rack 3; controlling mike relays. Because it was under the table we didn't see that it was in the wrong position. When the storm came through and the power barfed, the emergency power came up fine; studio lights worked; amplifiers and VU meters were lit up. But we couldn't get the mikes on! We got back on by scrambling a Collins remote amp, patching directly to the transmitter feed and handin a mike to the talent who worked from M-C for the duration. I had been there three months…and received ten years' worth of experience that night.)

The bottom of Rack 8 contains what looks like the remains of the power supply, audio-assigns and tube analyzer for the original disc-cutting equipment. There were two more racks on that end (10 and 11). They contained monitor amplifiers and a third Ampex 350 (Another story: Freddie Hermann was an engineer about 5 feet long, whose last duty of the day was to go to rack 11 to record the 5PM CBS news for playback at 5:10. Freddie needed a step-stool to reach the Ampex. He'd climb aboard, set the recorder in motion and leave. The only problem is, he'd also leave the cue speaker on (wide open because he was hard of hearing). No problem; there was nothing on the net at that point. 5PM was a VERY busy switch time; straight up, just as you were swinging into the major local newscast, the CBS news would come booming out of the cue speaker Freddie had left wide-open. You'd dive for the rack to dump the cue amp….usually stumbling over Freddie's step-stool in the process.

The M-C photo was taken by someone standing near the turntable bay. There were 3 of the old RCA ‘knuckle-crackers’ in a row, far enough away from the racks to require a chai with good casters if you were alone (overnight). These turntables were later upgraded: Each was given two 16-inch pickup arms; one had a 3-mil stylus to play the acetates tha we used to record all of the spots; the other was a 0.7-mil pickup arm for stereo vinyl. (WCCO had an affair with carts very early on...and got burned by lack of reliability. So they stayed with cold-stylus acetate until the new control room went on the air in1977!)

Each turntable had its start switch on its own “B-Bus” fader. A twist of the knob put the turntable on the air. The RCA turntables had a terrific ‘wow’ at start and if you spun the fader up quickly that ‘wow’ went to air. Most of us learned to fly-cue…or if one-handed (the other holding a cigar), we would come just out of detent to start the table, take a breath and then open the fader.

Each of the three turntables (and, in fact, each of the dozen or so tape machines around the place) had its own cue amp, volume control and speaker. Again...the spatial separation of the speakers and their location next to the appropriate machine helped the engineers when it got very busy in that room.

In the complex of the 60's the 'transcription equipment" (tape decks in various rooms an the turntables in M-C), were interconnected via the afore-mentioned "ET Bus." That bus was a low-impedance balanced "trunk" that circulated among the studios and ended up i the Studio 5 mixer panel. Any tape recorder anywhere in the complex could immediately go 'live' by operating the “B-Key” next to that machine. When not on-air each location’s “B-Key” was back-loaded by an equivalent resistance. The “B-Bus” was very useful when a lot of audio was coming in from different directions and we had to get it to air quickly.

Studios that worked in conjunction with M-C’s “Studio 5” were: “Studio 1” (decommissioned by this time); “Studio 2”, the audience-participation studio, “Studio 3”, the edit/production studio and “Studio 4”, primarily a recording control room. 1 and 2 used passive mixers and 3 also had an active console (RCA 76B-2). 4 had a Collins 212.

There's much more to these stories…it was a fun place to work. Over the years there wa a lot of human-engineering built into the operation. There were always five ways to do something…overly-complicated by today’s standards but a comfort in the days of potentia tube failures.

Driving a station with a 55% share of the audience, we did a lot of on-air engineering by the seat of our pants. But we had the tools to do it.

Mark Durenberger