STABILITY IN THE MODERN CAR

(*Continued from page 39*)

tial action is nil and this car should have little or no wheel fight in addition to even tire wear.

This section was included because wheel fight contributes heavily to driver reaction. Also, jounce and rebound suspension-steering influence car front end oversteering and understeering.

POWER STEERING

Power steering virtually eliminates all road shock from reaching the driver and stabilizes car steering during all operating conditions. Shown in Fig. 11 are the functioning parts of Chrysler power steering. As the driver turns the steering wheel, the steering column spur gear climbs up or down with respect to the worm shaft axis. This causes an up or down motion of the valve operating block. While the movement of the block is of very small magnitude, it is sufficient to open and close the distribution and reaction valves in the desired combination. This produces a difference in pressure between the power cylinders so that the pistons move the power arm in the same direction as the worm-and-roller is driving the steering gear shaft.

In regard to the problem of car stability, how does the power steering unit work as the front wheels of a car drop into a chuck hole or encounter other road obstacles? In a reverse action, the steering linkage is started in motion by a turning of the car wheel. As the driver is holding the steering wheel, the spur gear mounted at the end of the steering gear shaft tries to climb upon the gear at the end of the steering column. As a result, the valve operating block moves up or down and the valves are set in operation, causing the oil pressure in the power cylinders to oppose the movement of the car wheels. Thus, hydraulic pressure is applied as a counteracting force to dampen the shock that was previously acting on the steering linkage and greater steering and car stability is achieved.

BALANCED WEIGHT DISTRIBUTION

The final phase of designed stability in the modern passenger car is balanced weight distribution. The evaluation of mass distribution has gone from horseless carriage to the science of balance now employed in our present-day cars. Automobiles of the early 1900's may have had as much as 70% of the weight on the rear wheels. This 30% front wheel loading would make our modern car oversteer dangerously when going around curves. This is one fundamental objection on the part of some automotive engineers regarding rear-engine cars, as this type of car is usually loaded more at the rear than at the front.

By careful placement of the modern passenger-car chassis and body components, a 50-50 weight distribution is usually obtained. However, whenever possible, the balance of loading is generally shifted to 55% on the front wheels, since an understeering car is much easier to manage. The passenger load is applied primarily to the rear wheels. With a curb weight distribution of 45-55%, the 50-50 loading is more nearly approached when the car has a full passenger load.

Of equal importance to the suspension engineer is the mass distribution in the vehicle. The four most important suspension frequencies of a passenger car are: jounce, roll, pitch, and yaw. The latter two—pitch and yaw—are dependent on the moment of inertia of the vehicle at an axis perpendicular to the wheelbase passing through the center of the car, as shown in Fig. 11.

The mass of the car could be split in two sections and placed several feet off the front and rear bumpers and, if properly split, the basic 47-53% wheel weight distribution would remain the same. But the moment of inertia would be changed considerably over this car shown. The car weight has only been decreased 55 lbs. from 1952 to 1953 in the Plymouth. However, the wheelbase has been shortened 4½ in. and the distance between the centerline of the front wheels and the engine—a big factor in mass distribution—has been decreased 2½ in.

Briefly, balanced weight distribution means this. The jounce rate of the front and rear suspension has remained unchanged. This tends to retain car spring stability. The pitch and yaw car frequencies depend on the moment of inertia, as well as being a function of the square of the distance from the center of gravity to the centers of the front and rear springs. While the moment of inertia of some of our 1953 cars has been relatively unchanged, the wheelbase has been shortened, thus reducing the distance from the c.g. to the centers of the front and rear springs. As a result, the pitch and yaw frequencies have been reduced in these cars. To the engineer this means a better "isolation ratio"; to the driver it means a wider range of driving conditions with less road disturbance.

WHAT IS IT?
See the July Motor Life

MOTOR LIFE INDEX

A new feature listing all available back issues with a table of contents for each, use this page as a handy reference, order issues you have missed today!

1951

SEPTEMBER
Darlington Race
Russetta Meet
S.C.T.A. Meet
Bumper Guard Tail Lights
Cover Hot Rod
Cover Custom
Dago Drags

OCTOBER
Bonneville Previews
De Ville Merc
Saugus Drags
Cover Hop Up
Indianapolis Custom Show
Bell Timing Meet
Airoadster
Blown Sampson Sprint Car
Studie Custom
Offy Midget Engine
Custom Merc

NOVEMBER
Bonneville
Cover Hop Up
Kurtis 4000
Russetta
'42 Buick Custom

DECEMBER
Custom Hudson
To the Lakes with "The Screwdrivers"
Custom Hudson
188 mph Tank
More Horses thru Chemistry—Navarro
Custom Hints
Cover Hop Up

1952

JANUARY
What is One Horsepower?
Custom Chevrolet
Custom of the Month
Russetta Meet
California Roadster Association
Morrison's Roadster
Track Roadster
"T" V8 Roadster
"T" V8 Coupe
Readers Customs
Custom Hints
SCTA Meet

FEBRUARY
How to Use Hot Fuels
Mexican Road Race Report
No. 1 Custom of 1952
Illinois Roadster
Practical Restyling
So You Want to Paint Your Car?
Hop Up Test No. 9
North of the Border
Hamilton High Jamboree
Florida Ford
You Can't Judge a Book by Its Cover

MARCH
Technical Tips
How Many Pots?—Navarro
Mexican Road Race
Barris Kustom
Who's a Hot Rodder?
Custom Roadster
Del Mar Road Race
Roadster Rally
San Diego Drags
Custom Hints

APRIL
The Flame—Navarro
Clean and Channeled
Early Lakesters
Cummins Diesel
Hop Up Test No. 1
Custom Hints
Cover Custom
GMC Dynaflow Ford
Thunderbolt

MAY
Technical Tips
What Lights the Flame?—Navarro
Pomona AAA Stocker
Pontiac Custom
Old Lakesters
Hop Up Road Test No. 2
Fabulous Custom
Custom Hints
Dragin' Wagon
Cover Custom
How to Hop Up a Chevrolet Engine
Marcad—Cad Engined Marmon
Muth Custom

JUNE
Technical Tips
Why Ford's the Favorite—Navarro
Custom Hints
Hop Up Test No. 3
Cover Pick Up
Chevy Custom
Palm Springs Road Race
A V-8 Coupe
Cad Pick Up
Hopping Up the Buick Engine

JULY
Robbing Peter to Pay Paul—Navarro
SCTA Lakes
Custom Merc
San Diego Drag Races
Pebble Beach Road Race
Cover Roadster
Hop Up Test No. 4
Custom Hints
Plymouth Custom
Chevy—GMC Installation
Technical Tips

AUGUST
Does the Indianapolis Race Prove Anything?
Keck Special
Ansted Special
Custom Chevy
Custom Hints
Manning Sport Car
Hop Up Test No. 5
Kern County Drags
Russetta Lakes Meet
Midwest Motor Show

SEPTEMBER
"De' Stroke"
Custom Ford
6000 Miles in a Custom Car
Indianapolis Auto Show
Hopping Up the Olds and Cad
S.C.T.A. Lakes Meet
Behind the Scenes at Indy
Trouble Shooting Contest
Custom Hints
R.T.A. Lakes Meet
Built for Bonneville
Custom Ford
Bonneville Previews

OCTOBER
The Truth about Cams
Chuck Price's '32 Roadster
Sectioned Ford Custom
Hop Up Test No. 6
Esquires Club Stages Roadeo
Custom Hints
S.C.T.A. Lakes Meet
Hopping Up the Plymouth
Russetta Lakes Meet
Channeled '40 Ford Convertible
Big Bore Ben

NOVEMBER
Blown Cad De Ville
"De' Stroke" Cartoon
Bonneville Diary
Hop Up Test No. 7
Chevy Custom
Salt Lake Drag Races
Buick-Cad Hybrid Custom
Custom Hints
Reader's Customs
Big Bore Ben

DECEMBER
The Truth About Cams, Part II
Hoosier Hop Up
Cover Custom
Custom Hints, Part II
International Record Breaker
Custom Cadillac Convertible
Hop Up Test No. 8
Canadian News
Plymouth Custom Coupe
Reader's Customs
Big Bore Ben

1953

JANUARY
Blowing a Chevrolet
Clean and Classy
Missouri Roadster
Canadian Capers
Faster Than Stock
Keystone Kustoms
Terrific Kustoms
Terrific T V-8
Custom Hints
Draggin' for Damon
Practical Customizing
Tommy's Torrid Truck

FEBRUARY
How to Use Hot Fuels
Mexican Road Race Report
No. 1 Custom of 1952
Illinois Roadster
Practical Restyling
So You Want to Paint Your Car
Hop Up Test No. 9
North of the Border
Hamilton High Jamboree
Florida Ford
You Can't Judge a Book by its Cover

MARCH
'53 Lincoln-Mexican Road Race Champion
Stylish Studebaker
Pomona Drags
Preparing the Mexican Road Race Winner
Customized '36 Ford 3 Window
Traffic Stopper
Custom Hints—So You Want to Lower Your Car
Practical Restyling
Chev-Ford Combination
Cover Custom
320 hp OHV Merc
Men Who Make Racing
The San Francisco Ramblers

APRIL
Chopped Chevy Custom
Roadable Roadster
Plastic Bodies For Home Production
California Coupe
Building a Hot V-8 Road Engine
Custom Hints
Bay City Roadster
Practical Restyling
3 Day Coupe
Buick by Barris
Hawaiian Dragster
Henry J Convertible
Custom Car Contest
Hop Up Test
Ford-Chev Combination
Big Bore Ben

MAY
Sectioned Cadillac
Fact Not Fiction
Hawaiian '32
Lowest Coupe
What You Should Know About Wheel Alignment, Part I
Chopped Truck
Practical Restyling
Hot V-8 Road Engine Part II
Custom of the Month
Fordebaker
Chrome Plating
Bay City Champion
The Barris Story

JUNE
Cover Roadster
America's Hottest Hop Up
Preparing for Indianapolis
Foreignized Olds
What You Should Know About Wheel Alignment, Part II
Auto Glass—Why and How
Practical Restyling
For Chevy Owners Only
Show Winner
Converted Convertible
Keep It Cool
The Chrysler-line V-8 ohv Engines
Repair Fiberglas at Home
Studebaker Road Test

JULY
Hop Up Review
Black Beauty
Gal Hot Rodder—Peggy Hart
Elegance Award Winner
Lakes Opener—SCTA
Lakes Opener—RTA
Practical Restyling
Hill Top Rod
Personality of the Month—Clay Smith
First Time Out
Potent Crosley
Wheel Alignment Part III
200 mph Club
Inside Hop Up
Pomona Championship Drags

AUGUST
Bonneville Previews
Practical Restyling
Your Automobile's Chassis
Detroit—Quo Vadis
Hopping Up the Ford Six
500cc Club Builds a Special
Restyled Rambler
Experimental Engine
Race Bred for Road Use
Detroit Stylist's Dreams Revealed
Hopping Up the Four Barrel
Frantic Ford
Build for Go! Not for Show!
Plymouth V-8
Flying Cars?

SEPTEMBER
Deadline Data
Indianapolis Analysis or The Kurtis 500
Hop Up Auto Body Design Contest
Conservative Custom
Tucker Torpedo
Archie's Special
Fordomatic Plymouth
Louvers
Mobile Hospital
Deuce Delivers
Your Automobile's Chassis
200 MPH Club
First Forty-Niner
Custom Car Contest Results
Perforated Dragster

OCTOBER
You Can Survive an Accident
Capable Custom
Improving the Breed?
Formulized Ford
1954 Style Predictions
'40 Ford Coupe
American Cars at Le Mans
How to Drive and Survive in California
Beatty's Blower
Custom Continental
Ardun Roadster
Kurtis 500 KK
Wheel Balance
Two Big Drag Meets
Cad Conversion
Practical Restyling

NOVEMBER
Bonneville Diary
Hudson: Progressive Independent
Blue-Print Dragster
Custom Capri
Four Throated Carburetion
Thin Band of Safety
Plush Pick-Up
Revamped Ford Tub
Your Automobile Chassis
Invention for Jeanne
How to Install a V-8 in an "A"
Seven Toothed Custom
Practical Restyling

DECEMBER
0 to 100 in 11.1 Seconds!
General Motors Customs
Captivating Corvette
IV Carrera Panamericana Mexico
Lincolns Prepare for Mexico
AAA Bonneville Internationals
Long, Low and Languid
Christmas List
Bonneville Engine Analysis
Motor Life Fotorama
Panoramic Ford
Technical Tips

1954

JANUARY
How Much Did You Really Pay for Your New Car?
Spohn Custom Mercury
1954 Dodge Road Test
Streamlining the 1940 Mercury
The New McCulloch Supercharger
Contest Winner
Franklin-Continental
Kurtis Wins Again
Custom Car Contest
Bu-Merc Conversion
We Broke 196 Records!
National Speed Shop Directory

FEBRUARY
TEST REPORTS
Ford for '54
Headers—Misunderstood Speed Equipment
Chrysler's 235 HP V-8
Ford's OHV V-8 New Hop Up Hope
Dayton Dazzler
The Mexican Road Race
Hot Rod in Mexico
Almost Airborne
Spark Advance—Hop Up Trouble Spot
Radical but Practical?

MARCH
TEST REPORTS
'54 Hy-Drive Plymouth
High-Performing Hudson Hornet
The Life-Long Battery
1954 Complete Auto Directory
Specifications of all '54 Cars
Analysis of all '54 Cars
Analysis of '54 Engines
Auto Design Contest Winners
Speed with Safety
Merc-Mobile "88"
High Speed Handling
Illinois Custom
Cal-Neva Coupe
Designed for Restyling
Readers Customs

APRIL
TEST REPORTS
Buick's New Century
'54 Chevrolet Powerglide
Deadline Data
GM's Motorama—Nine Cars for Tomorrow
America's First Gas Turbine Car
I Drove the Firebird
Tuneup Trouble Spot
How to Install Mufflers
Lube It Yourself
Amazing Kurtis Sports Car
Sawed Off Six
Cheating the Wind

MAY
TEST REPORTS
New V-8 Mercury
Ford's Modern Six
Transplanting Horsepower
Mount for V-8 Conversion
Straight Six Stripper
America's Best Custom Car?
Ford's "Personal" Car
First Step to Improve Performance
How to Install High Compression Heads
More Drive from Overdrive
Blow Off the Heat!
Install Your Own Continental Kit
144 MPH in the Quarter Mile
Neither Dream nor Reality
Inside Ford's Secret Styling Room
New U.S. Economy Car
Skylark Becomes $10,000 Custom
What About Fiberglas?