Review Questions

If hired into a studio that is completely unmaintained for years, and had to get it going.

What would you calibrate first? Oscilloscope.

Then, waveform monitor and vector scopes. Right now, substitute oscilloscope for waveform monitor.

If you have a good signal generator, you can align monitor first. But, those are bad too.

So, first thing, can color balance our cameras with the oscilloscope as a waveform monitor, since can look at thickness of lines of gray scale to color balance. If don't have subcarrier on a black-and-white subject, then have white balance.

Studio production, need quick shot of bears in pond in front of administration building, what's the first thing to do to the field camera?

White balance.

Director wants best audio, so plug condenser microphone in, not working even when crank up audio volume

Turn on phantom power. Could damage a dynamic microphone.

When white/color balance a camera, what is the physical thing we remove from the video signal?

Subcarrier.

What are axes on the B-H curve?

Magnetic field and current through the coil.

No tally light on camera, so where start looking for problem?

Start with the call button. Next, check the video switcher.

The switcher can command the server to start recording or playing. What command is it from the switcher that does this?

The tally.

There are tallies that connect from the switcher to the monitors on the bridge.

Intercoms

We need to know about this stuff.

Intercom is two-wire system. One wire is ground, the other wire carries?

Audio and power. Audio rides on the DC power. Intercom runs on 30VDC. 1 volt of audio runs on the DC. 31 to 29 volts reserved for the audio. 30 volts used to power the belt packs.

In power supplies, ripple rides on DC. Remove ripple with capacitor. The ripple will feed into the audio of the intercom and mess it up. Put 30 volts into a regulator, get 25 volts out without ripple. That's how they separate the power from the audio (take the audio out of the power). Diagram 1. Use capacitor to block DC to get the audio. Ensure the voltage drop across the regulator is greater than the maximum swing of the audio voltage. It could be that the regulator drops it down to 12 volts, and the 30 volts is to reduce voltage drop on long lines.

Won't your audio be too loud in your earphone?

Sidetone controls what gets fed back from your microphone to your earphone/headset. We need a little bit for us to think it works. Long time ago, would not get any sidetone on telephones.

More Questions

If have a chart (diagram 2) that has a white window in the middle, what would the WFM show on the line rate (to show a single line)?

Must know what the WFM will show for the various test charts we use.

If were looking at the entire field, we'd see a solid line at 7.5 all across the line, with also a line at 100 in the middle.

The pilot used in FM is at what frequency in baseband?

19 kHz. Used for? Reference for the L-R, which is amplitude modulated on the subcarrier at 38 kHz. The 38 kHz subcarrier is suppressed. Why send pilot at 19 kHz? If no carrier, local oscillator drifts and get a warbly sound. Send the 19 kHz reference on the signal, double that to get 38 kHz. L+R and L-R are both amplitude modulated baseband; we frequency modulate the entire complex of signals and transmit that. If the receiver doesn't hear enough 19 kHz pilot, it won't attempt to decode/demodulate the L-R and thus won't give you FM stereo (and make the little FM stereo light go on in your receiver).

Why not transmit two FM carriers, one for L+R and one for L-R? Expensive transmitter to transmit two carriers. Probably would add expense to receivers to have two tuning circuits and IFs.

Long time ago, used to have a 15 second delay in the mono-to-stereo system in FM receivers, just to give you the idea of the difference between mono and stereo.

Remember this is baseband. The 0-15 kHz segment is just audio, not modulated on anything, because those are the audio frequencies. In order to add another audio signal (the L-R) onto this baseband, we

AM it onto that 38 kHz carrier; we can't just drop it into 0-15 since that's taken up by L+R.

TV has four carriers: 1.25 MHz video, 3.58 MHz color subcarrier, 4.5 MHz FM sound, 4.5 + 2 * 15734 (31468 Hz) pilot for FM stereo signal which is AM'd onto the FM sound carrier. The 4.5 MHz FM audio carrier is considered a subcarrier of the 1.25 MHz picture carrier. Pilot frequency for TV FM audio is the horizontal oscillator frequency (15734 Hz).

If we have a bandwidth for FM, and the 4.5 FM carrier is above the video carrier which is 1.25 (putting the FM carrier at 5.75), and we have a pilot at 15734 (5.765734 MHz), we have a guard band at the top of about 200 kHz.

Know TV channel allocations; have them in black book.

VTRs

Dynamic Braking

Opposing force between the two motors on the two reels. To stop a fast forward, move some of the energy from the takeup reel to the supply reel. Pull back on the tape as kinetic energy (momentum) moves the tape forward. It is on the opposite reel from the reel taking up the tape.

Tension controls the tape during play. Change the torque of the motor, that's why it is called tension not dynamic braking.

Monitors

HOT

Horizontal output transformer

Balanced Modulator

In balanced modulator (where? Monitors, camera encoders (QAM), and audio (L-R subcarrier is balanced out)), if have no modulating input and have carriers, then nothing comes out.

FM

Working at FM station, no modulating frequency going in, what comes out of transmitter? Carrier.

AM

Working at AM station, no modulating frequency going in, what comes out of transmitter? Carrier (no sidebands).

IF

Intermediate frequency. What is it? Used in receivers. All incoming frequencies are converted to IF.

Put the frequency conversions (IF sound and picture carrier frequencies) in black book. Allows for a sharp cutoff of a filter to pass the IF. 45.75 MHz video, 41.25 MHz audio.

CCDs

They are analog. The output levels are changing at an analog rate, not at a digital rate. They are sampled, but at a pixel position, not a discrete voltage. Voltages output by CCD are continuous within a range, not digitized.

Each pixel's information gets put through a capacitor to derive a continuous video signal from the individual pixel voltage values.

CCD advantages over tube: smaller, less power required, accept higher light levels, no registration problems, no time delay needed for warmup, last longer, no bias light, lower supply voltages

Tube advantages over CCD: image quality, choose your aspect ratio, tube may have better resolution, no screen door pattern (pixel pattern from spacing), no residual point noise (RPN) (that's the stuff that messes up CCDs, the cause isn't known, but it's known that the problem increases when the CCD is flown at a high elevation).

Fixing RPN: in camera, memory contains maps of where RPN exists, replaces bad pixel's value with a calculated value that incorporates the values of its neighboring pixels. When run out of memory, must send the equipment back.

Lab Review

Oscilloscope Demonstration