Camera Block Diagram (continued)

PR board

PR board contains the brunt of camera adjustments.

Gamma, knee, white and black clips. Adjustments are for each color.

Peak-to-peak should be about 1 Volt.

PR-49 on this camera.

AT board

Catchall – stands for automatic.

4 of them in this camera.

Memory on these boards to remember some of the adjustments on the camera.

Microprocessor controls some of the adjustments.

Auto-iris on the AT-29 board.

On another camera you might find a separate microprocessor board.

IF board

IF = interface board.

Interface from camera to viewfinder (an odd interface).

Zoom indicator, safety zone generator, center marker generator, box cursor generator.

EN board

Encoder board.

Color bar generator, Y matrix, I/V matrix, Q/U matrix.

What are V and U? These are the PAL versions of I and Q.

Do complete modulation on this encoder, so have composite coming out of the encoder.

Outputs RGB, R-Y, B-Y, composite. Not all of the outputs are shown hooked up to things in this block diagram; that's the choice of the block diagram publisher.

RGB connects to the BKP connector. This might be an adapter for multi-conductor cable.

PS boards

Power supply boards.

PS-53

DC to DC converter present, so we are running on something way over 60 Hz. More like 40 kHz.

6.3V for tube filaments: called heater regulator. This is a tube-type camera.

Focus voltages fairly high.

Additional power on other PS boards.

SG board

Sync generator.

Generating sync for free-running. Want camera to be sync'd from house sync traveling through triax.

Pulse generator goes to "conv trig" line, which feeds the DC-to-DC converter, so the converter must run at horizontal sync frequency (15734 Hz).

Audio on Camera

Some of this is for portable field cameras.

- Internal and external microphone lines.
- PL/intercom line.
- Talent's mic line – not used much, except for interviews and ambient noise – not really used for studio cameras .
- Headphone line.

Camera and the CCU has to be set up for the intercom system of interest.

Two systems of intercoms:

- two-line
- four-line

Often they take a lot of manipulation to get to work.

Summary

Cameras are three cameras in one (R, G, and B) that finally get combined by the encoder. Matrix also generates R-Y and B-Y. 3.58 MHz oscillator built in.

Triax

Triax brings house sync to the camera. If lose sync, will see a vertical roll.

Triax line also carries teleprompter info. Two names for cameras: companion (portable/small) and hard camera (big camera) and soft camera (the smaller portable).

240VAC at 60 Hz sent up from CCU. This 60 Hz is the lowest frequency sent across the triax. Have an external power jack (convenience outlet) to power; it's made for the US market so it puts out 120V (via a toroidal autotransformer – see diagram 1). That way a tech can plug in an oscilloscope at the camera at the end of a long run of triax without having to lug the camera back to somewhere there's 120VAC power. Power output is enough to run a scope and a monitor.

Two return video ports on the side.

A minus green port on the side. Registration alignment needs minus green.

Nothing in a camera is hot-swappable. Pulling out a powered board will destroy the board.

2 microphone inputs on the side of the camera.

BNC connector on the side of the camera. Says video out.

Older cameras you could use triax or coax. Coax was composite video only (no power), so you had to power the camera separately.

Triax cross-section

Diagram 2. Heavy gauge (so it won't break) on outside, then an insulating material, then a shielded braid, another insulator, another shielded braid.

Originally had multi-core, but had three major coaxes running down the line; that's where triax term came from.

All signal done by the center conductor. The two braids provide better shielding with less noise when flexed.

Modulate different signals at different frequencies on the cable. Various tank circuits on the camera separate out the appropriate modulated signals. Same circuit on each end, it just depends on if we are adding signal or extracting signal.

Return video is not the greatest quality. Just the camera operator will see it, so can handle insets so can aim/position the camera properly.

Numbers on the diagram are just for example and are not actual frequencies. Steve guesses that running into 100 MHz bandwidth or more for all the signals that are on the triax.

This modulating of multiple signals on different frequencies on one line is called **multiplexing**.

Some manufacturers use AM for some signals and FM for others. Differs among manufacturers.

Fail-safe system. 30 VDC comes to camera. Turns on circuit that sends a tone back. Tone received by CCU, knows that it's the correct camera on the other end, then turns on the 240VAC. If pull off triax, tone goes away, CCU stops transferring power. That's why you can pull off triax in the rain and drop it in a puddle on a golf match production without hurting anything/anybody. Problem if that tone somehow gets generated to fake out the CCU. This is why one can hot-swap a camera.

Adjustments to Cameras

Most of the work in adjusting a camera is balancing out the subcarrier.

Take more care on cameras since they feed signal to so many things that will then be wrong if the camera is wrongly aligned.

Ikegama cameras do not have a video out, so we have to run a coax from the CCU out so we can look at video for adjustments.

Automatic Beam

AB is abbreviation. Lots of beam current down the tube limits tube life, so AB limits the current to prolong tube life.