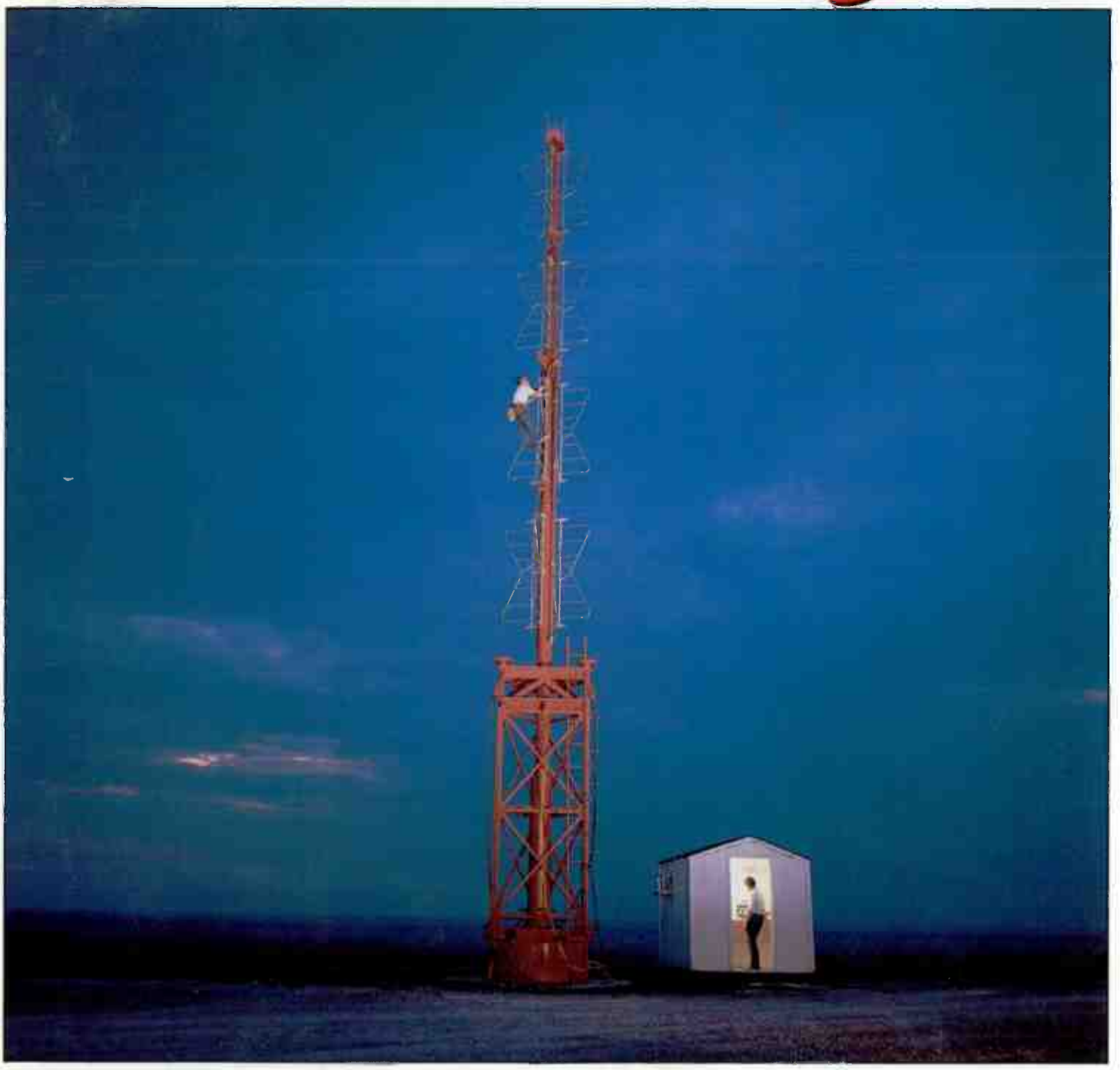
FALL 1992 VOLUME 2, NUMBER 1

BROADCAST Communiqué



Modifying Antenna Systems for NTSC/HDTV Simulcasting

HARRIS ALLIED

Signal Security.

The last thing you want to worry about is your transmitter. And, with a Harris Platinum Series™ all-solid state FM transmitter in models from 2 through 10 kW, you won't have to.

Platinum transmitters are ultra-reliable. They replace the tube— the most common single point of failure— with multiple hot-pluggable 1350 Watt solid state power amplifier modules which operate in parallel. Your transmitter will continue to operate even if you remove a module.

Beyond reliability, you'll find that Platinum FM transmitters need only about 10 percent the routine maintenance of older tube models. What's more, most service and maintenance can take place while the transmitter is on the air.

To learn more about how a Harris Platinum FM Transmitter can add to your peace of mind, phone us at 217-222-8200. In Canada phone 800-268-6817.

HARRIS ALLIED

TAKING The Lead

Unique But Not Alone

by MARTHA B. RAPP
Manager - Marketing Communications

Recently an editor of a television publication phoned for a ballpark estimate of what a typical TV station would spend for an HDTV antenna.

It was a good question, and, as a matter of policy, we try to respond promptly to every question with a clear and accurate answer.

In this case, however, we couldn't— even though we wanted to because we know this is a question many broadcasters are asking.

Why couldn't we respond?

Because there were simply too many variables— all of them pointing to the unique characteristics, goals and needs of each individual station.

The best we could do was to explain why many of today's antennas should be suitable for HDTV broadcasting; to discuss how stations can avoid the expense of building a new tower by reconfiguring an existing one for NTSC/HDTV simulcasting, and to encourage broadcasters to phone us if they want to discuss their particular situation.

This incident pointed to an incredible irony. Despite a continuing and foreceful trend toward increased standardization, in today's broadcast environment one size is less likely to fit all— or even some— than ever before.

Recognizing this, Harris Allied has specialists ready to discuss your goals, plans or requirements in each of four areas— radio studio and satellite products; radio transmission equipment; television transmission equipment, and radio studio, RF, video and satellite communications systems.

Whether you're looking ahead to HDTV, thinking about establishing a digital STL network, considering a new satellite uplink vehicle or debating the purchase of a new transmitter or studio product, we would welcome the opportunity to work with you.

While it's true you have become unique, you do not have to be alone.

Moving Ahead...

Jim Woods

Harris Allied is pleased to announce Jim Woods has been appointed senior marketing manager - advanced television systems. In this key new position, Jim is coordinating Harris Allied's worldwide HDTV marketing program. He is based in Highland Heights, Kentucky.

Joining Harris as a marketing associate in 1983, Jim became a U.S. radio sales representative in 1984; a U.S. television RF sales representative in 1986, and sales manager for Europe and Africa in 1990. A graduate of Purdue University with a degree in mechanical engineering, he worked for several broadcast stations before joining Harris.

We're excited to welcome Jim to this dynamic new position.

How To Reach Us When You Need Us:
In U.S.:
Radio Studio Products: 800-622-0022
Radio Satellite Products: 317-962-8596
Radio RF Products: 217-222-8200
Television RF Products: 217-222-8200
Video and Satellite Systems: 606-572-6880
Radio Studio and RF Systems: 217-222-8290
In Canada: 800-268-6817

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Broadcast Communiqué is a bi-monthly publication of **Harris Allied Broadcast Division,** which includes four operations:

Quincy, IL: RF equipment manufacturing; RF and audio systems; service and training.

Richmond, IN: Radio studio and satellite equipment distribution.

Highland Heights, KY: Fixed and mobile video and satellite communications systems.

Cambridge, England: RF equipment manufacturing; European radio studio equipment distribution.

TV Today

Modifying Antenna Systems For NTSC and HDTV Simulcasting

by **REX NIEKAMP**
Manager - Antenna Operations

The transition from NTSC color broadcasting to High Definition Television (HDTV) will require a period of NTSC and HDTV simulcasting. This will mean accommodating an HDTV antenna. For financial reasons as well as real estate, regulatory and environmental restrictions, it is likely that most broadcasters will prefer co-locating the HDTV antenna on an existing structure rather than building a new tower.

The question is how?

In the U.S., many towers already are loaded to the point where additional antennas cannot be added without significant structural reinforcements. Structural reinforcements are costly and, in some cases, they may be impractical. Reconfiguring an existing antenna system to "clear" space for HDTV antenna systems may be an ideal solution.

Normally tower space is cleared in two ways— by multiplexing two or more channels into a single wideband antenna, or by reducing the length of the NTSC antenna. (Reducing antenna length will lower gain and the station's ERP *unless* transmitter power is increased.)

Antenna Types

Most broadcast antennas used today have either a traveling wave (TW) or a branched feed design. Normally, UHF traveling wave antennas use coaxial or slotted waveguide construction and are limited to single channel operation. Slotted traveling wave antennas provide very high power handling capability.

Branched feed antennas include pole-mounted dipole radiators and panel type antennas. They offer bandwidth sufficient for multiplex operation, but because of their small branch feedlines, they normally are more limited in power handling capability than slotted antennas.

While additional research will be needed to define specific parameters for HDTV antennas, it is likely that existing antennas will be suitable for HDTV operation with only minor design and manufacturing adjustments. In fact, slotted traveling wave antennas may continue to be used for single channel high power applications for either NTSC or HDTV. And branched feed models will play an important role in multiplex operation.

Modifying Existing Antenna Systems

Let's consider how four typical tower facilities can be reconfigured to accommodate NTSC and HDTV simulcasting requirements, assuming that:

- *Only* UHF frequencies will be used to simulcast HDTV with existing VHF and UHF NTSC frequencies.
- HDTV will require less ERP for equivalent desired coverage than NTSC.
- HDTV signals can be multiplexed successfully.

Case One: Tower with light to moderate loading with a single or few antennas. Existing NTSC antenna is top-mounted on the structure.

By far this is the most common example of a tower providing coverage to rural areas and small cities. As a result of projected expense of HDTV conversion, it is likely that such a station will not be among the first to add HDTV.

Figure 1 shows the typical tower for this configuration— a top-mounted VHF antenna on a four- to seven-foot face guyed tower. Figure 2 suggests that the HDTV signal may be added through a side-mounted UHF traveling wave slotted antenna. A wrap-around panel type antenna might also be used.

Case Two: Multiple spine (candelabra) towers with two to four spines with as few as two to three and up to a dozen antennas.

Typically this type of structure is located near large metropolitan areas. Many of these towers are severely loaded, and further strengthening may be impractical *or* prohibitively expensive. Additionally, many environmental and zoning restrictions may prohibit or severely limit new tower construction.

FIGURE 1, CASE 1 — NTSC

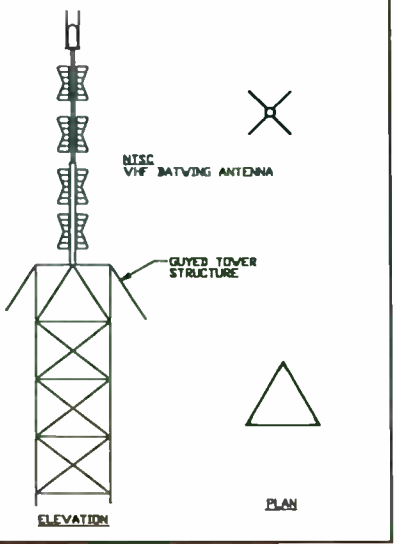


FIGURE 2, CASE 1 — NTSC/HDTV

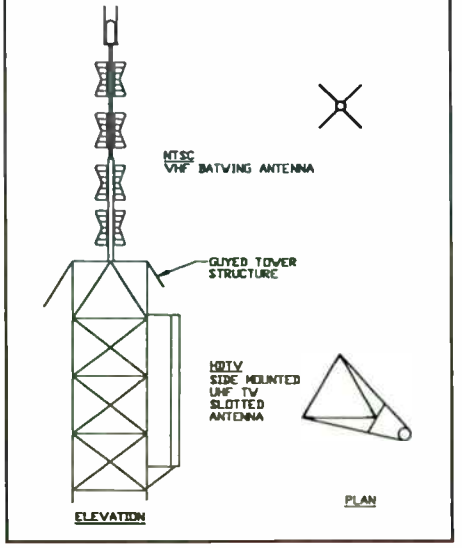


FIGURE 3, CASE 2 — NTSC

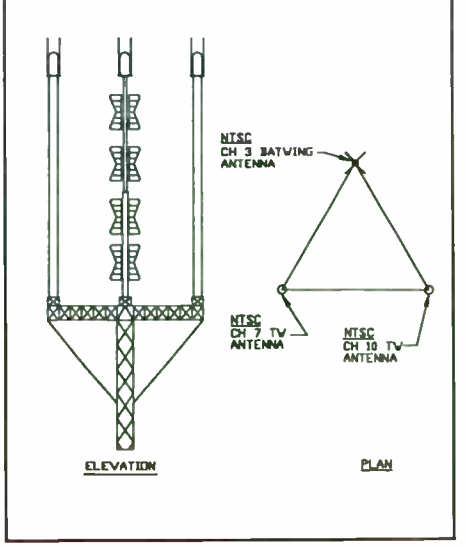


Figure 3 shows a typical candelabra type structure. Legs of this structure are occupied with a channel 7 traveling wave antenna; a channel 10 traveling wave antenna, and a channel 3 Batwing antenna. It would be desirable to clear one of the three legs for the HDTV antenna.

In Figure 4, two of the highband VHF antennas are combined and multiplexed on a single Batwing antenna. This clears one leg for a new broadband antenna that can be multiplexed for each of the new HDTV stations.

Case Three: Tower with heavy loading: Many antennas side-mounted to the structure, and single antenna top-mounted.

This case also is typical of structures near large metropolitan areas. Many of these towers are severely loaded and further strengthening may be impractical or too expensive. Many environmental and zoning restrictions may prohibit or severely limit new tower construction.

Figure 5, a typical tower which is heavily loaded, has a channel 5 top-mounted Batwing antenna; a channel 2 "4-around" dipole panel antenna; a channel 40 "Tangential fire" zig-zag antenna, and a channel 4 Deltawing panel antenna. Again, HDTV may be accommodated by reducing tower loading and clearing tower space.

Figure 6 shows one possibility. The existing top-mounted channel 5 NTSC station is multiplexed with channel 4 using a broadband panel type antenna

(Continued on Page 6)

FIGURE 4, CASE 2 — NTSC/HDTV

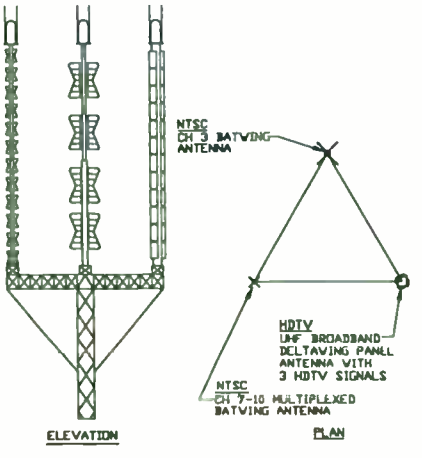


FIGURE 5, CASE 3 — NTSC

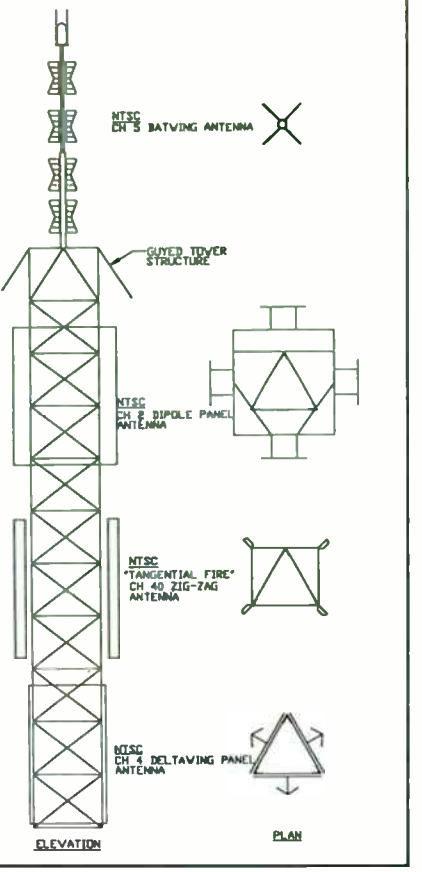


FIGURE 6, CASE 3 — NTSC/HDTV

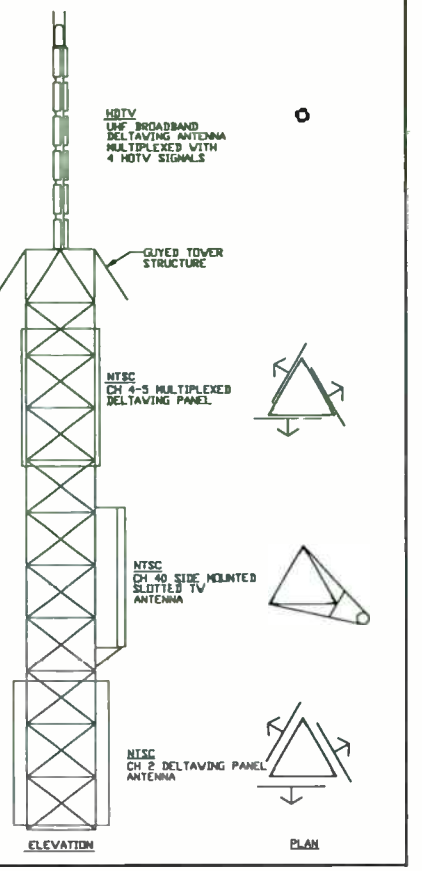


FIGURE 7, CASE 4 — NTSC

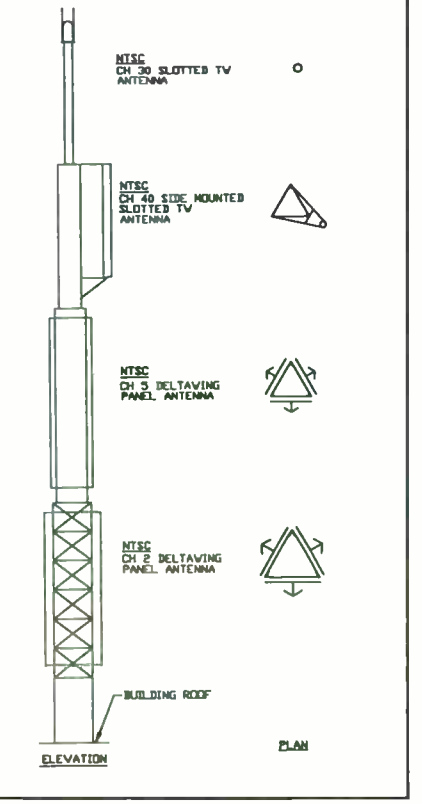
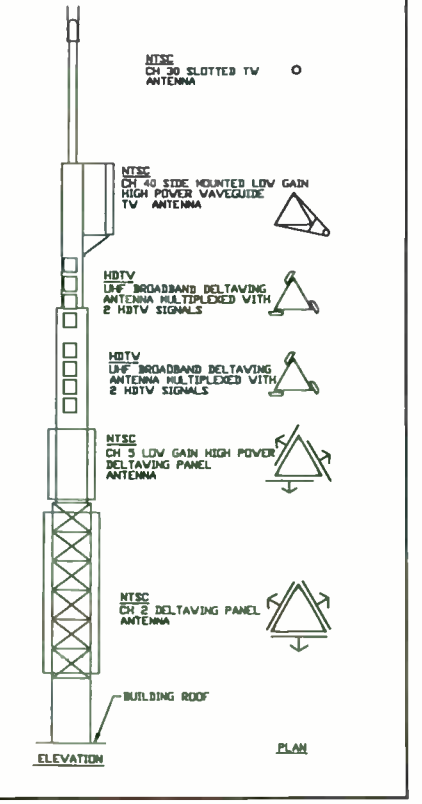


FIGURE 8, CASE 4 — NTSC/HDTV



which is located near the top of the tower to reduce tower top windloading. Moving the channel 5 antenna clears the top of the tower for a new broadband UHF panel antenna which can be multiplexed for each of the new HDTV stations.

Case Four: Antennas on top of tall buildings. Configurations may be multiple spine or single spine. Generally such installations involve many broadcast antennas which have lower gain to improve close-in coverage.

These structures are typical of very large metropolitan areas where the "best" tower spaces are only available at premium prices. While alternative sites are another option, they may be unavailable.

Figure 7 shows a typical antenna layout for a tall building. While many buildings offer two or three spines with several antennas mounted on each, a single spine is shown for simplification. Here, a channel 30 slotted traveling wave antenna is stacked on a side-mounted channel 40 slotted traveling wave antenna. Channel 5 and Channel 2 Deltawing panel antennas also are located on this tower.

In this case, lower gain antennas may be used to clear tower space and improve close-in coverage. However, it is a serious step which may impact transmitter power and the transmission line feed system if the same ERP is desired. Figure 8 shows a possible solution using both lower gain and multiplexed NTSC and HDTV signals. The channel 40 antenna is replaced by a lower gain high power traveling wave waveguide antenna, and the channel 5 antenna is replaced by a lower gain high power Deltawing panel antenna. This clears sufficient tower space for two low gain broadband Deltawing panel antennas. Improved close-in coverage may be achieved through the use of low gain antennas for both the NTSC and HDTV signals.

Conclusion

Broadcast tower facilities may be upgraded to permit current NTSC signals to be simulcast with HDTV signals. While this article discusses only a few specific cases, the general principles of clearing tower space through multiplexing and use of lower gain antennas and reducing tower loading with low windload antennas can be applied to most existing installations.

Measuring Up: Harris Antenna Testing Verifies Pattern and Performance Accuracy

Your station has painstakingly prepared for its new antenna. You've worked with Harris Allied's antenna design engineers to ensure your model precisely meets your coverage requirements. You've reviewed installation and other drawings. You're comfortable with the 24-hour service and parts support which will back your antenna.

Much of your antenna has been fabricated at Harris Allied's Quincy, Illinois factory. Other components have been provided by carefully selected suppliers. Your antenna has been assembled by a team of experienced engineers and technicians. It is almost ready for shipment.

Yet despite the care you have taken, a disconcerting question lingers: Will this antenna *accurately* provide the coverage you need?

Your question is not unique. After all, once an antenna is installed, modifications are highly impractical, inconvenient and costly. This is why Harris Allied verifies pattern accuracy as part of its comprehensive antenna testing program, the most rigorous in broadcasting.

A Commitment To Testing

Indeed, every Harris-manufactured FM, VHF or UHF antenna is tested before shipment to verify customer specifications are fully met. Depending on the type of antenna, testing may include impedance optimization, cylindrical near-field pattern testing and far-field pattern measurement testing. Customers are encouraged to witness testing of their antenna.

Harris' 40-acre antenna range is ideally situated on a 230-foot bluff near the Mississippi River in Missouri. That area, with transmitters located in the Mississippi bottom lands to the east, provides ideal testing conditions, approximating the "free space" situation of an installed antenna. The range includes an office/manufacturing/shipping building and areas for near-field and far-field testing. Computerized control and monitoring systems are in block houses near test pads.

Newly-assembled antennas are rolled from manufacturing on dollies then transported to the intended test area by the largest Travelift of its kind— a 45-foot high, 50,000-pound vehicle with a 30,000-pound carrying capacity.

Harris Wavestar® Antenna during far-field test

Verifying Pattern Measurements

Antenna pattern measurements are verified during far-field testing.

For horizontal and vertical pattern testing, the antenna is positioned across support towers on a turntable with a 90-foot concrete base. During testing, a beam rotates a full 360 degrees, examining the antenna from every angle.

For horizontal pattern testing and impedance matching, a crane positions the antenna upright on a vertical turntable. The antenna is raised to a height of 35 feet to provide isolation from most adverse ground effects.

Location of these turntables at the sheer edge of the 230-foot bluff ensures a direct line of sight to the bottom land transmitters which beam signals to the antenna on test. Direct line of sight and selective height of the transmit antenna prevents ground reflections from distorting test results.

During testing, the antenna being measured acts as a receiving unit which then transmits signal readings to computerized test equipment. Sophisticated test gear translates readings into horizontal and vertical patterns which are plotted, producing a drawing of expected field coverage the antenna will provide when put into actual use.

No Harris-manufactured antenna which undergoes pattern testing is shipped unless pattern characteristics are verified to fully meet customer specifications. Harris Allied's unmatched combination of technical expertise, test procedures, facilities and test equipment offer special assurance that even if you are purchasing an antenna— one of the least understood but most important links in the RF chain, you'll get the performance and pattern for which you are paying.

SYSTEMS Today

Harris Allied Systems and S-23 First with First Team Productions

by PHILLIP RUMORE
First Team Productions, Inc.
Birmingham, Alabama

In August of 1991 we started First Team Productions, Inc. with one goal— to offer satellite uplinking and video services with state-of-the-art equipment and unequaled customer support at competitive prices.

Although we're a young group— our oldest team member is between 38 and 40— we'd had up to 11 years of experience in the industry and we knew what we wanted. With plans to provide video teleconferencing, electronic newsgathering, live sports, media events and corporate video presentations, we wanted facilities well above industry standards. We were familiar with the S-23 satellite communications vehicle from Midwest's Systems Division (which became Harris Allied Systems Oct. 1, 1991), and we didn't want to settle for less.

We'd also had contact with the Systems Division on other projects. I'd even tagged along with a friend who's vice president of satellite operations for another company from the onset of his M-30 (production truck) and S-18 (satellite communications vehicle) projects.

As far as First Team Productions was concerned, the Systems Division was a front-runner with a desire to serve its customers better than anyone else. Its people went out of *their* way trying to treat *their* customers the way we try to treat *our* customers. It wasn't necessary to check up on the people there to see whether they were doing what they said they'd do.

Added Extras

Due to prior experience, we were determined to use top-quality components as our standard and to provide a highly redundant facility. In fact, the only thing *not* redundant on this truck is the generator!

Beyond uplink equipment— a Vertex 2.6 meter, four-port antenna; MCL phase-combined 300 Watt TWTs; Scientific Atlanta redundant 7555 exciters with protection switching and Scientific Atlanta receivers, and Tektronix 1705 spectrum monitor— we put our money into extra production, communications and back-up equipment.

First Team Productions has been hired as an uplinker, but if a customer's Beta deck goes out, we've got a back-up in the vehicle. In such situations, some customers have asked whether they can rent our equipment and we tell them, "You're already renting it with the truck."

For refueling at remote locations and on three-to-four day shoots, we have a Ford F250 chase vehicle. We also have up to seven cellular phones; two hardline phones, and 2,500 feet of wire.

The only thing I wish is that we had more engine power in the S-23— one that would consistently go up hills at 65 miles per hour. Our unit was built on an Iveco chassis. Harris Allied Systems has since coverted to the Ford CF Series with higher horsepower. We may also want to add a third air conditioner. The South gets hot in the summer, and when the truck was at a prison riot last August in 100°-plus heat, we would have had the third unit running. We want to keep our customers comfortable. In fact, Harris Allied Systems has put an optional third unit on several S-23s.

Serviced Within An Inch Of Its Life

First Team Productions keeps its equipment serviced to within an inch of its life. And by the way, if you're making this investment, you might as well pay a little extra for a shelter to protect your truck.

Uplink vehicles aren't like washers and dryers. They're complex systems. The calibre and the attitude of the supplier's support staff is very important. We've probably called Harris Allied Systems every hour of the day and night.

Some of First Team Production's staff has had problems with other suppliers' attitudes— unenthusiastic responses of "Yeah. We can solve the problem. Tomorrow." Tomorrow can turn into 10 days or two weeks.

But with Midwest Systems— now Harris Allied Systems— the support is great. Even at 1 or 2 a.m., the problem is solved, and the attitude is "Do whatever it takes to get the job done and worry about the fine-print later."

Eventually we'll be looking to add another vehicle. When we do, we'll call Harris Allied Systems.

To discuss your requirements for a fixed or mobile video or satellite communications system, please phone 606-572-6880. In Canada phone 800-268-6817.

PRODUCT Showcase

We call it the entry-level hard disk recording system. Introducing the CardD™ system.

At $795, the CardD™ is an AT-compatible bus board that gives you real time, direct-to-disk stereo (2-channel) recording and playback. CardD™ also features 16-bit audio and analog ins and outs.

The $295 EdDitor™ is an interactive stereo waveform editing program that features non-destructive editing, cut, copy and paste and full zoom-in and zoom-out.

CardD™ — EdDitor™ — I/O CardD

Complete the package with the $295 I/O CardD™ which provides S/PDIF and IEC digital interface. This permits direct digital transfer to and from any DAT machine.

Your Harris Allied salesperson has information on-line.

ATTENTION

Western States & Radio & TV Station GM's, Engineers and PD's in:

Alaska	Idaho	Utah
Arizona	Nevada	Washington
California	Oregon	Wyoming
Colorado	New Mexico	

If you have *not* received the new 70th Anniversary Edition Catalog from Harris Allied, Please call

800-622-0022

DynaMetric TMP 610

DM's new TMP-610 allows the user to record feeds from a telephone or, with the flip of a switch, send program material back down the phone line.

Connected among your telephone, its associated handset and playback or record sources, the TMP-610 works on most modular telephone sets.

Still searching for what many stations now consider the best storage system for your CDs? Our storage cabinet holds 840 jewel cases for immediate access to your programmer or disc jockey. Industrial-gauge steel construction, 3 drawers and a security lock. 4 ft x 2 ft x 2 ft. Pricing and a freight quotation are available from 8 to 5 in your time zone at 800-622-0022. Jewel cases only.

CD Storage Cabinet

Five and one-half minutes of audio with a 5kHz bandwidth and no moving parts! It's Henry Engineering's latest, cost-effective product, the upgraded DigiCord.

This upgraded DigiCord is perfect for network news delay, weather, EBS, request line playback and any on-air source that doesn't exceed 5½ minutes.

Up to 16 random-length messages may be recorded up to the 5½ minute limit. Playback is random-accessible; messages can be played back in any order. A user selectable "repeat" mode permits automatic looping.

DigiCord easily records from a mic, tape deck or studio line. Balanced, line-level audio in and out. Battery back-up. It's digital which means no maintenance and no moving parts to wear out.

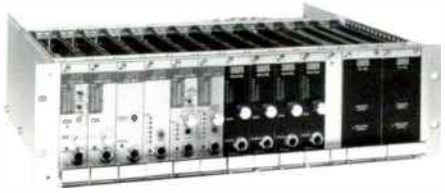
Call us toll-free at 800-622-0022, we'll tell all, including how the DigiCord is optionally capable of a 7.5 or 10 kHz bandwidth.

Henry DigiCord

Mix and match. More than a slogan, it describes ATI's expanded line of modular systems. Plug-in microphone and line amplifiers are now available as single and dual units with or without metering and with transformers or with active balanced outputs. VCAs with remote DC gain control are optionally available, also.

These new 10,000 series modules are 100 percent compatible with ATI's famous DA10,000 rack frame. This farsighted action permits users to intermix all of ATI's plug-in module types in one frame.

Ask your Harris Allied salesperson for literature and information on the over 40 variations of interchangeable ATI mic, line and DA modules available to MIX and MATCH precisely to your requirements.



ATI 10,000 Series Modules

The DAT with the Otari difference. The DTR-90 represents the most complete time-code DAT machine at a new low price. The Otari experience assures extra attention to detail, reliability and features.

Link two DTR-90 machines with the optional CB149 R-DAT editor for high-precision digital audio electronic editing.

If DAT is in your plans, be sure to FAX or phone Harris Allied for complete information and pricing.

Otari DTR-90

Wohler AMP-1A & AMP-2

Wohler's reputation was built and now thrives on squeezing maximum sound out of minimum space. These rack-mounted stereo monitors are ideal for transmitter rooms, central control and VTR bays.

The small size, and quality sound will probably startle the first-time listener. Where could all that audio be coming from?

The AMP-2 (2RU) or the 1-A (1 RU) provide ample power, increased operational flexibility and indication of out-of-phase stereo feeds.

Major TV and radio networks, groups and stations use them by the dozens. A quick call to 800-622-0022 reveals prices and availability.

AEQ TH-02 Hybrid

Specmanship in broadcast telephone hybrids eventually arrives at one most critical factor; Null capability!

This hybrid by AEQ sports in excess of 60 dB of null making it probably the best null you've heard of or will ever hear.

The TH-02 by AEQ uses digital processing technology achieving telephone talk unequalled by any other method.

TH-02 is a configurable system which can be used in the 2-wire mode as a digital hybrid or in the 4-wire mode as a full duplex intercom.

Mix-minus is built-in. When working with two lines, the user can take advantage of the mix-minus bus and create full multiplex communication.

Before you invest in any hybrid, you owe it to your station to discover AEQ. Your Harris Allied salesperson is fully knowledgeable on this exciting new product.

Comrex DX Series

If you're gonna stay in broadcasting, add CODEC to your lexicon. The Comrex DXP and DXR codecs allow full duplex audio transmission with a 7.5 kHz bandwidth.

This Comrex DX system works with all 56- and 64-Kb/s digital data services.

As switched digital services become increasingly available, the DX system can provide additional broadcast options and flexibility for sports feeds, on-site, even overseas entertainment and personality shows with perfect clarity and full two-way (duplex) operation.

Harris Allied has an informative and interesting booklet compiled by Comrex that will guide you in the use of this system and the switched digital services available. This how-to guide explains terms, lists contacts and telephone numbers and describes the Comrex DX system. It's free. Just ask!

Did those of you in Central, Mountain and Pacific time zones know that we have eager salespeople just waiting for your call every business day all the way up to 5 p.m. West Coast time?

This means that anywhere in the lower 48 states you can access our toll-free 800 number until *your* closing time. We're here when you need us most. *Any* time between 8 a.m. and 5 p.m. your time!

RF Notes

Ensuring Your System Is Properly Earth-Grounded

from the Harris Allied Broadcast Technology Training Staff

A good earth grounding sytem for a broadcast transmission facility may appear as simple as a metal rod hammered into the ground.

However, by effectively shunting unwanted power transients to the earth which absorbs them, this surfacely-simple system performs many valuable, continuous functions for your station:

First, it protects personnel from potentially lethal situations (i.e., a motor or transformer shorted to the case).

Second, in conjunction with surge protection devices (gas discharge tube, MOV, etc.), it prevents damage to costly equipment from transients ranging from lightning strikes, which can be in excess of 2 kV and last from a few hundred nanoseconds to microseconds, to static electricity generated by simple friction, to indirect surges from overhead power lines.

Third, as part of shielded wiring circuits it safeguards microprocessor-based systems (i.e., remote control) from magnetic pulses which can otherwise be induced into wiring, causing such problems as dumped memory.

When Should You Test Your Earth Ground System?

Because earth resistivity is affected by many factors over time, your earth ground system should be tested periodically.

Essentially, testing measures a system's resistance to the flow of current through its earth electrode (metal rod). Resistance can be caused by three sources: the earth electrode itself and connections to it; contact between the earth electrode and the ground next to it, and the earth around the electrode.

Obviously these sources can change over time as a result of many factors, including soil, its moisture content, and temperature or climate variations.

To this end, beyond testing when a new facility is installed, earth ground should be tested if:

- Your system is several years old. Ground rods *will* corrode and changes in climate and temperature will also influence earth resistivity.
- The water table in your area is falling.
- Non-metallic pipes or conduits have been used to replace metal pipes or conduits near your earth electrode.
- A plant or electrical facility has been added or expanded in your earth ground area.

Principles of Testing Earth Ground

In general, broadcast equipment should be grounded to an earth electrode which has maximum resistance of 5 ohms per centimeter of earth. Figure 1 shows a basic earth resistance test:

You will note three rods are used: the earth electrode being measured (Rod 1); a current reference probe (Rod 2-C), and a potential reference probe (Rod 3-P). An ammeter measures current between Rods 1 and 2, and a voltmeter measures voltage between Rods 1 and 3. By locating Rod 3 at various points between Rods 1 and 2—ideally in a straight line, it is possible to get a series of voltage measurements. Using these measurements and ohm's Law:

$$R = E/I$$

where R equals resistance in ohms; E equals volts, and I equals current in amperes, it is possible to calculate earth resistance at any point measured.

Plotting earth resistance values (Figure 2) will show resistance values increase as Rod 3-P is moved away from Rod 1, but that the rate of increase becomes so small that it is almost constant. However, as Rod 3-P approaches Rod 2-C, resistance values rise sharply.

Correct resistance is usually obtained if Rod 3-P is placed approximately 62 percent of the distance between Rod 1 and Rod 2-C— in other words, at a point where earth resistance appears to be almost constant.

It is important to keep several things in mind with this test: First, you must know the true electrical center of your earth electrode system; second, accuracy will be higher if earth resistivity between all three electrodes is fairly constant, and third, Rod 3-P (at 62 percent distance between Rod 1 and Rod 2-C) *must* be out of the electrical sphere of influence of Rod 1.

Getting Down To Earth

Affordable commercial Megger instruments enable earth ground testing to be conducted relatively easily and reliably. However, if your station lacks the technical staff and equipment, an electrical contractor should be able to do the job accurately and efficiently.

Harris Allied offers nearly 50 training programs each year at its Quincy, Illinois Broadcast Technology Training Center. For a complete schedule, please phone: 317-222-8200, Ext. 3508 weekdays.

FIGURE 1

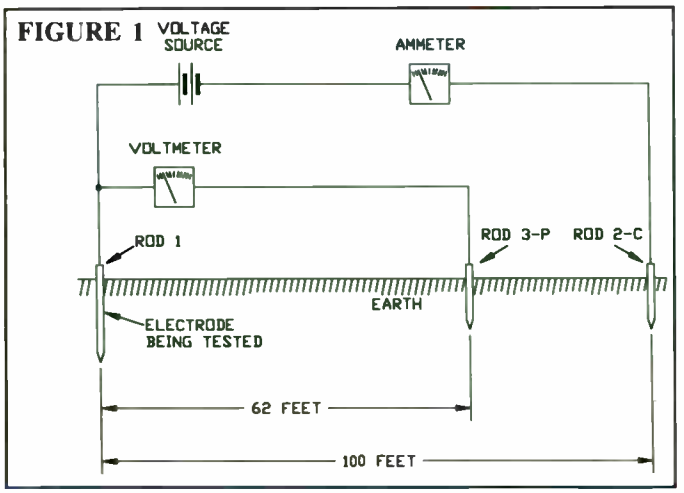
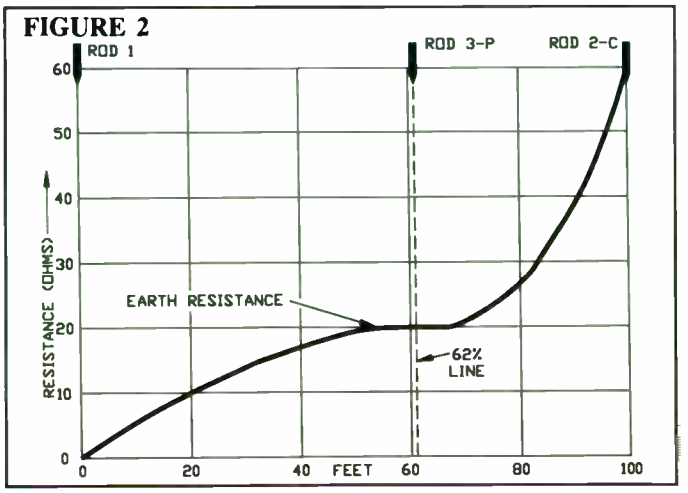


FIGURE 2



INSIDE Story

The Intelligent Fix: Harris Allied Repair Capabilities

Repair— always important— has become even more crucial in recent years. Many stations no longer have engineers on site to handle repairs, and, with the complexity of equipment, even experienced engineers may spend hours troubleshooting a problem in an unfamiliar product. Plus, many repairs require test equipment which costs more than the product being repaired. For example, a spectrum analyzer can cost up to $35,000, and gear to verify performance of a TV exciter, over $100,000.

As an important dimension of its customer service, Harris Allied operates repair centers in Quincy, Illinois and Richmond, Indiana.

Quincy: Repair of Harris-Manufactured Products

At Quincy, an eight-person staff repairs any part of a Harris product that is small enough to ship, including boards, modules, and exciters.

While the department's normal hours are weekdays from 8 a.m. to 5 p.m. CST, repair technicians are on call at all times. Repairs for customers who are off the air and have no backup transmitters are top priorities. All repairs carry a 90-day warranty or the balance of the original equipment warranty, whichever is longer.

"I'm proud of our repair service," says Repair Technician Robert Spaun. "Transmitters are a long-term investment. You can pretty much bet no one else can support a product the way we can."

For repairs of Harris-manufactured equipment, carefully pack the equipment for shipping and enclose the following information: Company name, address, and telephone number; Description of trouble symptoms and requests for special attention; "Ship to" and "bill to" address, and purchase order number if used.

Send the equipment via insured carrier, charges pre-paid, to:

Harris Allied Broadcast Division
Attn: Repair Department
30th and Wismann Lane
Quincy, Illinois 62301

Richmond: Repair of Radio Studio Products Distributed by Harris Allied

Jack Harris, manager of the Richmond Service Department, and a staff of four technicians repair products from a majority of the 300-plus different lines distributed by Harris Allied. This department also serves as a factory warranty repair center for many lines— including Otari, Tascam, Teac, Denon, and Audiometrics.

"Richmond stocks more repair parts than anyone else in the business and focuses on prompt, accurate and professional service at a reasonable price," Jack says. "Our services are unique in radio distribution. We don't just sell boxes— we back what we sell."

For radio studio equipment repairs, please call the Richmond repair center at 317-962-8596, Extension 234 weekdays from 8 a.m. to 5 p.m. EST. For emergencies at other times, leave a message in the voice mail. Describe your problem when you phone.

If the problem cannot be solved over the phone, you will be issued an authorization number to return the equipment for repair.

Carefully pack the item for shipping and send it along with the authorization number, freight prepaid, to:

Harris Allied Service Department
3712 National Road West
Richmond, Indiana 47375

RADIO Today

Digital Aural STL System Overcomes Old Limitations; Handles New Applications

by MARTHA B. RAPP
Manager - Marketing Communications

Your station hopes to take advantage of Local Marketing Agreements (LMAs) which allow one station to send programming to two or more nearby stations...

Your station feeds programming via STL (studio-transmitter link) from its studio to a transmission site up to 70 miles away but has experienced increasing interference which is playing havoc with signal quality...

Your broadcast operation needs to link many sites, including a studio more than 150 miles away from headquarters...

Your station wants to add high-quality (but cost-effective) live remote broadcasts originating 50 miles away to its program line-up...

If any of these scenarios sound familiar, you'll want to closely examine the DSP 6000 STL System from Moseley Associates, Inc., distributed by Harris Allied.

Bringing digital STL transmission to the aural STL band, the DSP 6000 has proven to be the ideal solution for many broadcasters since its introduction at NAB '91. To date, more than 300 systems have been sold. Beyond overcoming many traditional limitations of analog STL systems, the DSP 6000 is proving to be adept at new applications.

Overcoming Traditional STL Problems

For decades now, radio stations have used STL systems to carry audio from the studio to transmitter site. STL signals are transmitted via microwaves, which have several characteristics:

First, microwave signals require a clear line of sight for transmission. As a result, radio STL systems commonly require two or more "hops" in the signal path.

Second, microwave signals are highly subject to interference in areas where frequencies are crowded.

Third, microwave signals are prone to fades— a deterioration of signal-to-noise ratio (SNR) most commonly caused by weather conditions.

While analog STL systems have been an excellent alternative to telephone line signal delivery, they have presented some limitations. For one, they tend to pick up noise during transmission. The solution— increased gain— requires larger (and more costly) antennas and transmission line. For another, they typically experience a 3 dB deterioration in signal-to-noise (SNR) ratio at each hop as the signal is received then re-transmitted. For still another, they are highly susceptible to reduced signal quality from fades.

Digital STL Benefits

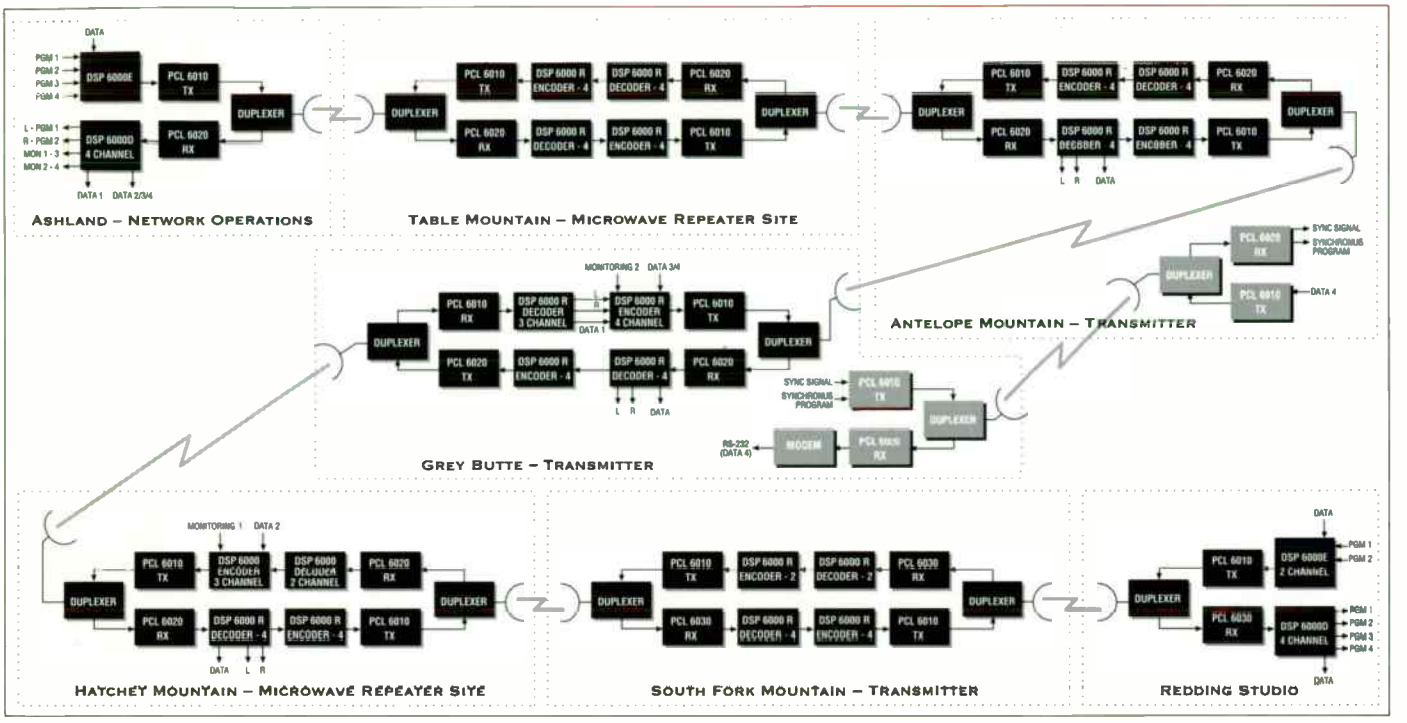
Moseley's DSP 6000, which accommodates up to four 15 kHz program channels plus two auxiliary channels, overcomes limitations associated with analog STL systems. The system offers:

- Immediate cost savings: The DSP 6000 requires 25 dB *less* signal than an analog STL to deliver a >90 dB dynamic range. This reduces antenna and transmission line costs and eliminates the need to upgrade to more expensive antennas for longer signal paths. The DSP 6000 system works with four-foot antennas despite the length of the signal path.
- Consistent CD-quality: Digital audio is immune to problems which have traditionally degraded sound in analog STL systems. Quality remains consistent no matter how many hops there are in the signal path. Unlike analog STL systems, which receive then re-send the signal at each hop, the DSP 6000 passes an intact digital signal. Signal-to-noise (SNR) ratio, the DSP 6000 delivers its full dynamic range all the way down to the digital threshold.
- Spectral efficiency: The DSP 6000 operates in existing channels from 100 kHz to 500 kHz and can co-exist with established radios.
- Direct digital interface: Built-in AES/EBU digital audio interface allows the DSP 6000 to accept or deliver digital audio to or from other digital audio equipment. Multiple signal-degrading analog-to-digital and digital-to-analog conversions are eliminated.

The DSP 6000 consists of a digital encoder (the DSP 6000E); a composite STL transmitter and receiver, and a digital decoder (the DSP 6000D). If you already own a Moseley PCL 6000, 600, 606, 505C or 500 STL or a TFT 7700 or 8300 system, you can upgrade your system. The upgrade, which involves a minor modification to your STL and the addition of the DSP 6000 encoder and receiver, costs about $6,000 for a two-channel system. Complete packages, which also include the Moseley PCL 6000, are available from $13,000.

To discuss your specific application, please phone Harris Allied at 800-622-0022. In Canada, please call 800-268-6817.

Diagram 1: Jefferson Public Radio, Ashland-Redding Network



A Tale of Two Stations: Using Digital STL for New Applications

I. A Cost-Effective Digital Network

Jefferson Public Radio uses the Moseley DSP 6000 and the MRC 1620 Remote Control to link its Network Operation Center in Ashland, Oregon with its Redding, California studio more than 150 miles away.

This cost-effective digital network is possible because the DSP 6000 permits digital signal regeneration and also allows audio to be dropped off and inserted at a midpoint in a repeater configuration. Digital signal regeneration frees multiple-hop STLs from audio degradation normally associated with analog regeneration.

The Jefferson Public Radio network (Diagram 1) accomplishes the following:

1. The system conveys two stereo channels from the Network Operation Center at Ashland to transmitter/repeater locations on Table, Antelope, Grey Butte, Hatchet and South Fork mountains down to the Redding studio.

2. It backhauls a stereo signal from the Redding studio to Ashland.

3. It enables broadcasts from the Hatchet Mountain and Grey Butte transmitting locations to be monitored at the Ashland Network Operation Center.

4. It provides a simple single-hop program to carry a synchronizing program to the Antelope Mountain booster from Grey Butte.

5. It remotely controls all equipment at Redding, Hatchet Mountain, Grey Butte and Antelope Mountain on both a dedicated and dial-up basis.

Typical path length between sites is 35 miles. Celwave duplexers enable a common antenna to be used for transmission and reception. While average signal strength at each receiver is only - 150 dBm, the DSP 6000 requires only -93 dBm. Thus, fade margins are kept well over 1 dB per mile on each shot, using only half-inch Andrew LDF4-50 at all sites.

A PC in the Ashland studios maintains constant vigilance over all sites using the DSP 6000's RS-232 data ports to facilitate a 4800 baud, full duplex data path for the remote controls. PC dial-up to sites can be made during an emergency. **(From Moseley Associates, Inc.)**

II. Live Remote via Digital 950 MHz STL

KRFD Marysville, California recently proved it *is* possible to do a top-quality live remote broadcast via digital 950 MHz STL— even with a 47 mile path!

The challenge this past May 21? To broadcast a Grateful Dead concert and interviews live from the outdoor CalExpo Amphitheater. The budget? Next to nothing. The solution? Borrowed equipment: At the KRFD transmitter site on top of the Sutter Buttes, a transmit dish was hung on the lightning grid and a receive dish on a vacant pole by Dave Field of Field Tower Systems. Dale Harry, chief engineer of KGBY Sacramento loaned KRFD his spare STL system, and KQBR Davis, its new Moseley DSP 6000.

The signal path started with a feed from the house-mix board; went to a backstage stereo mixer which fed the digital STL; was transmitted to Sutter Buttes, converted to analog and fed to the transmitter from an Optimod 8000.

The results? First-rate— so good, in fact, that KRFD taped the broadcast with a DAT machine at the transmitter and periodically plays back songs from the concert. **(From SBE Chapter 43, SAC Monthly Newsletter)**

FAST Facts

FAX TO HARRIS ALLIED BROADCAST EQUIPMENT 317-966-0623, IN CANADA 416-764-0729
OR MAIL TO HARRIS ALLIED, P.O. BOX 1487, RICHMOND, IN 47375

PLEASE PRINT OR TYPE

I'd like more information on:

_____
_____
_____
_____
_____
_____

My need is:

- ☐ Immediate
- ☐ Near future
- ☐ Long range

Please:

- ☐ FAX to me
- ☐ Mail to me
- ☐ Call me

My intended use is:

_____
_____
_____
_____
_____
_____

I need:

- ☐ Prices
- ☐ Product literature
- ☐ Delivery information
- ☐ Ideas or help

on: _____
_____
_____
_____
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_____

My Name: _____

My Title: _____

Company/Station: _____

Street Address: _____

City: _____

State: _____ Zip: _____

Phone: ( ) _____ FAX: ( ) _____

HARRIS ALLIED

PHONE 800-622-0022 IN U.S., 800-268-6817 IN CANADA

Trak★Star

MULTI TRACK HARD DISK RECORDER SYSTEM

Instructions: Remove From Packing Box and Start Editing!

Trak★Star, by Arrakis Systems, is the first cost effective multitrack digital audio recorder, mixer, and editor designed specifically for the radio broadcast professional. The TS-8 provides two audio input and output channels with comprehensive playback and editing of up to 8 tracks simultaneously from disk. Ready to use right out of the box, the TS-8 base system comes complete with rack mounted digital hard disk controller, color VGA monitor, keyboard and trackball. Anyone in your radio station can now achieve the creativity and productivity of multitrack editing.

With Trak★Star, creating spots, jingles and liners has never been easier. Record and store on disk all of your standard music beds and sound effects. Select any combination of up to 8 of these sound files for editing and mixing. Once selected, you can easily cut, splice, copy, move, delete, and fade any combination of these files to create your new spot or jingle. Record or overdub new voice tracks into the system while simultaneously playing back your preassembled mix. No matter how much you cut, splice or throw away pieces of files...non-destructive digital editing leaves your original files unchanged.

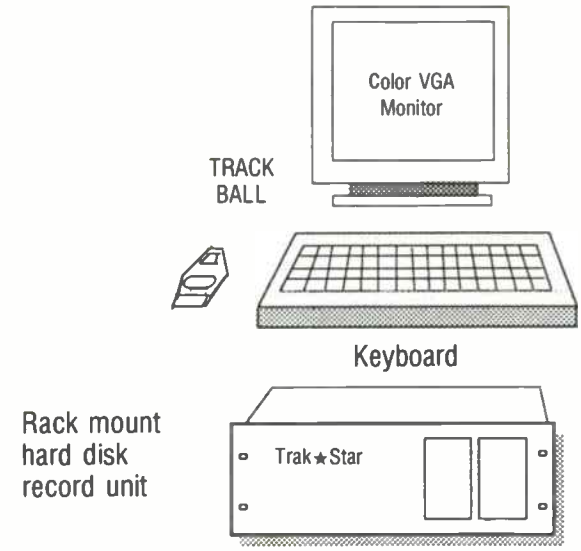
With its built-in mic preamp, Trak★Star is literally a complete multitrack studio in a compact box. Call Harris Allied for all the details.

1-800-622-0022

FEATURES

- 8 track editing and playback of 4 stereo-mono pairs
- Two channel audio input and output
- CD quality audio performance
- Non-destructive real time editing
- Loop scrub for easy, precision location of edit points
- Full Keyboard and Trackball control
- Base system is complete- Hard disk controller with 120MB storage, VGA color monitor, keyboard, and trackball

Basic Trak★Star Hardware



TS-8C Record Unit

The basic system comes complete and ready-to-use out of the box. It includes the record unit with 110MB of audio storage, VGA monitor, keyboard and trackball.

TS-766

Is a 766MB hard drive for added audio storage.

TS-128

Is a 128MB removable optical drive for added storage.

HARRIS ALLIED