The SPARTAN

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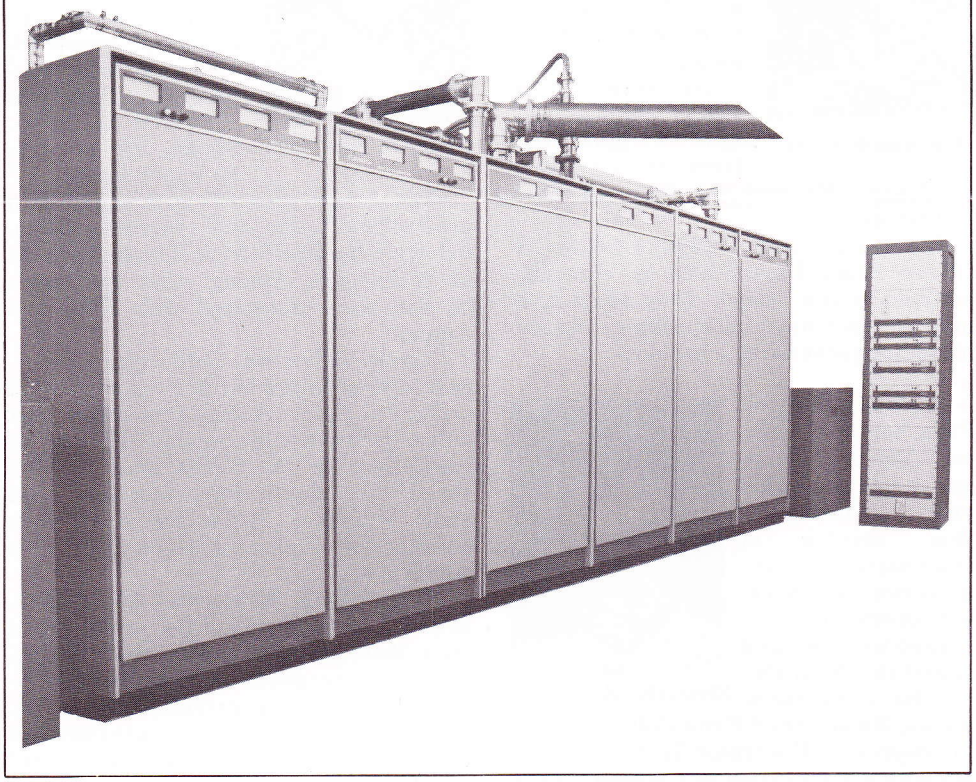
Model 650 50 kW FM For KPOL, Los Angeles



On September 1st this 50 kW FM transmitter will radiate a new Sparta quality signal out over one of the nation's most hotly-contested audiences. As the newsletter went to press, the Model 650 was being delivered to KPOL for immediate replacement of another maker's transmitter.

In the view above the left hand two cabinets comprise a complete Sparta Model 625 25 kW FM Transmitter . . . the center two cabinets the combiner and 20 kW reject load . . . the right hand two cabinets another complete Model 625. The power vaults of the two 625's flank the transmitter proper, while the 50 kW reject load is out of sight to the right of the photo, connected to the 6" rigid line which appears to end in mid-air.

At the extreme right is the control systems cabinet; twin Model 680 Direct FM Exciters, twin Model 682 Stereo Generators, exciter switchover control (one system acts as standby) and transmitter switchover control.

The Model 650, not in the present Sparta price schedules or literature, is a custom transmitter. Contact the Sparta sales department at (916) 383-5353 for prices and further information.

Price Changes Effective Labor Day

In spite of the gradual reported upturn in the US economy, inflationary pressures on Sparta's materials and labor for manufacturing, as in most business, goes on seemingly unabated. It was hoped until recently that last December's price line could be held somewhat longer, but Sparta Controller, Don Laws, in his July review, produced the news that price increases were needed immediately.

Orders received for Sparta broadcast equipment, before Sept. 1, will be honored at December 1, 1974 prices.

Any order received after that date will be filled at the new prices, with price schedule distribution slated for late August.

Solid State Transmitters Moving Ahead

— by PAUL GREGG
Xmtr. Products Manager

Paul Gregg

The first production run of all-solid state Sparta Model 600B 250 Watt FM Transmitters was completed in the second quarter of this year, and most of these units are now in the field.

This is about as 'high' a power level in FM solid state that Sparta will be producing in the near future . . . the limiting factor being the operating voltage of RF transistors suitable for UHF work. Since the major market for the transistors is in the mobile radio field the basic auto 12 Volt electrical system is the controlling factor.

Such is not the case for AM transmitters. High voltage, fast switching ECRs are now available, and one manufacturer (Westinghouse) demonstrated their proper use in a 5,000 Watt AM transmitter at the NAB Convention in Las Vegas this spring.

Sparta transmitter engineers are in active pursuit of minor finishing details relating to this approach, and expect to have a unit in field test this fall.

It is expected that the Sparta solid state AM system will lead beyond the initial 1 kW level to 2.5, 5, 10 and 50 kW transmitters.

Look For Us At The

NAFMB-ATLANTA NEXT MONTH

(See Story on Page 2)

Product Of The Month

SPARTA MODEL CE-3 BULK REEL AND CARTRIDGE ERASER . . . easy *downward* pressure on the switch operates the CE-3 eliminating the usual tabletop push-pull match of operator *vs* tape-and-eraser. Reels up to 10½" can be erased to below-noise levels, as well as cassettes and cartridges. Another feature is the "on" light; if the pushbutton switch should ever fail, the light tells the operator to unplug the CE-3 before it overheats. Construction is of sealed, sturdy epoxy fiberglass and plastic, with cushioned rubber bottom for desk protection. Removable center pin, 6' cord, 9 lbs.

CE-3 TAPE ERASER: price, on orders RECEIVED BEFORE SEPT. 1, 1975, $65. . . . thereafter, $75. — *Sparta Photo*

NAFMB Expo

The Marriott Hotel in Atlanta, Ga., is scene of the NAFMB all-radio convention and show September 17-20. It promises to be larger and better in every way, with over 90 per cent of last year's exhibitors signing up again, and up to 2,000 people expected. The exhibit hall is "practically full" reported Elena Saldan, NAFMB administrative director, at press time.

"We have Louis Frey, congressman from Florida who is a sponsor of pending license renewal legislation, speaking at the Thursday (Sept. 18) luncheon," Elena told us, "In addition to FCC Chairman Wiley on Friday, and Julian Bond on Saturday."

Sparta, Jampro, and Vega Divisions of Cetec Corporation will be exhibiting in booths 37-41. AM and FM transmitters, audio equipment, FM antennas, and Vega wireless microphone systems will be "hands on" available for examination.

MOVING Up At Sparta

Bill Overhauser, Sparta president, has announced two personnel changes in recent weeks.

Christine M. Davis

Christine M. Davis, 26, became full-time personnel and administrative supervisor following her September 1974 release from active duty as an Air Force 1st Lt. Chris entered the AF in August 1971 after graduation from St. Lawrence U, Canton, NY with her BA in English Literature.

She was married in 1972 to fellow AF officer Brian Davis, who is currently enrolled in law school. They share avid interests in tennis, backpacking, and skiing, among other active hobbies.

Rigoverto "Rigo" Felix

Rigoverto "Rigo" Felix became Customer Service Manager in late June this year, following a year serving in transmitter engineering as check-out supervisor.

Rigo was born and raised in Chico, Ca., not far from Sacramento. He attended Butte College, taking his degree in Electronic Technology and winning a scholarship to California Polytechnic State University, where his major was electronic engineering.

Rigo and his wife of four years, Anita, have three children.

News of Other Divisions

Wesley M. "Mort" Fujii

(North Hollywood, California) Wesley M. "Mort" Fujii recently was named vice president and general manager of Cetec Audio, another broadcast group division of Cetec Corporation. Fuji was V.P./G.M. of Electro Sound, Inc. prior to his appointment.

"Mort" has spent 20 active years in professional audio and recording fields, following his BSEE from Illinois Institute of Technology. Among other companies he has been associated with RCA and Ampex.

(North Hollywood, California) Concurrent with appointment of Fujii as general manager, Cetec Audio announced that Jules Sachs would become director of marketing for the firm's lines of high speed tape duplicators, speakers, and audio consoles. Sachs previously was director of duplicator sales for Cetec Audio in NYC.

(Santa Clara, California) Maxfield J. Brown has been appointed president of Data Measurements Corporation (DMC), computer terminal manufacturing division of Cetec Corporation, El Monte, Ca. Brown was executive vice president of DMC under Phil Gundy's presidency until the change to divisional status earlier this year. Prior to that Brown was with Gilfillan, Inc. of Los Angeles, for 16 years.

☆ ☆

a little of Everything

"Old soldiers never die . . ." The saying that General MacArthur made so famous comes to mind as we lay aside our famous Spartan warrior logo. In its place you now find the double-C logo which identifies all divisions of Cetec Corporation now.

Sparta has been a member of the strong and growing family of Cetec Corporation companies for eight years. The adoption of our "parent's" logo reflects Cetec's deepening interest in, and committment to, the worldwide broadcast industry. There are now four Cetec divisions offering broadcast equipment; Cetec Audio, Vega, Jampro, and Sparta.

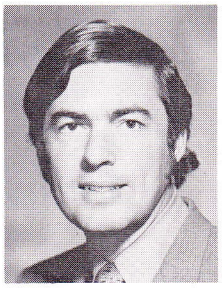
Expect from Sparta new ideas and the finest products as the Spartan warrior fades away — but will not be forgotten . . .

Bill Overhauser
President

☆ ☆

Transient Intermodulation Distortion

— by DAVE EVANS
Audio Products Manager


Dave Evans

In the first installment of this three-part series we looked at various characteristics of harmonic distortion, and also suggested some distortion standards for audio consoles according to where and how they are used. (See Sept.-Oct. 1974 issue; Ed) The suggested standards, while much more stringent than provided for under Part 73 of the FCC Rules and Regulations, cannot guarantee a clean, crisp audio signal because there can be intermodulation distortion present in sufficient quantity to cause audible 'acoustic roughness' which is not detected by harmonic distortion measurements.

IM distortion was the subject of the second part (Nov.-Dec. 1974 issue; Ed) and is rapidly gaining acceptance as an important specification on broadcast and recording studio audio equipment.

In this issue I'd like to review still another distortion phenomenon called transient intermodulation distortion. TIM, which is a fairly new concept, sounds like regular IM distortion — usually described as acoustic roughness — but is not the result of crossover distortion or non-linear circuit elements, the usual culprits behind IM distortion. The causes of TIM are much more subtle than other forms of distortion, and it is often difficult to identify because it may only appear when certain musical instruments are reproduced. These usually are cymbals, pianos, and other percussion instruments which can produce sounds of very short duration, ie: *transients*.

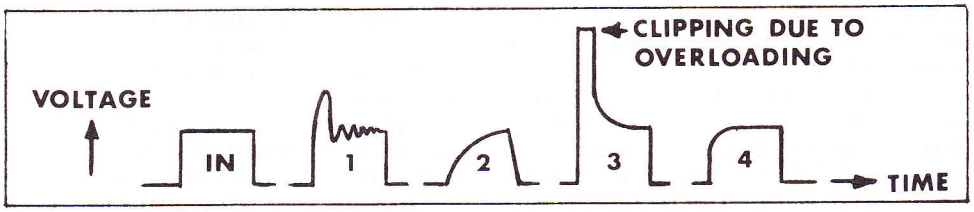
An example of TIM is the harsh or grating quality that has mysteriously appeared on one channel of a consumer stereo set, usually on certain records or musical passages only, that defies troubleshooting by normal methods since frequency response, IM, and THD are normal. When such symptoms are present, a square wave generator and oscilloscope will often reveal abnormal waveforms — usually overshoot and ringing on a 1,000 Hz signal — typically indicating the presence of an ultrasonic peak or oscillation, often due to a faulty tone control circuit.

The possible causes of transient distortion in amplifiers are numerous, but three general categories are probably the most common:

(1) Ultrasonic peaks or oscillations which cause overshoot and ringing on sharply rising transient waveforms, such as from percussive instruments. This results in a harsh quality on certain sounds.

(2) Inadequate high frequency response, resulting in a rounding of the leading edge of transients. This produces a dull sound, lacking in sharpness and detail.

(3) Momentary overloading of an amplifier's input stage at the beginning of a transient due to propagation delay in the overall negative feedback loop of the amplifier. The audible effect is similar to that of crossover distortion; a somewhat muddy, rough-edged sound quality.



10 KHz SQUARE WAVE RESPONSE

This figure shows an incoming 10 KHz square wave and what happens to it under the three conditions of TIM listed.

Condition (1) produces overshoot and ringing, distorting the amplitude of the fundamental frequency of the transient, and creating new frequencies.

Condition (2) eliminates the beginning of the transient, and if it is short enough, the transient may not be reproduced at all. Harmonics will be attenuated for an even longer period.

Condition (3) overloads the amplifier input, which clips until the negative feedback signal arrives.

Condition (4) represents a well-designed amplifier with an upper frequency response of 70 KHz or more, showing only slight rounding of the square wave.

Conditions (1-3) each alter the sound quality of the transient, while (2) and (3) actually eliminate the beginning of the transient, or in some cases virtually eliminate it. These mission musical elements are termed 'holes', and cause an audible alteration of the original sound.

Propagation delay is particularly significant in amplifiers with several stages which have a negative feedback loop from the amplifier output back to the input. Audio consoles are usually constructed with a series of self-contained amplifiers, each with its own feedback loop which minimizes propagation delay.

Ultrasonic peaks and oscillations are uncommon in broadcast audio equipment because the traditional design standards have dictated an upper end of 15-20 KHz. Although it may seem inconguous that consumer sound equipment might have a wider frequency response than 'professional' broadcast equipment, it is a fact. The broadcast field, unlike the recording industry, has only recently concerned itself with new audio concepts such as IM distortion, and transient distortion. Thus the limited high frequency response of most broadcast audio equipment fits category (2) as a cause of transient distortion.

For instance, optimum reproduction of a 10 KHz square wave requires a frequency response to 100 KHz, but this is not practical due to the transformers normally used at the input and output of broadcast audio amplifiers.

The microphone input transformer is almost a necessity because it gives a voltage step-up and improves the signal-to-noise figure. However, a differential input circuit for high level signals will give the same protection from ground loops that a transformer does, and will increase the bandwidth so as to accurately reproduce the transients in recorded music. For optimum reproduction of recordings this is preferable. Recording studios often bypass the mic input transformer when recording percussion instruments which are loud enough not to require the voltage step-up of the transformer. Again, a differential input is used.

At least one recording console, the Multi-Track "B", has a frequency response ***flat to 360 KHz*** with the mic transformer bypassed! This may represent an extreme, but the point is that the recording industry does provide us with a product in which special care has been given to the recording of transients and harmonics.

Through the utilization of custom designed input and output transformers,

(Continued on Next Page)

Tech Tips

— by RIGO FELIX
Mgr. Customer Service

Felix

Proper tape cartridge equipment head alignment is very essential to achieve machine-to-machine compatability. To begin the process, clean the heads and rollers. Next, you need a 'standard' of measurement.

Begin alignment with proper height; the vertical position of the head relative to the proper tape center line. Height can be checked by removing the oxide from a strip of tape with laquer thinner, stretching it through the tape guides and across the head face. If adjustment appears necessary, loosen the locking screw of the HM-2 head stack, and turn the two zenith adjustment screws equal amounts in the same direction.

The Sparta AG-2 Alignment Gauge is useful in both height and the next adjustment . . . zenith. Zenith is the perpendicularity of the head face relative to the deck surface; it should be exactly 90%. Using the AG-2 after the height has been checked, adjust the rear zenith adjustment screw to bring head face and deck into proper 90%relationship. At this point, recheck height; there is interaction between the two, so one must be rechecked each time the other is changed.

Last comes azimuth, the most critical factor, involving side-to-side tilt of the head as viewed from the front. Correct adjustment brings the gap in the pole pieces perpendicular to the direction of tape travel. Again, the Sparta AG-2 is most useful, providing optical proof of head verticality. Then, for exact alignment, a test tape (The Sparta AL-1 is recommended; 12,000 Hz continuous tone) should be used while tilting the head, until maximum program output is found. There will be false peaks, so care must be taken to select the highest one.

When replacing heads, or doing routine maintenance, only the azimuth is likely to require adjustment. However, height and zenith should be checked if the tape transport has had previous maintenance by other persons.

Then check head insertion into the cartridge against the pressure pads. It should enter firmly enough to cause a straight, smooth pass of tape across the head. Too great pressure can cause problems such as tape squeal and drag.

If you are checking a record/play system, adjust to proper recording level by comparing the output of a recorded cartridge against that of a standard reference level cart. The Sparta CL-1 Test Tape Cartridge is recorded 1 KHz at 0 dB for this purpose. Play the CL-1 or similar cartridge on your freshly-aligned machine and set playback level on the console at 0 VU.

Next, leaving the PLAY LEVEL set where 0 VU was reading, RECORD 1 HKz tone, slowly advancing the input level and noting the meter reading on the console. As the VU meter approaches 0 VU, so should the VU meter on the recorder. If you find that the meter on the console reads 0 VU, and the recorder VU meter reads -2.0 dB, you are recording approximately 2 dB higher than the standard level. Adjust equipment as needed.

Finally the cue level sensitivity should be properly set with a pre-recorded level of -10 dB at 1 KHz from a test tape cartridge. The Sparta CL-2 is designed for this, being an exact 1 KHz at -10 dB.

Don't Forget The

NAFMB Convention

Atlanta - Sept. 17-20

WE'LL BE THERE!

Booths 37-41

Evans Article

(Concluded)

Sparta's latest audio console, the 3000-Series, has a frequency response to 45 KHz (3 dB down) which yields an acceptable looking 10 KHz square wave. With the input transformer bypassed, the response is flat to 100 KHz. A requirement for balanced input and output transformers does not dictate that broadcast audio equipment has to be restricted to the traditional 15 or 20 KHz high frequency response level.

How important is it to accurately reproduce the harmonic content of music? Important enough to require another installment. See you in "The Spartan" again next month!

(Editor's note: Dave Evans' IM and TIM series will be concluded and summarized in the September 1975 issue.)

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SPARTA

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