

## A JBL INSTALLATION

# CLAIR BROTHERS and JBL

Any discussion of touring sound companies will invariably bring up the name of Clair Bros. Audio, and with good reason. One of the pre-eminent live sound firms in the world, Clair Bros. has been setting trends while taking care of concert sound clients since 1966.

At that time, brothers Roy and Gene Clair began to sense a market for a portable concert sound system to serve traveling musical groups that came through rural Pennsylvania. Starting with local college dates, the ambitious pair began to establish a reputation for providing concert sound that was loud and clear. After a few years, their accounts included rock groups like Chicago, the Beach Boys, Iron Butterfly, and the Grateful Dead.

The company's reputation spread internationally, and English groups such as Yes, the Moody Blues and Elton John helped the company to grow. The seemingly endless list of Clair Bros. clients includes many of entertainment's greatest, including Elvis Presley, the Rolling Stones, Kenny Rogers, Tina Turner and Bruce Springsteen.

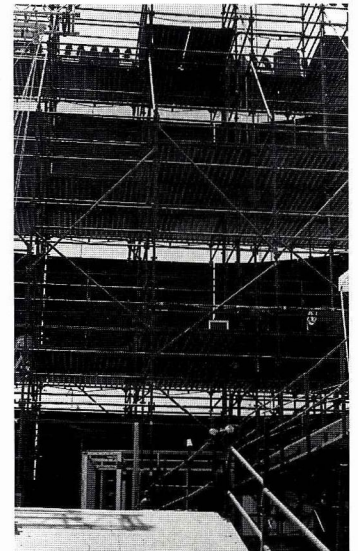
Since its early years, Clair Bros. has relied on JBL loudspeaker components. The company has worked closely with JBL engineers to develop transducers that could handle the high-power demands of the touring rock industry on a long-term basis. Clair Bros. Audio has set standards in both individual component development and whole system design. "We were one of the first sound companies to go with smaller cone speakers for improved intelligibility, first the 12" and then the 10" speaker," explained company co-founder Roy Clair. "That meant working with JBL to develop speakers that could hold together and deliver good sound for large concert use in our systems."

One of Clair's most notable achievements was the development of the S-4 loudspeaker cabinet, a single-box full range enclosure that made the assembly of large, portable hanging and stacking systems more feasible. Developed in the early 1970's, the S-4 cabinet has gone

through several design evolutions to incorporate the latest in transducer, materials and hardware technologies.

A typical S-4 contains a pair of JBL 46 cm (18") loudspeakers, four JBL 25 cm (10") loudspeakers, JBL 2441 compression drivers and custom-built JBL ultra-high frequency compression tweeters. Each unit weighs approximately 193 kg (425 lbs.) and measures 109 cm (43") high by 114 cm (45") wide by 56 cm (22") deep.

Multiples of S-4 enclosures are used to assemble large arrays. A typical indoor arena tour may use from 48 to 64 cabinets. Larger outdoor stadium and festival shows may require up to 200 or more speaker cabinets.



Rear view of the scaffolding for the sound system.



Three-array system (left, center, and right). Note curvature in both horizontal and vertical planes.

Clair Bros. technicians have become highly skilled in assembling and using powerful systems for large outdoor public music events. In fact, many of the major rock festival dates handled worldwide involve Clair Bros. systems. Notable events such as Rock In Rio (Brazil), Live Aid (USA), the Amnesty International Tour (world wide), and the 1982 and 1983 US Festivals (USA) have been handled by Clair Bros.

Such mega-events can become the focus of worldwide attention, and the sound reinforcement needs for them can be highly complex. For example, 1985's Live Aid concert in Philadelphia, Pennsylvania, USA, involved providing sound for 40 different bands in 14 hours. The 1983 US Festival, staged in California, drew nearly 300,000 persons on a single day to a 22 hectare (54 acre) site, and

involved 34 different performing acts spread out over several days.

Typical of Clair Bros. approach to live outdoor sound for festival events, the system for the 1983 US Festival included a total of 180 S-4 enclosures. Stacked on 12 meter (40') wide platforms on both sides of the performing stage, the S-4's were grouped in vertical columns, nine boxes high and ten boxes wide. Approximately 60 custom long-throw horns were arrayed atop the 15 meter (48') high scaffolding towers to project high frequencies far into the listening audience.

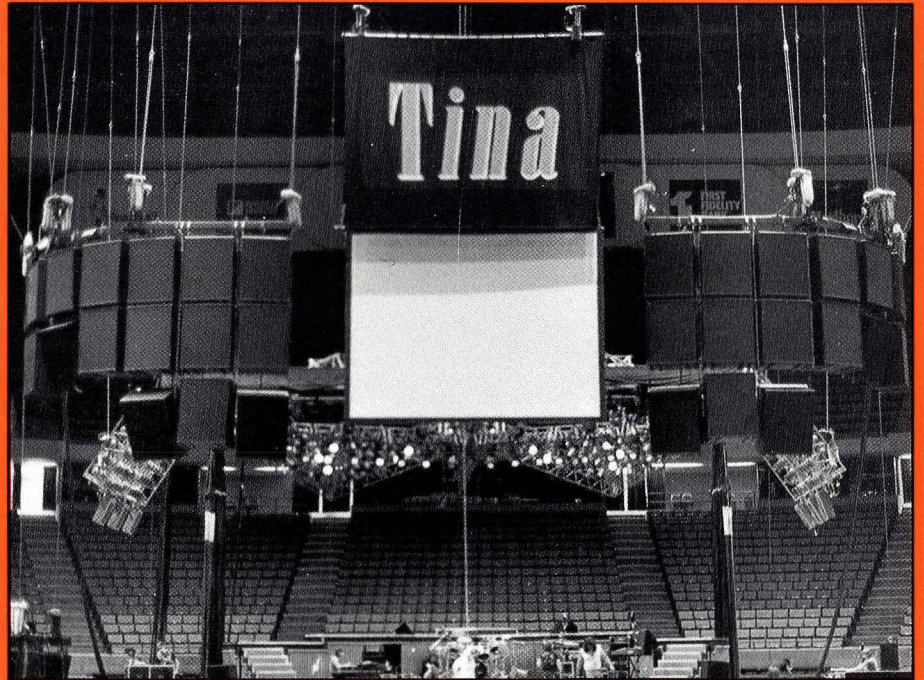
The house mix position was located 46 meters (150') out in front of the stage, and four additional delay speaker towers were located in the audience area at a distance of approximately 180 meters (600') from the stage.

The main stacked S-4 speaker arrays were configured to offer maximum control regarding both level and frequency-range balance to the system operating technicians. "We found it to be really important that the engineers have complete control over what was coming out of such a large loudspeaker array," explained Roy Clair.

Each speaker stack, consisting of 90 enclosures, was divided into eight different sections, or zones. The output mix for that side of the stage was sent to eight different sets of system output electronics, including compressor-limiters and Clair custom crossovers. System specifications for the US Festival site called for an average sound pressure level during the program from 90-100 dB as measured at the rear of the audience area, nearly 400 m (1/4 mile) away.



View of 40-input console.



Two-way system (left and right). Note curvature in both horizontal and vertical planes.

Electrical power requirements for such large systems are enormous. The 1983 US Festival made use of a V-16 Caterpillar diesel engine, driving a one million watt generator set. 800-amp, three-phase alternating current at 123 volts was available to Clair Bros. for sound system needs.

Clair Bros. designs and builds compact, custom electronics racks holding modified power amplifiers. Different models from several manufacturers are employed, depending on the application. "When we are assembling such large systems, the choice of type and size of power amp can make a big difference in both weight and space," noted Ron Borthwick, senior design engineer for Clair Bros. "A huge system that is being shipped overseas needs to have every advantage, in terms of size and weight, that we can give it."

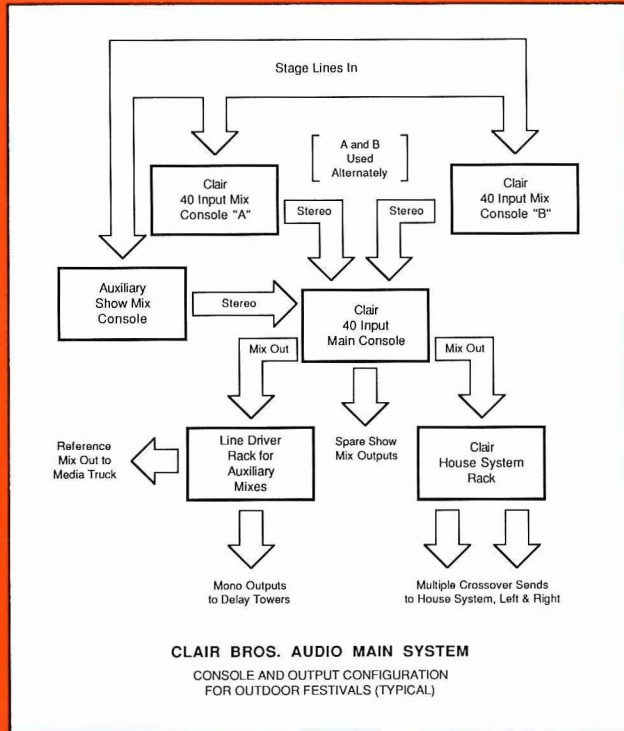
Touring acts enjoy favorable treatment from Clair Bros. when stage monitors are considered. The company designs and builds its own custom monitor enclosures, and has a sophisticated wood shop facility for the construction of unique, durable cabinetry. The firm has been known to go to great lengths to custom tailor monitor systems for particular shows. For example, floor slant monitors for a Beach Boys tour were once painted ocean blue to match the stage set. For Bruce Springsteen, custom floor monitors were built into the artist's stage flooring, with bass speakers hidden below metal grillwork.

While Clair Bros. uses mixing consoles available from several different manufacturers, the company's own trend-setting

custom console, originally available in a 32-input version with a limited number of auxiliary sends for use effects units, is still used with great success. Updates have expanded the consoles input and output facilities and kept it competitive with commercially manufactured products. Designed by Ron Borthwick of Clair Bros. and Bruce Jackson (sound mixer for Bruce Springsteen and Fleetwood Mac), the desk is center-hinged, and the two control sections fold together for ease of transport. This innovative mechanical feature is a hallmark of the Clair custom console. The original design criteria of quality sound, ease of operation, dependability, and portability appear to have been met, as is evident by the thousands of successful shows the Clair consoles have been used for since the devices were first introduced in the 1970's.

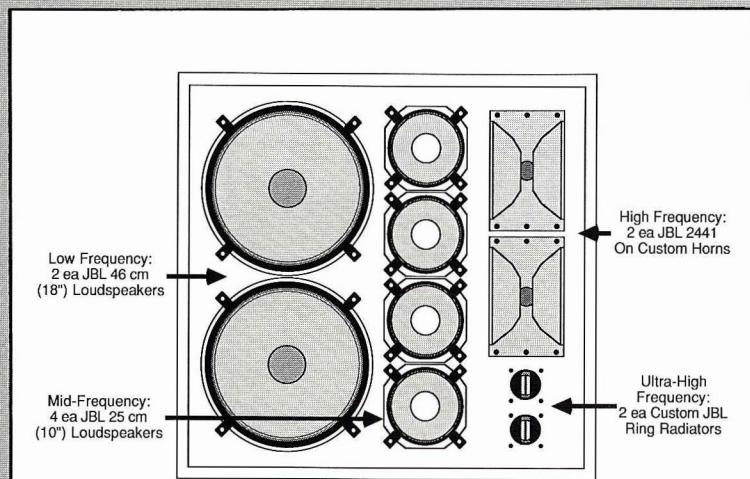
While Clair Bros. systems have become somewhat standardized over the past two decades, clients still have many options when it comes to specifying sound equipment for touring use. The S-4 enclosures are available in several different versions. This can include mirror-image pairs that are intended to improve coupling in large-array setups. Long-throw horn cabinets and extra-powerful low frequency subwoofers are available for tailoring a system to suit a group's needs. The Clair C-4 one-box system makes use of speaker enclosures that are somewhat larger than the S-4's, for increasing bass response. Each C-4 enclosure houses three 46 cm (18") speakers in the bass section, and a horn loaded mid-bass section. The vast majority of loudspeaker components in each system is manufactured by JBL.

An extensive inventory of the latest in microphones, signal processing equipment and mixing consoles is available for worldwide shipment. Some touring clients choose to take only consoles and electronics racks overseas. Other major performance projects elect to ship entire Clair systems to several different continents, to insure consistent live sound as they tour the world. A London office facilitates system operations and logistics for Clair clients that are touring the European continent.



A commitment to technical excellence and a lot of hard work has helped two brothers turn a high school hobby into a multi-million dollar international enterprise that employs nearly 75 people. Recent tours by Michael Jackson, Madonna, Fleetwood Mac, and David Bowie have all made use of Clair Bros. services, both in the United States and abroad. The company continues to expand both its client list and its speaker system inventory, and Clair systems are becoming more of a familiar sight internationally. Clair engineers continue to collaborate with JBL transducer engineers as products that are ideally suited to live concert sound are developed.

Clair Bros. Audio can be reached at (717) 665-4000. The mailing address is P.O. Box 396, Lititz, Pennsylvania 17543, USA.



**CLAIR S-4 SPEAKER ENCLOSURE (TYPICAL)**

Dimensions: 109 x 114 x 56 cm (43" X 45" X 22") (HxWxD)



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