Tek's Type 140 and 520 figure in Apollo missions

While Bill Vandermay, chief engineer of KATU-TV looks on, Charlie Rhodes, IE Television, Low Frequency and Mechanical Instruments manager, discusses television system incorporating Tek's Type 140 NTSC Test Signal Generator and Type 520 Vectorscope, similar to those used by Apollo technicians to check fidelity of color transmission from moon-bound spacecraft.

When Apollo 10 and 11 sent color TV pictures into living rooms throughout the world Tek's 140 NTSC Test Signal Generator and 520 Vectorscope were part of the complex system that made this feat possible.

The impetus to include color TV transmissions during the above missions came largely from Apollo commander Thomas P. Stafford. There was a feeling that the American people and the people of the world had the right to be part of this momentous journey into the unknown.

Once the decision was made to incorporate color TV into Apollo 10, there were only a few short months to adapt a color TV system for the spacecraft.

What was needed was a camera that was lightweight, used little power and was able to operate both in the low light levels of the spacecraft, and in the high light levels of the lunar environment.

Westinghouse answered this challenge by designing a 15-pound camera that met all criteria and was able to do so in time by converting a black and white camera to a field sequential color camera by the addition of a CBS-developed color filter wheel to produce the color signal. Only the field sequential systems camera was feasible in term of the weight and size limits imposed on the camera for these missions.

However, the NTSC system is the system in use by the public in North America and Japan, so some sort of conversion from field sequential to NTSC color was required. This was done at a ground station.

During this time, Westinghouse was looking for systems-related equipment and at the National Association of Broadcasters show in March they saw Tek's recently-introduced 140 and 520 Vectorscope which are NTSC equipment.

The Westinghouse Aerospace Division of Baltimore contacted Tek's Baltimore field office and arranged through Dave Wilson (former Tek FE) to obtain a specially-modified engineering model of the 140, because none had been marketed yet.

Dave Frazel with Tek's Baltimore field office dealt with Dan Provine, Westing-

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Tek Type 140 checks color transmission on historic Apollo 10, 11 moon-flights

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house engineer, and Larkin Niemeyer, who designed the color camera.

The engineering prototype 140 was provided to Dave Frazel in Baltimore one week after it had been requested. Steve Roth, Instrument Engineering TV instruments, burned the midnight oil to make the modifications and get the instrument into the hands of Westinghouse (and NASA) without delaying their program or ours.

After Apollo 10, Dan Provine contacted Dave Frazel to tell him how pleased they had been with the performance of the 140. The decision was made at this time to use it on last week's Apollo 11 too.

Basically, the 140's mission at Houston control is to test the color encoding equipment for color fidelity.

The 140 is used at the end of a series of steps, which begin when the field sequential TV signals produced by the spinning color wheel are transmitted to earth.

Ground equipment relays this signal to Houston control, where it is stored for 10 seconds in the standards converter, where the signal is converted from field sequential color to the NTSC color signal.

The 140 is used at this stage where color fidelity is to be established so it can be re-broadcast by commercial stations.

In Europe, the signal was transcoded into SECAM and PAL for the color receivers used in Europe. Thus every color system played a part in reaching an estimated 500 million earthling viewers or "Telespectators" as the French say. (This is more people than there were on the face of the earth at the turn of the century, incidentally.)

Charlie Rhodes, IE Television, Low Frequency and Mechanical instruments manager, notes that in the 140's application by NASA only three of its five operating capabilities are used. These include the NTSC encoded color bar, modulated staircase and EIA color standard and sync generator.

Charlie noted some of the advantages offered by color TV: In Apollo 11 the color was so true that it had the incidental medical advantage of being able to actually monitor the astronauts' appearance. Achieving this true color fidelity is essential and in essence this is what the 140 helps to provide.

Another advantage of having color within the spacecraft is that it enabled the viewer to identify objects within an unfamiliar environment with relative ease.

The advantage, at least initially, of using black-and-white filming on the moon (other than the obvious one of the lunar landscape exhibiting little color) is that the higher frame rate of the black-and-white cameras mean that fast movements appear less jerky than with the color camera.

The other Tek instrument mentioned earlier, the 520 Vectorscope, was also put to good use at Houston. The 140 generates the signal on the ground and the 520 looks at the signal after it has gone through the encoder and network facilities and telephone company to check the behavior of the transmission system.

These recent flights have just opened the door for color television's role in space, Charlie notes. Already, plans are being made to provide more full-color coverage on Apollo missions 13 and 14.

Charlie observes that Tek equipment played a far greater role than just the television application. Tek equipment was used in every phase of the 10 years of preparation which culminated last weekend.