

# Crafting the lightweight

# Sup

Santa Fe's six years under the leadership of forward-looking Samuel T. Bledsoe were revolutionary in more ways than one

BY LARRY E. BRASHER

**B**ETWEEN 1933 AND 1937, several revolutionary designs and new manufacturing techniques came together on the Atchison, Topeka & Santa Fe Railway to produce an outstanding example of technological advancement by an American industry. The result was the celebrated *Super Chief*.

This classic train, a gleaming stainless-steel streamliner powered by E1 diesels that introduced the famous red-and-yellow "Warbonnet" livery, did not spring full-blown into service, though. "The Super" became a streamlined, lightweight train in 1937 after a three-and-a-half-year development period.

The nurturing of the corporate environment necessary for the train's creation began with the authorization for expenditures to air-condition existing standard ("heavyweight") passenger cars granted by the Santa Fe board of directors to President Samuel T. Bledsoe on November 28, 1933. The truly creative period began the following year, when Bledsoe request-

ed funding for the diesel locomotives that would become the power for the first *Super Chief*.

In 1935, Bledsoe requested more money for the creation of experimental lightweight passenger cars. The funding was approved, allowing design and production work to commence. The next year, Bledsoe again went to the board and requested funds to buy new lightweight rolling stock and diesel locomotives to create a new, luxurious Chicago-Los Angeles train. The creative journey culminated on May 18, 1937, with the debut of a wholly new, lightweight *Super Chief*.

William Benson Storey had retired as president of the Santa Fe on May 2, 1933. He had been in office at the beginning of the Depression and was said to be exhausted from the workload imposed by his successful endeavors to maintain the road's



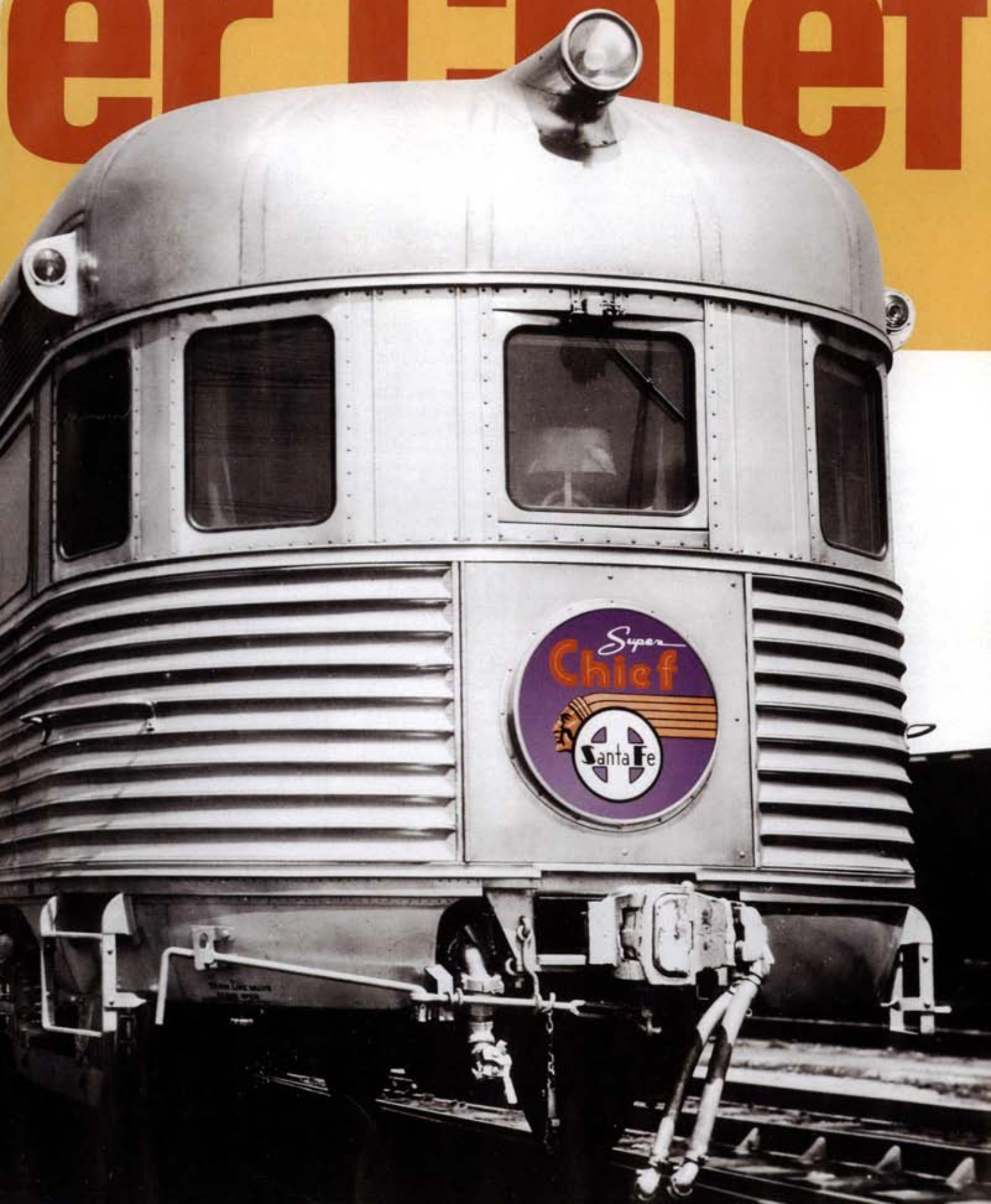
C. H. KERRIGAN PHOTO, AL CHIONE COLLECTION

From Warbonnet E1 diesel No. 2A to observation car *Navajo*, the original streamlined *Super Chief* was a triumph of fine design.

SANTA FE PHOTO; EMBLEM COLOR BY ROGER GROAT



# er Chief



solvency. In the midst of the economic slump, Storey was succeeded by Samuel T. Bledsoe, a forward-looking executive.

Bledsoe was not a railroad man in the tradition of his predecessors Storey, Edward Payson Ripley, and William Barstow Strong, all of whom had hands-on operating experience before being named president. Bledsoe came to the presidency with a strong background in law, specializing in land and railroad legal matters. Perhaps because he had no direct operating experience, Bledsoe was never reluctant to take on new technology. In his six years leading the Santa Fe, he demonstrated an enthusiasm for it, and for the required monetary investment in it. Not only did he direct the acquisition of new, advanced locomotives (both steam and diesel), he instituted new high-speed, streamlined passenger service and spent large sums on improving the physical plant and modernizing the right of way to accommodate it.

The drastic reduction in business activity and personal travel brought about by the Depression severely affected freight and passenger service. Losses were exacerbated by three factors: the rapid rise in private auto ownership, which pummeled intrastate passenger patronage; the fledgling air-transport industry; and the expansion of the interstate trucking industry, which cut freight revenues, especially less-than-carload business.

In 1929, Santa Fe's operating revenue was \$267.2 million, yielding income of \$61 million. By 1932, the figures had dropped to \$133 million and \$7.5 million, respectively. These issues and numbers were the focus of attention for President Bledsoe and W. K. Etter, vice president, operations. They were aware of both the need for advanced locomotive technology for faster freight schedules that would recover lost traffic, as well as the need to boost passenger patronage.

At the Santa Fe directors meeting of November 28, 1933, Bledsoe brought up the first of his many suggestions for improving passenger service. Since the railway's Chicago-Los Angeles route traversed the hot desert Southwest, Bledsoe pushed the idea of using air-conditioning passen-

Having left Chicago's Dearborn Station two days earlier, the inaugural run of the *Super Chief* rolls into Pasadena, Calif., on May 14, 1936. The boxy "One-Spot Twins" head up the all-heavyweight consist.

ger cars. The board agreed and approved the expenditure.

And spend he did. During 1934, Santa Fe installed the new steam-ejector air-conditioning system in 66 cars: 18 club-lounges, 4 café-observations, 14 dining cars, 13 Pullman room cars, and 17 Pullman observation cars. Counting the 23 dining cars Santa Fe previously had air-conditioned, the railway was operating 89 air-conditioned cars by the end of 1934. This was the first of a series of decisions that would see Santa Fe offering one of the finest and fastest long-distance passenger-train fleets on the continent.

On May 29, 1934, Bledsoe convinced the board to approve the air-conditioning of 30 Pullman sleeping cars. The following year Santa Fe added even more air-conditioned standard Pullman sleepers, club-lounges, and diners to its fleet. The estimated cost of each car's conversion: \$8000.

### BOX-CAB DIESELS AND HEAVYWEIGHT CARS

Having introduced air-conditioned comfort for first-class passengers beyond dining cars, Bledsoe then turned to motive power. He was aware of the new diesel-electric demonstration locomotive in the planning stages at Electro-Motive Corp., whose chief engineer, Richard Dilworth, had conceived and was working on the concept of a multiple-unit locomotive.

This machine would incorporate his untried idea of a diesel-powered mainline locomotive with an enclosed body and main frame fabricated from structural steel. Dilworth was intent on creating a 3600 h.p. multiple-unit locomotive powered by four of the new 900 h.p. Winton 201A diesel engines,

The *Super's* box-cabs and heavyweights gave way to streamlined E1 diesels and stainless-steel cars in May and June 1937. Though no more powerful than the One-Spots, the E's were miles ahead in styling.





TWO PHOTOS, SANTA FE





SANTA FE



GEORGE A. TRAEGER

Passengers knew the *Acoma* (top) as a bar-lounge car, but it also had bunks for the dining-car crew. Diner *Cochiti* sat 36 at tables for four and two; the car is now at the California State Railroad Museum, its tables set with china from many roads.

two per unit, each driving a generator that would furnish electric power to truck-mounted traction motors. On the Santa Fe, the result would be Nos. 1A and 1B, the "One-Spot Twins," the fourth and fifth such 1800 h.p. box-cab units built by Electro-Motive, in September 1935.

Bledsoe conceived the idea of marrying EMC/Winton's new technology

with existing standard Pullman equipment to begin a high-speed, first-class Chicago-Los Angeles passenger train. Bledsoe intended to maintain the traditional standard of luxurious service provided by the original *California Limited* of 1892, the *de-Luxe* of 1911, and the existing flagship, the all-Pullman, extra-fare *Chief*, introduced in 1926. The new train—high-speed, all-Pullman, extra-fare, to be known as the *Super Chief*—would operate on a 40-hour schedule, beating the *Chief's* time by 15 hours. The *Super Chief* actually would operate on a schedule of 39¼ hours, an average of almost 56 mph for its 2224-mile route.

On September 11, 1934, the Santa Fe board, after hearing Bledsoe's presentation of his revolutionary proposal, authorized the purchase of a 3600 h.p. diesel locomotive at a cost not to exceed \$400,000. In the short term, the new locomotive would pull a *Super Chief* equipped with heavy-weight cars, but Bledsoe believed that lightweight equipment was the future of passenger service.

He was also well aware of the success of Chicago, Burlington & Quincy's lightweight, stainless-steel, diesel-powered *Zephyr*, completed earlier in 1934 by the Edward G. Budd Co. of Philadelphia. The *Zephyr's* construction was based on the new manufacturing technique known as Shotwelding, a system perfected and patented by Budd's chief engineer, E.J.W. Ragsdale. This allowed stainless steel to be assembled without compromising its inherent strength and without marring the surface of the material. Budd lightweight cars employed a basic stainless-steel truss structure and stainless corrugated exterior sheeting, which increased stiffness.

This construction had been proven to be safe and effective in the *Zephyr*, and Bledsoe was convinced this approach was the solution to the challenge of reducing car weight. Wisely, though, Bledsoe wanted no part of the comfort or operational limitations imposed by the *Zephyr's* smaller-than-standard, articulated cars.

On June 25, 1935, Bledsoe received board approval for a maximum expenditure of \$200,000 for "diesel engines and light passenger cars." The diesels would be switchers, not a new concept, but the cars would be the first of a fleet of non-articulated, standard-size, lightweight rolling stock.

In January 1936, Budd delivered to Santa Fe for testing one lightweight stainless-steel 52-seat coach, No. 3070. It was the builder's first non-articulated, full-size, stainless-steel passenger car, and would be the prototype for many hundreds of siblings to follow. Fully equipped and ready for service, it weighed 83,500 lbs., about half that of a standard 160,000-lb. chair car. Santa Fe's experience with 3070 later in the year led the company to order from Budd the first lightweight *Super Chief* trainset.

## Cars of the lightweight *Super Chief*

This wasn't the only project spawned by coach 3070. Three years before, Lawrence J. Brasher, a machinist and the author's father, submitted a detailed proposal for a dedicated Chicago-Los Angeles train offering all chair-car service. The experience with the 3070 led Charles T. Ripley, Santa Fe's chief mechanical engineer, to suggest a lightweight version of a high-speed, but lower-fare, Chicago-L.A. train. This resulted in the all-coach *El Capitan* of 1938.

Eleven months after Budd delivered the 3070, Santa Fe accepted another lightweight chair car, 98,000-lb. smooth-side 3071, constructed of Cor-Ten steel by St. Louis Car Co. This car did not, however, influence the design of the *Super Chief* already under construction in Philadelphia.

### BLEDSOE'S AUDACIOUS PROPOSAL

Despite a major fire on one of the EMC "One-Spot Twins" during a November 1935 preliminary run of the heavyweight *Super Chief*, an undaunted Bledsoe presented his board with an audacious proposal on February 25, 1936—to equip six trainsets for Chicago-Los Angeles service, each with a diesel locomotive. The board approved a \$5.5 million expenditure for this.

One lightweight sleeping car, *Forward*, Pullman's first, had been put in test use in the heavyweight *Super Chief* in November 1936. *Forward* was due to be returned to Pullman in January 1937, but it was so successful that Santa Fe never let it go, purchasing it outright later in 1937. *Forward* served in revenue service until it was designated as a dormitory car in 1963.

Launched on May 12, 1936, the heavyweight *Super Chief* didn't last long—it was less than a year old when Santa Fe received the first lightweight set, of nine cars, from Budd in April 1937. The cars were tested extensively before entering scheduled service.

This trainset was initially equipped with American Steel Foundries slack-control couplers, but during the first movement of the coupled train at Budd, accidental uncouplings occurred, so necessary adjustments resulted in a delivery delay. The air-conditioning was of the steam ejector type as made by Vapor and Safety Car



3 Compartments — 2 Drawing Rooms — 1 Double Bedroom — Observation



2 Drawing Rooms — 2 Compartments — 6 Double Bedrooms



8 Sections — 2 Compartments — 2 Double Bedrooms



Club Lounge Car

Name/No.	Car type	Weight (lbs.)*
3430	Baggage	75,060
Isleta	Sleeper (8-section, 2-compartment, 1-drawing room)	104,900
Laguna	Sleeper (8-section, 2-compartment, 1-drawing room)	104,900
Acoma/1370	Bar lounge-dormitory	96,940
Cochiti/1474	Diner	110,200
Draibi	Sleeper (6-bedroom, 2-compartment, 2-drawing room)	107,500
Taos	Sleeper (6-bedroom, 2-compartment, 2-drawing room)	107,500
Navajo	Observation lounge-sleeper (3-compartment, 2-drawing room, 1-bedroom)	102,260

\* Weights do not include fuel, interior supplies, or people. Weights do include ice and water.

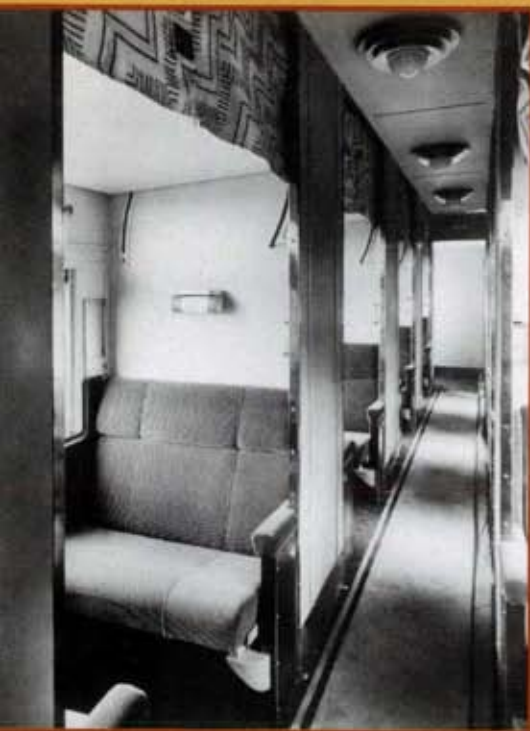
Heating Co. All the trucks were four-wheel with individual brake cylinders and clasp brakes; standard Westinghouse Air Brake equipment was successfully adapted to this high-speed operation.

Designed and built as part of the original set, lightweight Railway Post Office car 3400 did not enter service on the *Super Chief* because the Post Office Department required operation of mail-service equipment only on daily scheduled routes, and the *Super* ran only once a week. Although 3400 was tested as part of the nine-car set, it was then assigned to pool service.

The first lightweight *Super Chief*

consisted of a baggage car; two 8-section, 2-compartment, 1-drawing room sleepers; a bar-lounge-dormitory; a dining car; two 6-bedroom, 2-compartment, 2-drawing room sleepers; and an observation-lounge 3-compartment, 2-drawing room, 1-bedroom sleeper.

This consist was assigned to trains 17 and 18 throughout 1937. The entire train was serviced and turned at Chicago and Los Angeles after each run. This pattern, already established with the heavyweight *Super Chief* in 1936 and which allowed for the addition of equipment to handle increased passenger loads, would last substan-



Inside the *Super*: The section accommodations (above) in *Isleta* and *Laguna* indicate that the 1937 train just predated the all-private-room era. A view in *Navajo* (right) looks forward from the observation lounge toward the Pullman rooms. Two photos of lounge-dorm *Acoma* (opposite page) look toward and away from the bar.



tially unchanged for the *Super Chief* and *El Capitan* until the *Super's* takeover of the *Chief's* transcontinental sleepers in 1954.

Naturally, the riding qualities of the new cars were of great importance. During testing in 1936, noise and vibration levels inside cars were carefully monitored. Structural vibration was also a concern, and was recorded by specially installed equipment. Some harmonic vibration was noted and considered to be "possibly a function of this type construction." The data was also compared to earlier information from lightweight German railway equipment.

Equally important, high-speed braking tests were conducted. Stopping distance was a critical factor. As part of the big Santa Fe physical-plant modernization begun in 1935, signals had been adjusted for the high speed of the original heavyweight *Super Chief*. Brakeshoe wear was monitored, and brake-line and brake-cylinder pressure adjusted to allow maximum braking efficiency without sliding the wheels, a significant dan-

ger, especially at high speed, because any imperfection in track structure encountered by a non-rotating wheel could result in a derailment.

Coal-fired Pacific 3420 was used in testing on the Illinois Division, which confirmed that fuel consumption was 8 percent less and running time 12 percent faster with lightweight cars as compared with heavyweight cars. Steam performance was of great interest because several new trains being contemplated for introduction in 1938 with lightweight cars would have to be powered initially by steam locomotives. The test data indicated that all aspects of steam performance and economy benefited significantly from lightweight cars. The nine-car train as tested weighed 45 percent less than a similar heavyweight train.

#### WARBONNET AND STAINLESS STEEL

The first run of the streamlined, stainless-steel *Super Chief* with its intended motive power occurred on June 15, 1937. Heading the train were Electro-Motive's first E1 diesels, a

brand-new A-B duo numbered Santa Fe 2A and 2B. No. 2A was an E1A, with a control cab; 2B was a cabless E1B. They were the first diesels to wear the famous "Warbonnet" paint scheme of red, yellow, and silver, with black accents, designed by EMC illustrator Leland A. Knickerbocker.

Direct descendants of the box-cab One-Spot Twins of September 1935, the 2A and 2B together weighed 287 tons and had a combined length of 141 feet, 4 inches. Tractive power of each unit was approximately 91,000 lbs. at starting. The units were geared for an astonishing top speed of 116 mph. Each rode on two A1A trucks, meaning the center axle of three on each truck was not powered. The E1 cab unit shared the sloped nose introduced several weeks earlier on six similar EAs for Baltimore & Ohio.

EMC was late in delivering the E1's, as the lightweight train itself had actually debuted a month earlier. Its first exhibition run, to Santa Fe, N.Mex., was behind steam, while the One-Spot Twins handled the special introductory run from Chicago to Los



FOUR PHOTOS: SANTA FE; DAVID LUSTIG COLLECTION

Angeles and return, as well as the regularly scheduled runs from May 18, 1937, into mid-June.

The L.A.-Chicago return leg of the introductory special—powered most of the way by the short-lived trio of box-cabs 1A, 1B, and 1C—was made in 36 hours, 20 minutes, setting Santa Fe's all-time passenger speed record. At the time, Santa Fe press releases and magazine articles ignored this fact, which led to later historical confusion, as the record run attributed to 2A and 2B were in reality the work of the Twins and 1C. (In July 1936, one of the original 1800 h.p. demonstrator units, EMC No. 512, was leased from Electro-Motive for use as a relief unit on the *Super Chief*. Carried as No. 1C while on the Santa Fe, and closely related to ATSF 1A and 1B, she took part in early experiments in the operation of three units in multiple.)

#### LUXURY INTERIORS WITH NATIVE AMERICAN FLAVOR

The lightweight *Super Chief* was the epitome of luxurious design and service. The car names, chosen by

Roger W. Birdseye, Santa Fe's general advertising manager; honored Pueblo villages or Native American tribes: *Isleta, Taos, Acoma, Cochiti, Oraibi, Laguna, and Navajo*. The cars' interior decoration, by designer Sterling B. McDonald, was inspired by the Native American culture of the land through which the train passed.

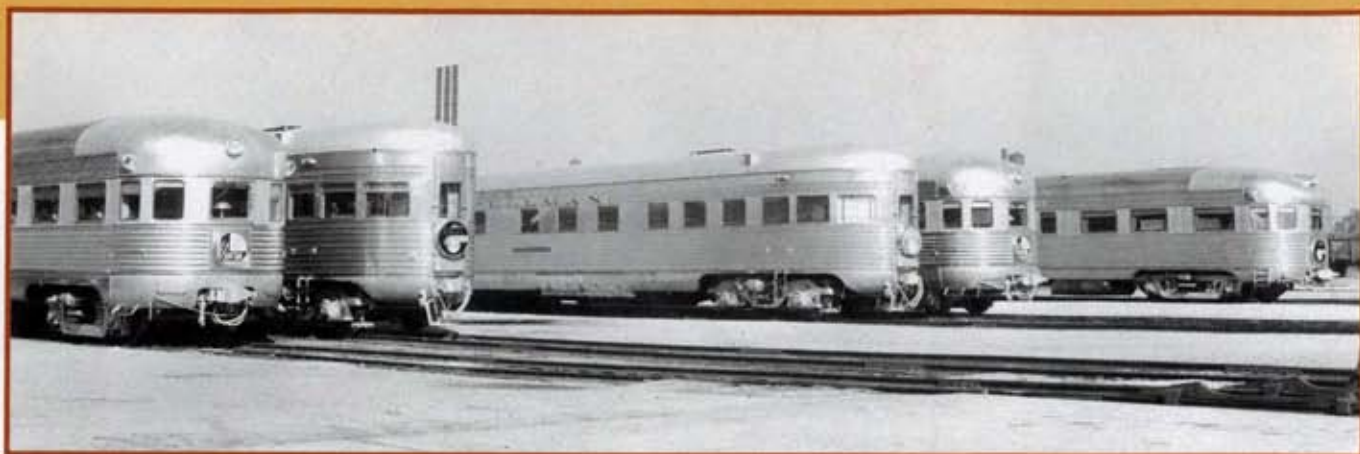
The two 8-section cars, *Isleta* and *Taos*, had rugs and window drapes of Native American design. Each open section achieved a semblance of privacy by the use of floor-to-ceiling aisle panels partially enclosing the seats. Upper berths in the sections were

equipped with small double windows.

A striking interior feature was the rare and valuable wood paneling, in each room of *Oraibi* and *Laguna*, the two 6-bedroom, 2-compartment, 2-drawing room cars. Each sleeping area was treated with a different Flexwood veneer: bubinga, white hawthorn, avodire, macassar ebony, prima vera, zebrawood, Brazilian rosewood, ebonized maple, American holly, redwood burl, teak, aspen, and satinwood. Each room was finished in a different pattern, which made them pleasant, attractive, and unique.

Bar lounge-dormitory 1370 *Acoma*,





SANTA FE

The 1937 *Super Chief* was the first in an illustrious line of Santa Fe streamliners. At a February 1938 photo session in Chicago, observation cars marked for the *El Capitan*, *Super Chief*, *Chief*, *Super Chief*, and *El Capitan* form an impressive lineup. Today, the *Super's Navajo* (far right) rests at the Colorado Railroad Museum.

featuring zebrawood veneer, had a typical sand painting of Navajo design in the panel behind the full-service bar. The dormitory section was designed to accommodate the 12-man dining-car crew.

The dining car, *Cochiti*, finished with walls of bubinga wood, featured silver service and the later-famous Mimbreno china pattern, both designed by artist Mary E. Coulter. The diner, staffed and operated by the longtime Santa Fe commissary partner firm of Fred Harvey, served the finest cuisine, upholding the tradition that began in Harvey-operated Santa Fe dining cars in 1888 and dated to 1876 in station dining rooms all along the system.

Observation lounge-sleeper *Navajo* did not feature wood veneer in the lounge section but had characteristic Native American decoration in the colors of the rugs and drapes. The furniture coverings were genuine Navajo blankets, yielding an atmosphere of genuine Native American and Southwestern decorative art.

Not to be overlooked was the abundance of space for passengers on this extra-fare train. Designed by Budd architects at the direction of the railway, the passenger areas were larger than standard, with a semblance of privacy even in the open-section cars. Berths were larger, and compartments, bedrooms, and drawing rooms were designed for maximum comfort and convenience. All

this attention to detail was augmented by the quiet and smooth ride, notable for the absence of side sway or slack action.

Additional lightweight cars, ordered by Bledsoe in 1937 and delivered in '38, included 30 Budd chair cars that introduced air-conditioned service to the coach-and-tourist Pullman consist of the economy-class *Scout*. This purchase also allowed the introduction of the new all-coach, extra-fare *El Capitan*. Ten more lightweight diners, six club-lounge cars, and six club-baggage cars from Budd, plus 45 lightweight sleepers from Pullman, allowed the daily *Chief* to be fully streamlined. The 45 sleepers built by Pullman were of improved design, based on the experimental car *Forward*, each containing new features and more room. Included in this order were new roomette cars with 18 individually enclosed rooms, each for use by one passenger in complete privacy, with a fold-down berth, washstand, toilet, and wardrobe.

Samuel T. Bledsoe died unexpectedly in 1939. In six dynamic years, he had presided over the modernization of Santa Fe's steam locomotives, the introduction of diesel power, and the creation of a first-class, high-speed passenger service that would serve as a model for the entire railroad industry. Bledsoe's foresight, coupled with his daring expenditure of scarce Depression-era dollars, left a legacy lasting far into the future of the Santa Fe.

### SUCCESS BEYOND FONDEST HOPES

Once in service, the streamlined *Super Chief* enjoyed a success beyond the designers' or Bledsoe's fondest hopes. Seldom operated at less than maximum booking, the train became a favorite of show-business notables,

in Hollywood and elsewhere.

The acquisition of more E1 diesels (Santa Fe wound up with eight E1A's and three E1B's, all delivered by April 1938) and lightweight cars allowed expansion of *Super Chief* service to twice weekly in early 1938, accompanied by the twice-weekly, all-coach streamliner *El Capitan*.

Throughout their lives until the inception of Amtrak, the "*Super*" and "*El Cap*" operated on the same 39¼-hour schedule. In 1946, the two trains increased their frequency to every other day, and went daily in 1948. Although many of the subsequent cars came from Pullman and American Car & Foundry, the luxury and service standards first established on the first Budd train was never compromised while under Santa Fe operation.

The *Super's* daily schedule as a separate train lasted for only 10 years, though, as a decline in patronage and an increase in operating costs forced change. In January 1958, the *Super* and *El Cap* began operating as a combined consist, with occasional exceptions during peak traffic periods such as in summer and around wintertime holidays. The combined train held on until 1971, when after 36 years of *Super Chief* operation Santa Fe reluctantly gave up direct operation of passenger trains to Amtrak.

The new national passenger carrier retained the train name *Super Chief*, but when service began to deteriorate Santa Fe management withdrew permission for Amtrak to continue using the famous title. The Chicago-L.A. train became the *Southwest Limited*, later modified to *Southwest Chief*. Although the *Super Chief* name disappeared from the timetable, it remains in memory as the shining example of passenger railroading at the peak of perfection. ■