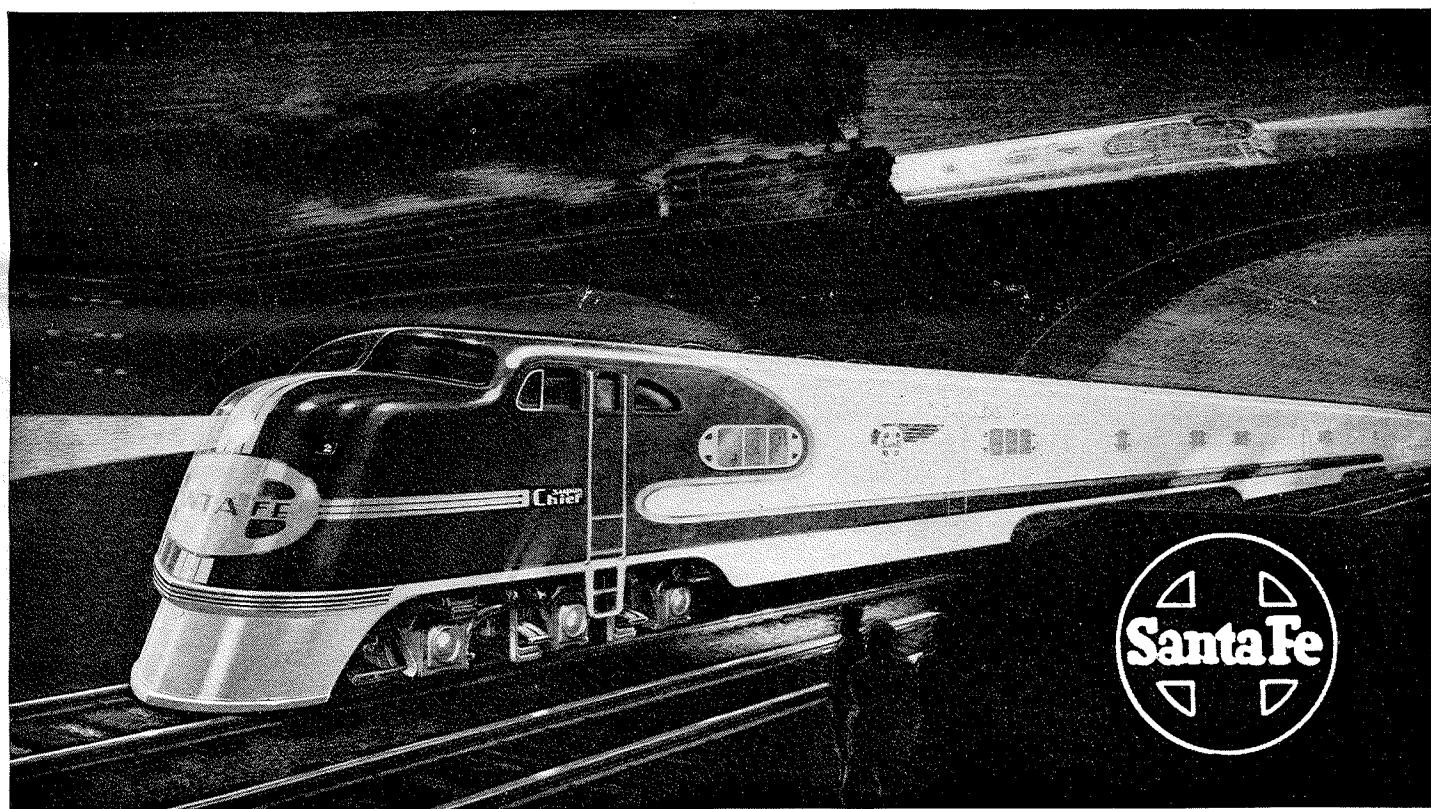


A DESCRIPTION IN DETAIL
of



THE SANTA FE
Super Chief



by Special Permission of
May 22, 1937, issue

Railway Age

Santa Fe Re-equips "Super Chief"

Stainless steel train, built by Budd, is hauled by Electro-Motive 3,600-hp. Diesel locomotive

COMPLETE new equipment for the Super Chief train, operated by the Atchison, Topeka & Santa Fe on a 39¾-hr. schedule between Chicago and Los Angeles, Cal., includes nine streamline light-weight cars, built of stainless steel by the Edward G. Budd Manufacturing Company and one new 3,600-hp. Diesel locomotive built by the Electro-Motive Corporation, LaGrange, Ill. This new equipment was placed in regular operation on May 18, after several weeks of demonstration runs and break-in service.

The Locomotive

The 3,600-hp. streamline Diesel locomotive, is composed of two 1,800-hp. units, coupled for multiple-unit operation from a single control station in the cab of the leading unit. The motive power for the 1,800-hp. units, generally referred to as the *A* and *B* units, is identical and consists of two 900-hp. Diesel-electric power plants, controlled simultaneously from the main locomotive throttle. The length over coupler pulling faces of the *A* unit is 71 ft. 4¾ in. and the *B* unit, 69 ft. 8 in.

The total weight of the locomotive, with full supply of fuel, water and sand, approximates 568,000 lb., this weight consisting of 284,400 lb. for the *A* unit, and 283,600 lb. for the *B* unit. These weights are again divided between the two 6-wheel trucks of each locomotive unit, and further proportioned to the two driving and single idle axles of each truck. This distribution provides an average wheel loading at the rail of 22,500 lb. for the idle axle, and 23,400 lb. for the drivers.

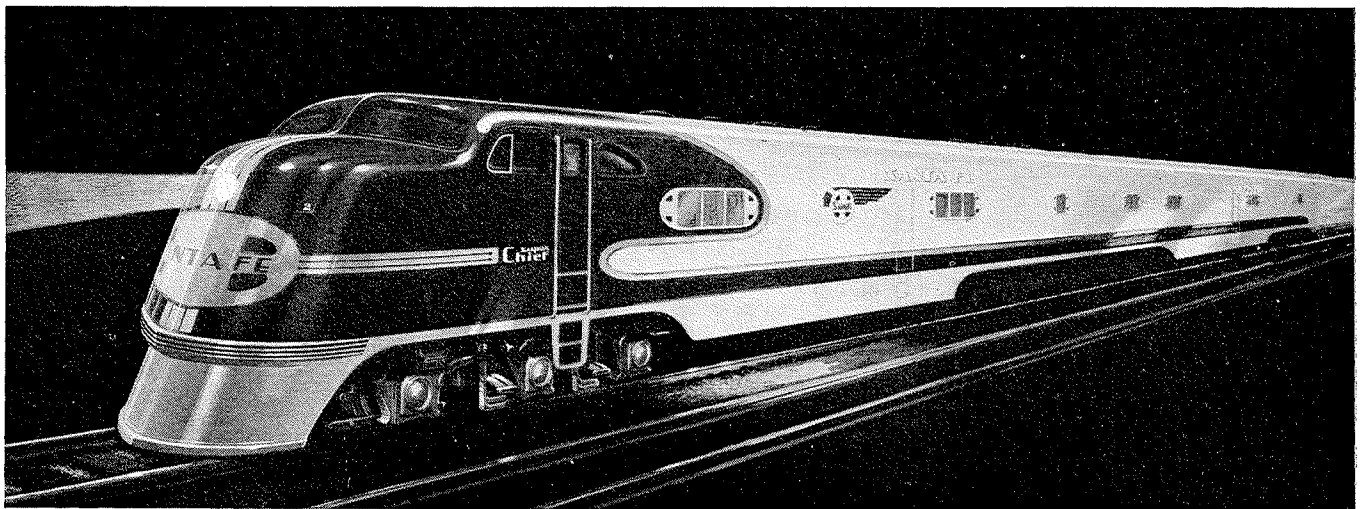
The locomotive unit bodies are constructed with side frames in the form of a modified Howe truss designed to carry the entire body weight. The underframe consists of cross-members running from side to side, which support the machinery. The upper members of the side frames are tied together with a turtle back roof. Center

sills are in effect continuous to take care of buff and drag, and end posts are approximately in line with the center sills. The majority of the connections are welded, although riveted construction is used where necessary. Welded bolsters and cross-bearers are stress relieved before being assembled in place. The body design is based on meeting the Railway Mail Service requirements in every respect for self-propelled cars in the class requiring 400,000 lb. buff.

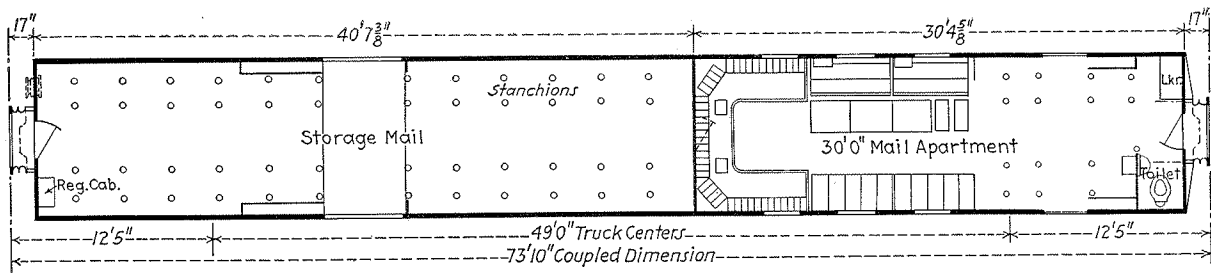
As the outside finish is not intended to assist in supporting the car body, it is designed and applied so as to prevent buckling. It consists of ¾-in. Plymetl panels, made of plywood completely covered front and back with stainless steel which is soldered at the edges. This finish is applied to the car body without bolt holes through the panels, thus preventing moisture from entering and insuring indefinite panel life. The entire steel structure, where panels are applied, is covered with asphalt-impregnated canvas so that the slight motion which may occur due to deflections will not cause the steel members to wear through the metal covering of the panels. The panels are properly spaced and held in position by the use of longitudinal and vertical battens riveted to the framing structure.

All truck assemblies are interchangeable, weigh approximately 48,000 lb., and have a 14-ft. 1-in. rigid wheelbase. The Commonwealth truck frame and swing bolster are of alloy cast steel, while the spring planks are of stress-relieved welded construction. Edgewater rolled-steel wheels, 36 in. in diameter, are mounted on three AREA E-11-X axles having equivalent to 6-in. by 11-in. journals. A maximum journal load of 21,600 lb. is carried on double-row SKF roller bearings of the latest design.

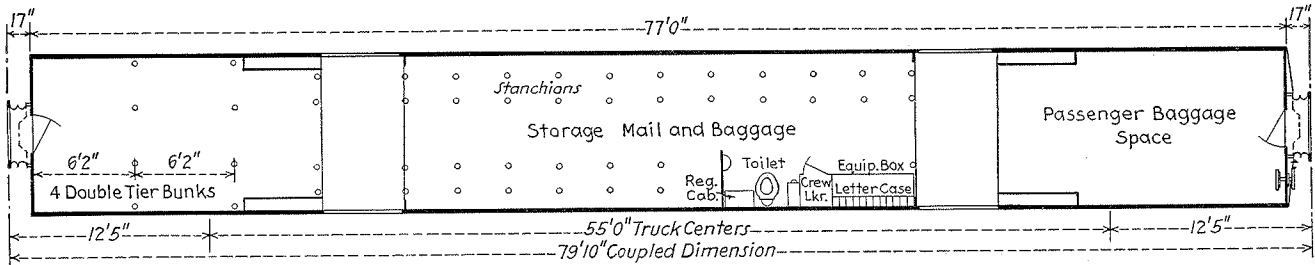
Improved riding qualities and greater stability in negotiating curves at high speeds have been obtained by a new treatment of load suspension. The truck frame is supported on its equalizers at four points by twin group



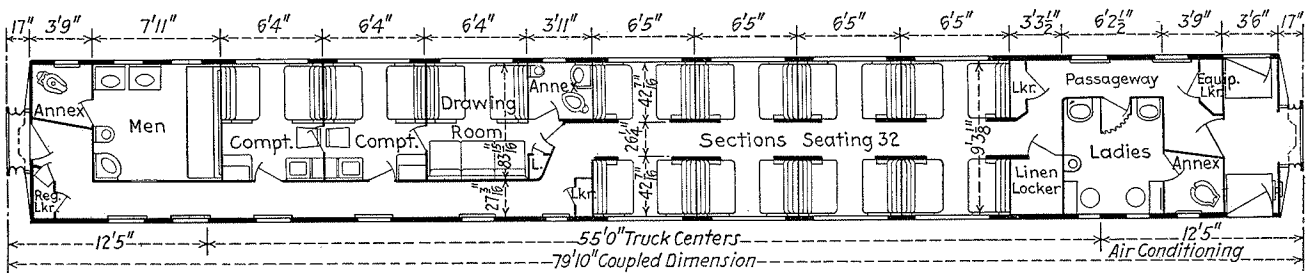
Newly Equipped "Super Chief" of the Atchison, Topeka & Santa Fe



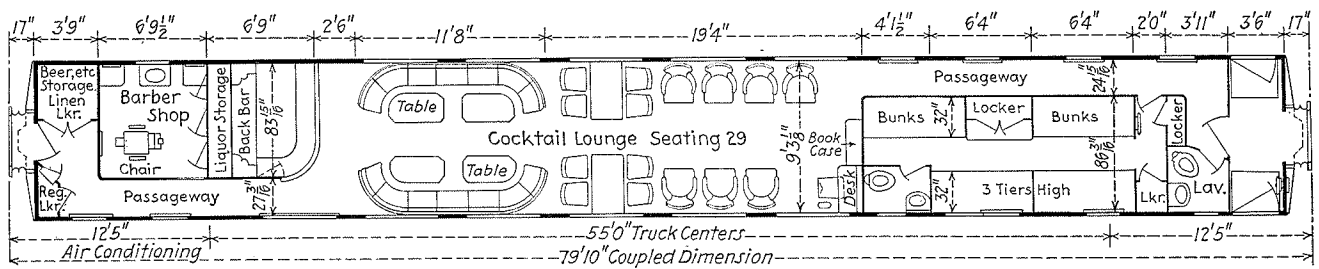
Postal Car No. 3400



Storage-Mail and Baggage Car No. 3430



Floor Plan of the Sleeping Cars "Isleta" and "Laguna"



The Cocktail Lounge Car "Acoma"

coil springs of silico-manganese steel. The bolster is supported at each corner by a pair of chrome-vanadium elliptic springs. These springs ride on two spring planks, which in turn are carried by swing hangers pivoted from the outside of the truck frame. Lateral oscillations of the bolster are dampened by four hydraulic shock absorbers which also act to ease the body load against the truck frame when entering or leaving curves.

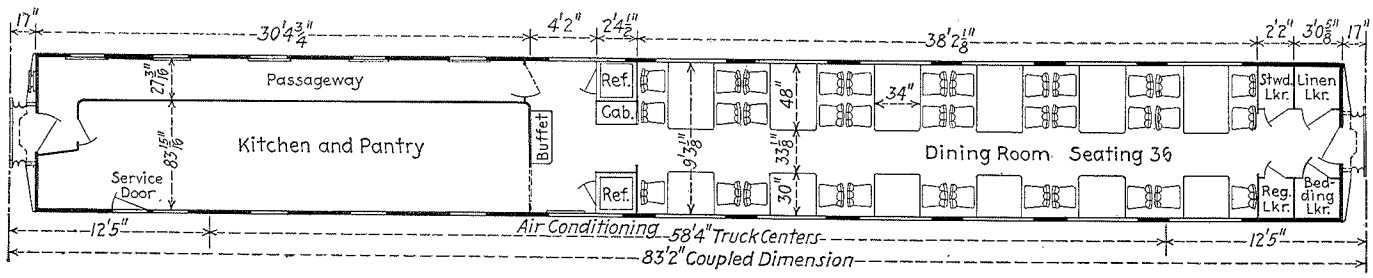
Each truck has two General Electric traction motors geared directly to the outer axles, and carried in conventional manner between the driven axle and the truck-transoms. The center axle is idle and necessary for load-carrying purposes only. Clean, dry air is forced to the motors by blowers located in the car body directly above each center plate. This air is directed to the motors through cast openings in the bolster and body center plates and from the bolster to the hollow truck transoms through matched openings in each. The passages between the swing bolster and transom sections are sealed by a Fabreeka gasket and manganese steel wear plate arrangement. From the transom, the air passes

to the motors through flexible rubber ducts permanently fastened to the motor and transom openings.

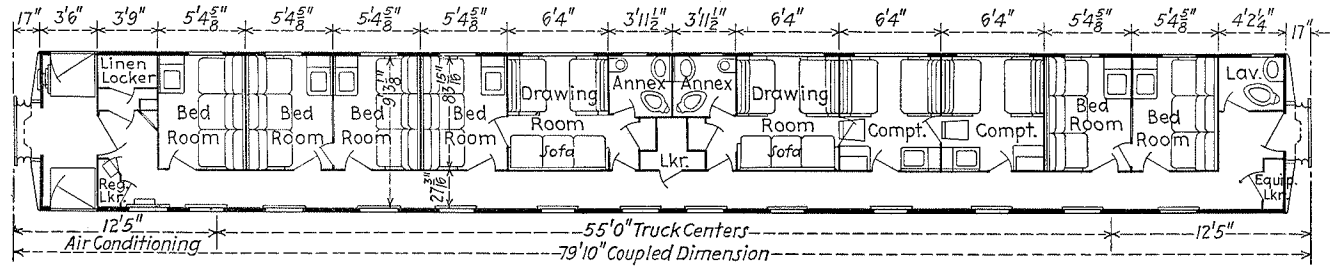
Braking effort is supplied by Simplex unit-cylinder clasp brakes, with two standard 13 3/4-in. shoes per wheel and four 10-in. by 10-in. cylinders per truck, fitted with automatic slack adjusters. With 100 lb. air pressure per cylinder, the available retardation force approximates 150 per cent of the locomotive light weight. Automatic and manual sanding is provided at the leading wheels of each truck of the *A* unit.

Although the second or *B* unit of the locomotive is equipped for independent operation in yard movements such as turntable maneuvers, the locomotive main throttle is located at the control station of the operator's cab located just back of the wind-break nose construction of the leading unit. The streamline contour of the head end is designed to effect a minimum wind resistance at high speeds and at the same time to provide maximum visibility for the operator.

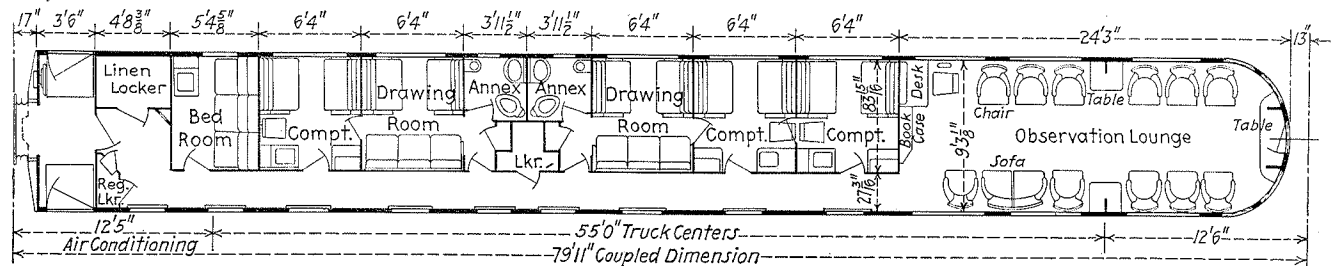
Seated in a deeply upholstered adjustable seat, the operator has a clear vision of both sides of the track



The Dining Car "Cochiti"



Floor Plan of the Sleeping Cars "Oraibi" and "Taos"



The Compartment-Observation Car "Navajo"

ahead through slanting automotive style windshields of 3/16-in. safety glass, equipped with patented windshield wiper and hot-air defroster arrangement. The cab side windows are likewise of the automotive type of safety glass with no-draft ventilators and adjustable side windows.

The operator's instrument panel provides for indirect illumination of an indicating speedometer, and the cus-

a comfortable seat on the left side of the cab and this station is also served by a windshield wiper, defrosting device and no-draft ventilation.

Locomotive movements have been simplified to the use of three levers: the locomotive main throttle, reverse lever, and air brake handle. With the engines idling and the reverse lever in running position, any movement of the locomotive throttle is relayed electrically through four control trunk wires to each power plant of the locomotive. These telegraphic impulses are received by an electro-pneumatic device which actuates the local engine-speed governor lever to increase or decrease engine speed and thus control the individual power-plant output.

At the head of each engine is a local control station, from which the attendant may check the operating condition of each power plant. This local control station comprises individual fuel and lubricating oil gages, an indicator, a 12-point exhaust pyrometer and an engine water thermometer. It also includes engine start-and-stop buttons and an isolation switch having two positions, on and off. Moving the switch handle to the off position opens all electrical control circuits to that power plant and reduces the engine speed to idle, irrespective of the operation of the remaining power plants. Returning the switch to the on position closes the control circuits, and the engine immediately responds to the power demand being called for by the position of the locomotive throttle.

In addition to the indicating instruments at each control station, the locomotive is equipped with a trunk-line alarm system, whereby a dangerous engine condition is brought to the attention of the attendant by an audible as well as visual alarm. This system includes, engine water-temperature and oil-pressure switches, an 8-in.

Consist of the A.T. & S.F. "Super Chief"

Name or number of car	Type of Car	Length	
		Coupled ft.	Between truck centers, ft. in.
3400	Mail; storage; 30-ft. postoffice	73	10 49 0
3430	Mail; storage; baggage	79	10 55 0
Isleta	Sections; compartments; drawing room	79	10 55 0
Laguna	Sections; compartments; drawing rooms	79	10 55 0
Acoma	Bar; lounge; barber shop; crew	79	10 55 0
Cochiti	Diner	83	2 58 4
Oraibi	Bedrooms; compartments; drawing rooms	79	10 55 0
Taos	Bedrooms; compartments; drawing rooms	79	10 55 0
Navajo	Bedrooms; compartments; drawing rooms	79	11 55 0
	Overall length	715	11

NOTE: The cars have accommodations for 32 in section sleepers; 26 in bedrooms; 22 in compartments; 24 in drawing rooms; and a total of 78 in the diner and the lounges. There are also sleeping quarters for a crew of 12.

tomary air gages indicating brake and A.T.C. control functions. At the right of these instruments is a wheel-slip indicator, which flashes a warning through a red lens when any pair of driving wheels slips. There is also



The Dining Car at Night—The Lighting Includes Both Center and Side Fixtures

electric gong, and four illuminated enunciator signals in each locomotive unit. The enunciator boxes have three different colored lenses corresponding to hot engine, low oil pressure, and boiler failure. The alarm gong rings with the illumination of any of the three signals and con-

tinues until the failure has been located and acknowledged by placing the isolation switch handle in off position. This same gong is utilized as a call signal for the attendant by use of a push button in the operator's cab.

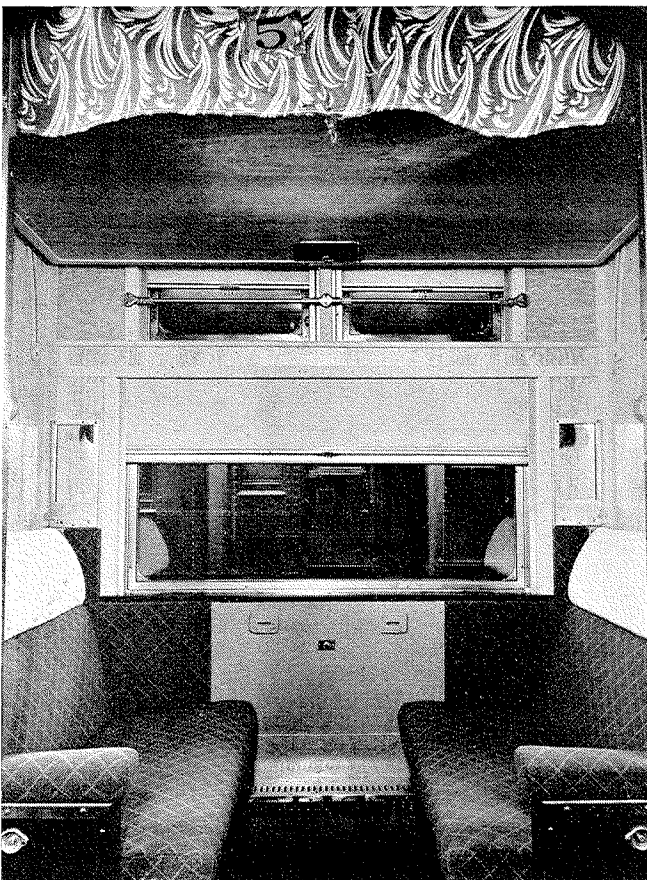
Main Features of the Power Plant

The essential units of each 900-hp. power plant comprise, in general, an engine with its attendant cooling, fuel and lubricating oil systems; power generator and exciter; battery charging generator; the necessary contactors, switches and fuses for the control of electrical circuits. In addition to two such power equipments, each locomotive unit carries a 1,100-gal. fuel tank and a 1,200-gal. water supply for the train-heating steam generator.

Each engine is a V-type, 12-cylinder, two-cycle EMC Diesel, having an 8-in. bore and 10-in. stroke, seven-bearing crankshaft, Satco-lined bearings, drop-forged connecting rods, needle-bearing wrist pins, aluminum pistons, lubricating oil and water pumps, and delivers 900 hp. at 750 r.p.m.

The main generator is a General Electric 600-volt direct-current machine, with differential voltage control through a belt-driven exciter and auxiliary generator set. It is used to supply power for the two G.E. 450-hp. traction motors mounted in the truck immediately below each power plant. This generator also acts as an engine starter when receiving energy from the locomotive battery through separate contactors supplied for this purpose.

A single engine-cooling system consists of 50 sq. ft. of water cooling radiators hung from the roof hatches, through which openings the engine and generators are lowered into the car body. Air for radiator cooling is taken through grilled openings in the sides of the cab body and forced out through the radiator assemblies by three 26-in. propeller-type fans which are belt-driven from the main engines. Automatically operated shutter arrangements are provided ahead of each fan group for control of engine water temperature during service operations. With the stopping of the engines, the shutters



One of the Open Sleeping-Car Sections

close automatically and all radiator water drains into the system water storage tanks.

Each engine is served by an independent fuel system consisting of a motor-driven tandem pump arrangement, necessary filters, pressure relief valves, and I.C.C. approved fuel gages.

Steam Heat and Auxiliary Equipment

Steam heat is provided by a Vapor-Clarkson flash-type steam generator in each locomotive unit, having a capacity in excess of 2,250 lb. evaporation at 225 lb. steam pressure. Feed-water pumps, fire control, and trainline pressure regulation is fully automatic as adjusted by a single hand rheostat. The steam trainline extends the full length of each locomotive unit to provide steam for heating the operator's cab while in service and to warm the engine water systems during maintenance or lay-over periods.

Air-compressor equipment for both locomotive units consists of four Gardner-Denver two-stage water-cooled compressors, of 79.4 cu. ft. displacement at 750 r.p.m. Each compressor is belt driven from a shaft extension of each main generator. The compressed air is cooled by 42 ft. of fin-type copper tubing and stored in two air-cooled reservoirs, 24 in. by 66 in., having a combined capacity of 56,500 cu. in.

Locomotive air-brake equipment is Westinghouse Schedule 8-EL modified to work in conjunction with U. S. & S. continuous train control and cab signal and to include the features of the HSC (high speed control) schedule. The majority of the air-brake equipment is piped on a single panel mounted in the hood compartment in front of the cab.

This hood compartment also houses the Exide 25-plate, 64-volt locomotive storage battery, and automatic-train-control equipment. Convenient access to this compartment is through a hinged door in the cab front partition under the locomotive windshield.

Locomotive coupler equipment consists of a straight shank, retractible coupler at the front end for emergency service, tight-lock coupler between units, and Type-E



A Stateroom Interior

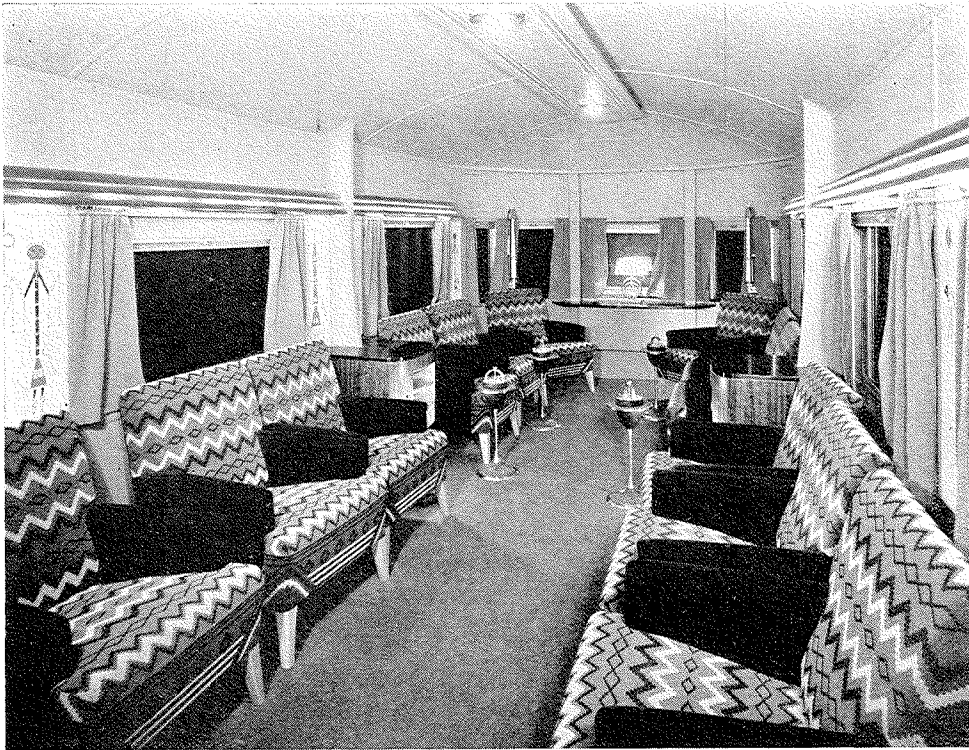
coupler at rear of the B unit. Rubber-type draft gears are employed throughout.

The Passenger Cars

Unlike the trains previously built by the Edward G. Budd Manufacturing Company, the Super Chief is made

Looking Toward the Bar in the Cocktail Lounge—The Back Bar Is Decorated by a "Sand Painting" Figure





Looking Toward the Rear of the
Observation Lounge

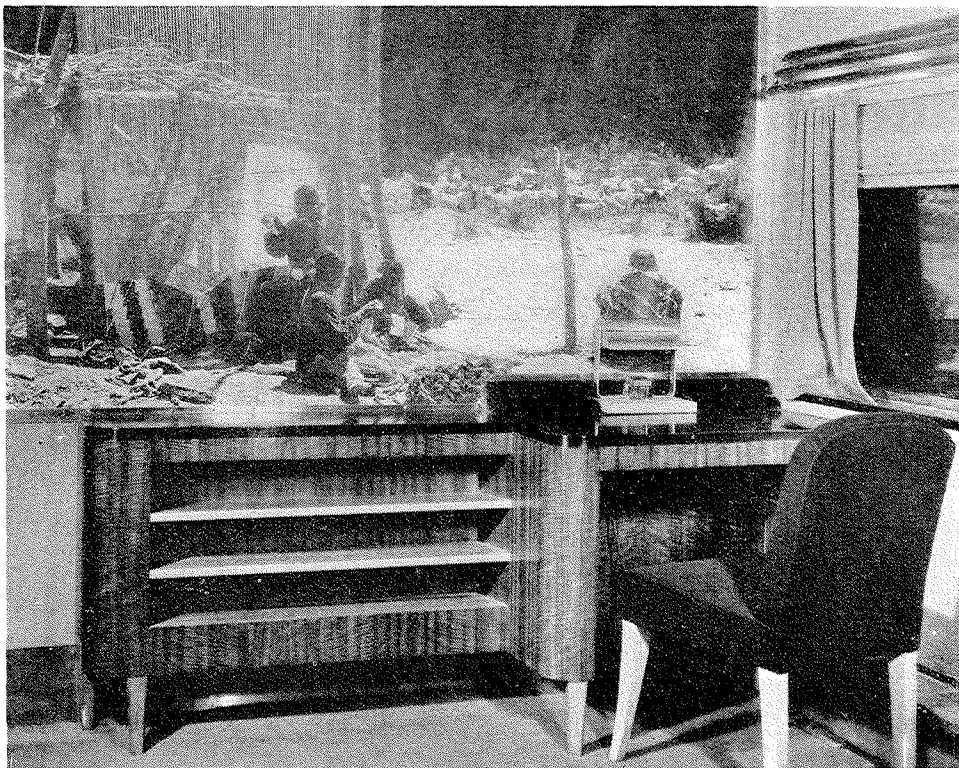
up of separate coaches, without articulation. The exterior, however, is completely sheathed with stainless steel in narrow, curved, longitudinally beaded panels below the windows, flat sheets between the windows and corrugated sheets above the windows and on the roof. The surface is not painted, except for the lettering on the letterboards and the name plates.

The cars are built without hoods, conforming in general external appearance to coach No. 3070 which this builder completed for the Santa Fe early in 1936, except that the apron below the sides of the cars has been removed opposite the trucks.

The consist of the train is shown in a table. The total weight of the train ready to run, exclusive of motive power, is 851,000 lb. There are berth accommodations for 104 passengers, with 42 seats in the observation lounge and cocktail lounge and seats for 36 in the dining car. Bunks in the crew quarters accommodate 12 persons.

Interior Decorations

The creation of the architectural and decorative treatment of the car interiors is the result of the collabora-



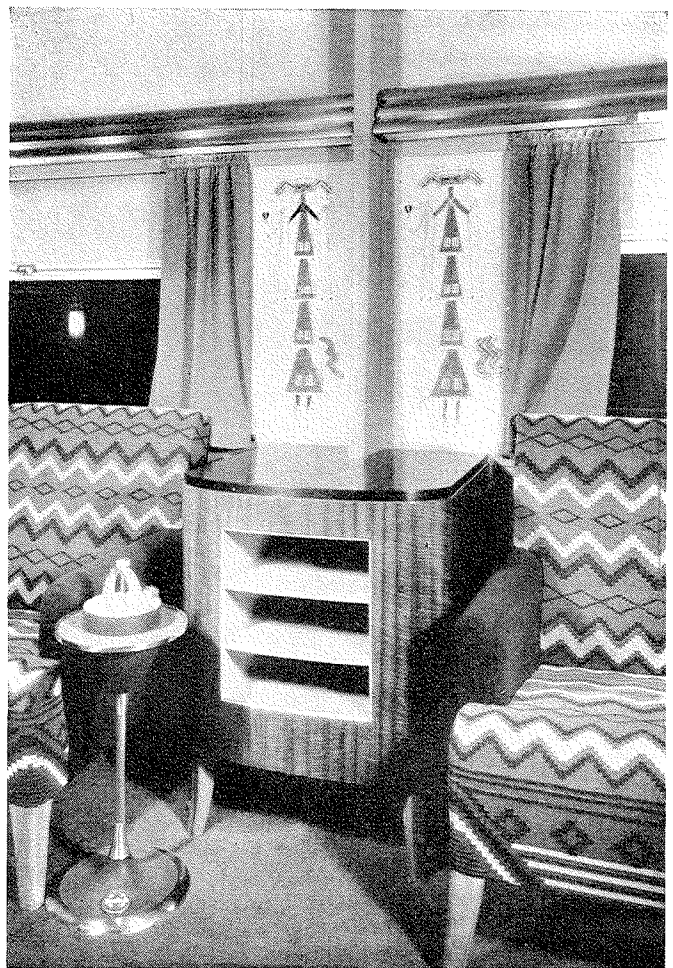
A Photo-Mural of Navajo Life
Covers the Forward Wall of the
Observation Room

tion of Paul F. Cret, Philadelphia architect, and S. B. McDonald, designing engineer and decorator of Chicago. Roger W. Birdseye, advertising manager of the Santa Fe, collaborated in the application of the southwestern Indian motif, especially in the observation lounge.

The result is that the interior decorations and up-

Partial List of Equipment and Materials on the Santa Fe "Super Chief" Cars

Steel Rustless Iron & Steel Corp., Baltimore, Md.
 Stainless steel Sharon Steel Corp., Sharon, Pa.
 Stainless steel corrugated sheets The Eastern Rolling Mill Co., Baltimore, Md.
 Frames, bolsters, castings General Steel Castings Corp., Eddystone, Pa.
 Castings Lebanon Steel Foundry, Lebanon, Pa.
 Underframes, Cromansil steel Lukenweld, Inc., Coatesville, Pa.
 Wheels and axles Standard Steel Works Co., Burnham, Pa.
 American Steel Foundries, Chicago.
 Crossbars, equalizer beams, swing hangers Camden Forge Co., Camden, N. J.
 Center plates, castings, etc. Dodge Steel Company, Indianapolis, Ind.
 Side bearings A. Stucki Co., Pittsburgh, Pa.
 Bearing wedges Standard Forgings Corp., Chicago
 Spring rigging American Steel Foundries, Chicago
 Spring seats General Steel Castings Corp., Eddystone, Pa.
 Couplers and yokes American Steel Foundries, Chicago
 Journal boxes The Symington-Gould Corporation, Rochester, N. Y.
 Journal bearings Magnus Co., New York
 Draft gear and buffers W. H. Miner, Inc., Chicago
 Buffer springs Union Metal Products Co., Chicago
 Brakes Westinghouse Air Brake Co., Wilmerding, Pa.
 Foundation brakes American Steel Foundries, Chicago
 Hand brakes and chain sheaves National Brake Co., Buffalo, N. Y.
 Brake shoes American Brake Shoe & Foundry Co., New York
 Shock absorbers Houde Engineering Corp., Buffalo, N. Y.
 Insulation:
 Alfol Alfol Insulation Co., New York
 Dry Zero American Hair & Felt Co., Chicago
 Kimsul Kimberly-Clark Corp., Neenah, Wis.
 Dednox Dednox, Inc., Chicago
 Felt Richards-Wilcox Mfg. Co., Aurora, Ill.
 Feltex Fidelity Felt Co., Philadelphia, Pa.
 Cork, tape Philip Carey Mfg. Co., Lockland, Ohio
 Cork, tile and linoleum cement Armstrong Cork Co., Lancaster, Pa.
 John R. Livezey, Philadelphia, Pa.
 Flexwood United States Plywood Co., Inc., New York
 Plywood Haskelite Mfg. Corp., Chicago
 Presdwood Masonite Corp., Chicago
 Self-tapping screws Shakeproof Lock Washer Co., Chicago
 Wovenstone Union Asbestos & Rubber Co., Chicago
 Asbestos Keasbey & Mattison Co., Ambler, Pa.
 Fireproof fabric Joseph Benn Corp., Greystone, R. I.
 Rubber The Republic Rubber Co., Youngstown, Ohio
 Sponge rubber Allender Body Co., Philadelphia, Pa.
 Diaphragm curtains Adams & Westlake Co., Chicago
 Diaphragms Morton Mfg. Co., Muskegon Heights, Mich.
 Sash Hunter Sash Co., Flushing, L. I., N. Y.
 Sash frames, formers, rolls Mitchell Specialty Co., Philadelphia, Pa.
 Springs in window sash John Evans' Sons, Philadelphia, Pa.
 Rolling doors and door hous- ing Philadelphia Fire Retardant Co., Philadelphia, Pa.
 Doors, rolling Kinnear Mfg. Co., Columbus, Ohio
 Door tracks and hangers Richards-Wilcox Mfg. Co., Aurora, Ill.
 Door pulls Adams & Westlake Co., Chicago
 Hinges The Homer D. Bronson Co., Beacon Falls, Conn.
 Locks, grab handles, door bumpers H. S. Getty & Co., Inc., Philadelphia, Pa.
 Locks and latches Adams & Westlake Co., Chicago
 Latches American Chain & Cable Co., Inc., Bridgeport, Conn.
 Locks Yale & Towne Mfg. Co., Stamford, Conn.
 Door closers, friction catches Russell & Erwin Mfg. Co., New Britain, Conn.
 Weatherstrip Midgeley & Borrowdale, Chicago
 Hardware Thomas Devlin Mfg. Co., West Burlington, N. J.
 American Chain & Cable Co., Inc., Bridgeport, Conn.
 Richards-Wilcox Mfg. Co., Aurora, Ill.
 Tread plates Morton Mfg. Co., Muskegon Heights, Mich.
 American Abrasive Metals Co., Irvington, N. Y.
 Trap door assemblies The O. M. Edwards, Inc., Syracuse, N. Y.
 Wear plates, pads, washers Fabreka Products Co., Inc., Boston, Mass.
 Grilles, registers Hart & Cooley Mfg. Co., Chicago
 Filters American Air Filter Co., Inc., Louisville, Ky.
 Air conditioning, fixtures, fans, panels, generators Safety Car Heating & Lighting Co., New York
 Moldings Bohm Aluminum & Brass Corp., Detroit, Mich.
 Dahlstrom Metallic Door Co., Jamestown, N. Y.
 Extruded aluminum Aluminum Company of America, Pittsburgh, Pa.
 Aluminum castings Rolle Casting Co., Philadelphia, Pa.
 Receptacles Albert & J. M. Anderson Mfg. Co., Boston, Mass.
 Loeffelholz Co., Milwaukee, Wis.
 The Safety Car Heating & Lighting Co., New York
 Lighting fixtures Adams & Westlake Co., Chicago
 Dayton Mfg. Co., Dayton, Ohio
 Lights Pressed Prism Plate Glass Co., Chicago



Navajo "Sand Painting" Figures on the Observation Wall

Wire and cable Anaconda Wire & Cable Company, New York
 Storage batteries Electric Storage Battery Co., Philadelphia, Pa.
 Upholstery Collins & Aikman Corp., Philadelphia, Pa.
 Massachusetts Mohair Plush Co., Boston, Mass.
 L. C. Chase & Co., Inc., New York
 Bed springs Bunting Glider Co., Philadelphia, Pa.
 Mattresses, cushions Mishawaka Rubber & Woolen Mfg. Co., Mishawaka, Ind.
 Stools, seating equipment Heywood-Wakefield Co., Gardner, Mass.
 Table tops Formica Insulation Co., Inc., Cincinnati, Ohio
 Furniture S. Karpen & Bro., Inc., Chicago
 The General Fireproofing Company, Youngstown, Ohio
 Ash trays Dayton Mfg. Co., Dayton, Ohio
 Clocks Chelsea Clock Co., Boston, Mass.
 Carpet Gimbel Bros., Philadelphia, Pa.
 L. C. Chase & Co., Inc., New York
 Carpet pad Midgeley & Borrowdale, Chicago
 Dish washer G. S. Blakeslee & Co., Cicero, Ill.
 Bar and kitchen equipment Angela Colonna, Philadelphia, Pa.
 Servitors Landers, Frary & Clark, New Britain, Conn.
 Curtain material The Pantasote Company, Inc., New York
 Curtain brackets and fixtures, racks Adams & Westlake Co., Chicago
 Curtain-rod fittings Kirsch Co., Sturgis, Mich.
 Seat sprockets, clothes hooks, brackets American Chain & Cable Company, Inc., Bridgeport, Conn.
 Lavatory equipment Adams & Westlake Co., Chicago
 Dayton Mfg. Co., Dayton, Ohio
 Lavatory and fittings Crane Co., Chicago
 Lavatory fixtures Scott Paper Co., Chester, Pa.
 Plumbing equipment Crane Co., Chicago
 Pipe and fittings Aluminum Company of America, Pittsburgh, Pa.
 Mirrors, Duplate glass Pittsburgh Plate Glass Co., Pittsburgh, Pa.
 Mirror frames Dayton Mfg. Co., Dayton, Ohio
 Drinking fountains, tanks, filters Henry Giessel Company, Chicago
 Cup dispensers Dixie-Vortex Cup Co., Chicago
 Copper tubing, fittings American Radiator Co., New York
 Heating, steam traps, fittings Vapor Car Heating Co., Inc., Chicago
 Bushings Bunting Brass & Bronze Co., Toledo, Ohio
 Tubing Goodall Rubber Co., Philadelphia, Pa.
 Interior finish Murphy Varnish Co., Newark, N. J.
 Decalcomanias National Decalcomania Corp., Philadelphia, Pa.
 Fire extinguishers Phister Mfg. Co., Cincinnati, Ohio
 Pyrene Mfg. Co., Newark, N. J.
 Back-up horn Westinghouse Air Brake Co., Wilmerding, Pa.
 Oil The Texas Company, New York

holstery of the new train suggest the country and the native traditions of the Southwest through which it operates. The colors follow those found in the landscape and in the Navajo Indian craft and ceremonial traditions. The Flexwood wall coverings of the sections, the drawing rooms, compartments and bedrooms are in a variety of rare woods, with adjoining surfaces painted in harmonizing colors. A few of the combinations are figured red gum, with flesh colored ceiling and mist taupe carpet; white harewood, with lemon cream and Vienna drab on other painted surfaces, and a jade green carpet; satinwood set off with blue gray, and a carpet in modern blue; redwood burl, with peach and blue-gray, and a mahogany carpet; Macassar ebony, with peach and light chocolate, and a Rumba carpet.

The "Isleta" and "Taos" each has eight open sections in addition to a drawing room and two compartments. In the Isleta the walls of the open sections and ceilings are finished in wood, with upholstery and rugs in soft blue tones. In the Taos painted surfacing is used and the upholstery and rugs are in soft green tones.

In the diner, the cocktail lounge and the observation lounge the native art of the Southwest has been drawn upon for ornamentation. The Navajo influence is apparent in the selection of fabrics, in the design and color of the upholstery, as well as in the decorative motifs, with which the walls are ornamented. The satin-finished chrome plating of the hardware is also in keeping with the silver work of the early American natives.

In the dining room the carpet has a reddish brown field with black insets and stripes, the side and end walls are veneered with Bubinga, trimmed with chocolate

brown moldings, and the vaulted ceiling is painted flesh. Ebony-finished walnut is used for the window sills, chairs, table legs and tops. A decorative buffet in ebony-finished walnut is placed against the wall. This is surmounted by a peach-colored mirror with overhead illumination. The roller shades are faced on the outside with aluminum Pantasote and on the inside with alternate stripes of white and pale yellow, and the drapes are of tan color.

The carpet in the cocktail lounge is of desert sand color; the side walls are finished in birdseye cypress, with light Portland brown moldings; the upper walls and ceiling are finished with Prima Vera veneer, with light buff moldings; the window sills, desk and magazine rack have ebony-finished walnut tops. The vertical surfaces of the desk and rack are trimmed with Zebra wood to match the front face of the bar. The tables have black Formica tops with stripes of bright metal inserted in the edges. The large tables are mounted in wall sockets and have a hinged leg on the aisle side, whereas the small tables are fastened to chrome-plated tubular supports. The sofas and the small chairs at the tables are upholstered with tan-colored leather. The desk chair and arm chairs are trimmed with henna-colored fabric. In contrast with the brown tones which are so generously used are the satin-finished aluminum bandings on the walls, the stainless-steel structural moldings and heater ducts, the horizontally black-striped cream window drapes, and the Navajo pattern of the roller shades with their black valance.

Two items of particular interest are the inlaid wood back bar ornament and the rug hanging over the desk at the opposite end of the room. The subjects displayed here are as a rule never executed in enduring mediums. These "sand paintings" as they are called are religious pictures which have lived between ceremonials only in the memory of the people. The rug is true Navajo, and the back bar inlay is an authentic reproduction.

The observation lounge in the last car also displays the work of the early southwestern Americans. In this room the setting comprises a carpet of desert sand color, copper-colored lower side walls and a turquoise blue ceiling. The tables at the sides and end are finished with dull black tops.

The desk and bookcase have Mexican parota tops finished in dull black, with bleached and weathered Mexican mahogany legs. The chairs and sofas are upholstered in a reproduction of native weaving, the original of which has been selected for museum display. The windows have brown drapes and tan roller shades.

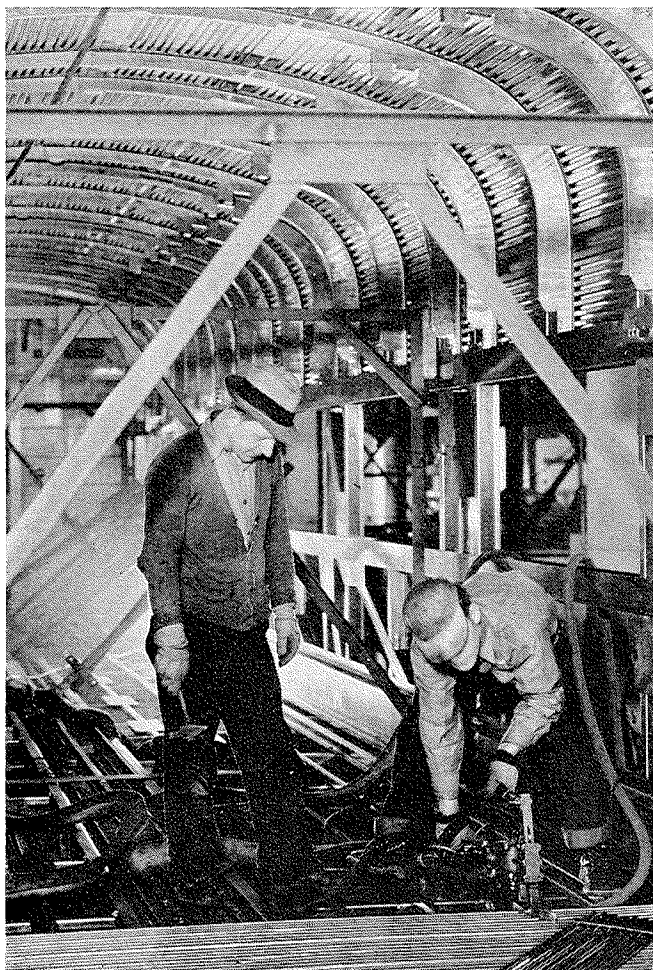
The ornamentation of the pier panels employs authentic copies of sand paintings which occur in the story of Dsilyi Neyani, the "Myth of the Mountain Chant." These figures are executed in native colored sands and charcoal, exactly as Navajo prophets have made them for generations.

The photo mural of Navajo weavers at work on their looms over the desk at the forward end of the observation lounge and the rear table lamp with its ceremonial knife stem and goat's skin shade are also in keeping with the Navajo motif.

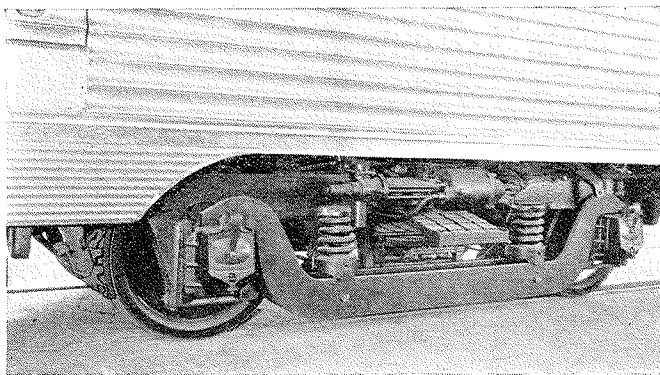
Berths of Unique Construction

Each of the open sections in the first two sleeping cars embodies a maximum of privacy by being partially enclosed by a narrow longitudinal partition extending each way from the aisle side of the section partitions. Additional comfort is assured by making all of the berths 6 ft. 5 in. in length.

A further innovation in berth arrangement is the



One of the Santa Fe Cars Under Construction



One of the Double-Equalizer Trucks

construction of the upper berth. Instead of swinging upward when in day position and forming a curved side ceiling, it is pushed up to a daytime position parallel to the night position, forming a flat ceiling over the section, the narrow opening between the car ceiling and the upper berth being enclosed by the upper berth curtain. The flat upper-berth tray is supported by rollers on four spindles projecting from the ends, one at each corner, into recessed guides in the partitions between the sections. From the day position the upper berth is lowered by first slightly lifting and moving the front of the berth toward the aisle when it will drop to the night position. By a similar operation the back of the berth is then dropped. Because the upper-berth tray is flat, more head room is available for the occupant of the lower berth.

The upper berth is restored to the daytime position by first lifting the rear side, completing the movement by lifting the aisle side of the tray. The berth is securely locked in day position because the supporting spindles and rollers are held in the ends of the guides by gravity, a position from which they can be moved only by lifting through a slight initial elevation in the guides before they are free to drop to the night position.

The Car Structures

The car structures are fabricated from the so-called 18-8 stainless steel by the Budd Shotweld process, except for the end, underframes and bolsters which are Cromansil fabricated by the Lukenweld process. Two

types of stainless steel, based on physical properties, were used in building this train. The high-tensile material has a unit strength of 150,000 lb. per sq. in. and is generally employed in the strength members of the structure. The low-tensile material with a unit strength of 100,000 lb. per sq. in. is used where ductility or special finish is of paramount importance.

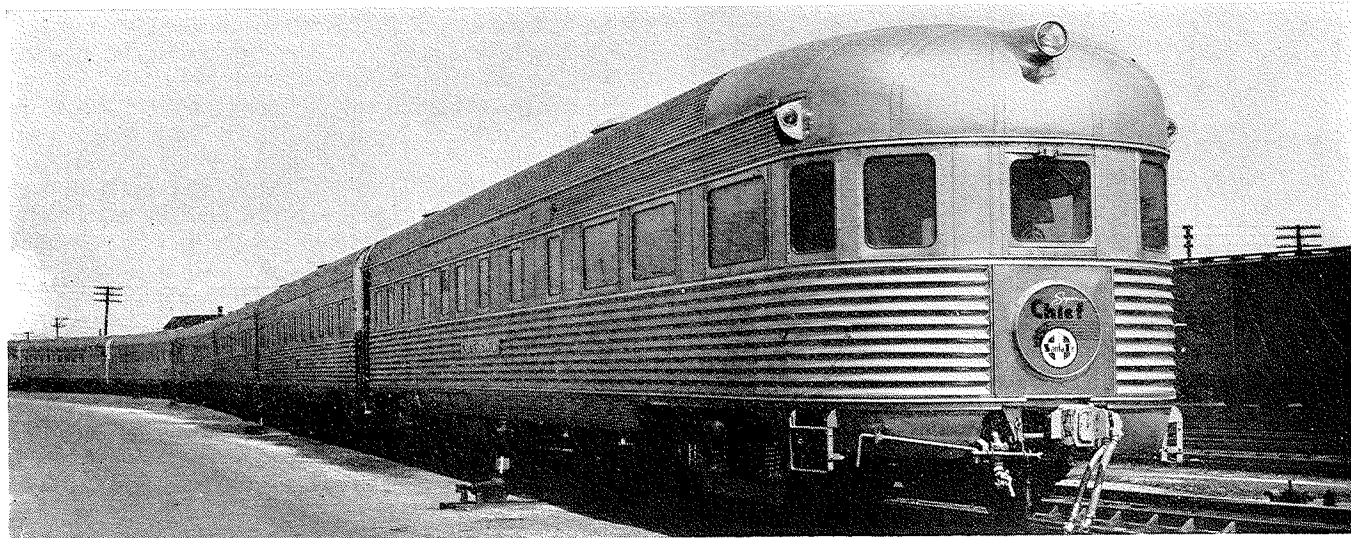
A number of changes have been made in details of the structure as compared with those employed in Santa Fe coach No. 3070. In that car a departure was made from the truss form of side-frame structure characteristic of all of the other trains built by this company. Wide vertical members of channel section were placed between the windows. In the cars of the Super Chief a return has been made to the modified Pratt truss type of structure, using narrower vertical channel members and diagonals in the panels between and below the windows.

The underframe structure is essentially that employed in coach No. 3070, except that the channel-section floor stringers have been replaced by members of Z-section. This marks a further step in the progressive simplification of the Budd type of construction by which the number of pieces and amount of welding have been reduced.

With the exception of postal car No. 3400, the dining car "Cochiti," and the sleeper-observation car "Navajo," the car bodies are essentially of the same overall dimensions as the first coach No. 3070. They are 79 ft. 10 in. coupled length; 10 ft. $\frac{1}{8}$ in. outside width, and 13 ft. 6 in. in height above the rail. Inside, the width is 9 ft. $3\frac{1}{4}$ in. The mail car is 73 ft. 10 in. in length; the dining car, 83 ft. 2 in. in length, and the sleeper-observation car, while not appreciably longer than the other sleeping cars, is built with a curved rear end, over which the roof is hooded.

The center of the roofs is insulated with 2-in. Dry Zero. The roofs adjoining the side walls, the side walls and end walls are insulated with 3 in. of the same material. All of the hollow structural members are filled with Kimsul. The space between the tops of the cross-bearers and the under side of the corrugated floor sheets is filled with Hairfelt or Salamander. The floor consists of 1 in. of cork laid over the corrugated floor sheets, the recesses of which are filled with cork strips. Above the cork is a $\frac{1}{4}$ -in. Super Pneu pad on which the carpet is laid.

The ceilings and side walls of the cars are generally finished with Masonite which, on the walls, forms the



Rear View of the New "Super Chief"

base for the Flexwood surface and, on the ceiling and parts of the walls, has a painted finish. The partition frames are of carbon-steel tubes of square cross-section to which the Masonite is applied by Shakeproof self-tapping screws. The Masonite is insulated from the steel work by strips of gummed cork-felt tape throughout the cars.

The outside doors throughout this train are so constructed as to fit flush and present a continuation of the body surface when closed. The passenger doors are fitted with O. M. Edwards folding steps, which, when not in use, are folded up to close the step well with an outside surface similar to that of the body proper. The steps are faced with aluminum Diamondette treads with a nosing of punched and formed stainless steel as a guard against slipping.

The interior doors are hinged in such a manner that there is no possibility of pinching, without the use of anti-pinch plates.

The windows in the passenger occupancy sections of these cars are double glazed with the outside glass fixed in the car body and the inner glass mounted in a hinged frame. The inner glass can be unlocked and swung inward to permit cleaning. The glass in both frames (inner and outer) is set in rubber to eliminate the transfer of any strain to the glass. A rubber gasket seals the space between the inner and outer sash. A departure from standard practice is the arrangement of small windows in the letterboard area of the open sections for the use of the upper-berth occupants. These are of the same construction as the large windows with their fixed outer sash and hinged inner sash. Small windows in the aisles, in the kitchen, and in the rear of the last car are of the movable type and are provided for emergency ventilation and to facilitate terminal servicing. All plain glass is shatterproof, $\frac{1}{4}$ in. thick.

Electrical Equipment

The electric power is 32-volt, d.c., supplied by Exide 850-amp. hr. batteries charged by Safety $7\frac{1}{2}$ -kw. body-hung generators with flat-belt drive from axle pulleys. Wire is carried in thin-wall steel conduits where practicable. In partitions the square steel structural tubing is fitted with adapters and used to carry the wires. The lighting circuits are protected with fuses in conveniently located and labelled panels.

All lighting is direct. The fixtures are for the most part especially designed to present an appearance in harmony with the decorative schemes employed and to furnish satisfactory lighting.

Air Conditioning and Heating

Conditioned air, composed of a controllable amount of fresh air from the outside and recirculated car air, is supplied to all passenger occupancy sections of this train. Both fresh and return air are filtered through washable metal filters before being passed over coils for cooling or heating. The subsequent delivery by insulated metal ducts and through lighting fixtures furnishes air to all parts of the train occupied by passengers. Special branch ducts carry air to the berths of the sleeping sections.

The Safety-Carrier steam-ejector equipment is mounted below the car floor, and the cooling coils are mounted

between the false ceiling and the roof. Vapor temperature-controls are fitted, and the ratio of fresh to recirculated air is controlled by manually operated dampers. Exhaust ventilators are fitted in the roofs over the toilets.

The passenger cars are equipped with the Vapor heating system. Individual thermostatic control is provided in each drawing room, stateroom and bedroom.

Water System

All service water for the passenger cars is carried in stainless-steel tanks, mounted under the cars, from which it is delivered by air pressure to the various outlets. The system used in the dining car is similar, except for the addition of overhead storage tanks, one for hot water and one for cold filtered water. The water system in the railway post office and the mail-storage cars is similar to existing equipment; i.e., gravity feed from overhead tanks. Separate tanks are installed beneath the floor of passenger cars to carry the make-up water for the air-conditioning equipment. Filler inlets are placed in the sides of the car body to permit rapid and easy filling at the water stations.

Water coolers fitted with self-closing taps are located throughout the train for the convenience of passengers as well as in the kitchen and bar. The sleeping rooms are fitted with water carafes made on the vacuum-bottle principle and which the attendant will fill at the water coolers in the aisle.

All plumbing fittings and fixtures are of high quality. Washstands are vitreous china, colored to harmonize with the washroom interiors; hoppers are furnished with porcelain bowls, and the dental bowls are of the same material and color as the wash basins. All exposed piping is satin-finished chrome plated.

Mechanical Equipment

The trucks are four-wheel double-equalized type with integral frames and transoms of cast nickel steel, double annealed and drawn.

The frames are designed to withstand 200 per cent braking power. All bearing surfaces are carefully machined and all brake-pin holes are bushed with case-hardened sleeves. Surfaces subjected to friction are faced with manganese steel liners, and unfastened metal-to-metal contacts are insulated with sound-deadening material. The trucks on the first five cars are fitted with friction type bearings in Symington boxes with Magnus Company Satco bearings, the Freedom rolled-steel wheels on these being 35 in. in diameter. The trucks on the last four cars are fitted with American Steel Foundries roller-bearing units with SKF roller bearings. All axles are nominal $5\frac{1}{2}$ in. by 10 in.

The coil truck springs are made of silico-manganese steel, and the elliptic springs of chrome-vanadium steel. Lateral movement of the truck bolster is dampened by the use of Houde hydraulic shock absorbers.

The cars are fitted with American Steel Foundries light-weight, high-tensile, controlled slack couplers, and Miner A4XB draft gears. The buffers are Miner B18X. The coupler-suspension guide, as well as the buffer stems, are Fabreeka surfaced.

All water, air and steam piping is made of soft heavy-wall copper tubing. Standard fittings are attached by the use of Parker adapter joints.

