starting by angling across the lane rather than straight uphill. Keep the sidecar on the downhill side.

Uphill corners

When negotiating steep uphill turns, remember that the weight shift to the rear has unloaded the front tire and reduced traction needed for steering. Use the inertia of the machine to carry it uphill, just to the tightest part of the corner. Get the machine turned while inertia is still pushing it uphill, then accelerate in the straightest possible line.

Downhill

When braking hard on steep downhill grades, veterans keep speed in check by using both brakes. The front brake is used in both left and right turns. Shifting to a lower gear and rolling off the throttle allows the engine to provide compression braking, but experienced sidecarists avoid sudden downshifts and quick release of the clutch, which can slide the rear tire loose. With the 2-wheel-drive >URAL Sportsman, engine braking force will dissipate if the sidecar wheel loses traction.

Descending steep switch backs, it is often necessary to stay on the brakes even while turning, so we have less traction available for steering. Smart downhill hackers brake harder on the front during the straight line approach to a curve, then ease up on the front brake to allow most of the traction for cornering.

Stopping on steep downhill grades requires more force on the front brake, but the rear brake will continue to be effective. With a loaded sidecar, the sidecar brake will help decelerate the weight in the car and make it easier to hold a straight line.

Downhill Right-Handers

It is important to slow more when approaching downhill turns, especially right-hand curves with an empty sidecar. Both inertia and gravity are pulling the combination towards the outside of the curve and the outfit could easily tip towards the left. Veteran sidecar pilots slow to a crawl and slide their weight off the saddle towards turns to help prevent tipovers. In subsequent lessons and exercises we will help you increase the cornering skills needed for such hazardous situations.

EVASIVE MANEUVERS

Whether we are driving the outfit in the city or the country, we must be able to maneuver away from trouble to avoid accidents. Ideally, we will spot hazards far enough ahead to simply make a small speed or position adjustment and avoid the problem. But we will sometimes encounter hazards that can't be predicted or occur so quickly we must take immediate evasive action.

We have laws that say a trucker can't ignore a red light and pull out in front of a motorcyclist. But, in fact, the trucker can pull out. You may have the legal right-of-way, but that won't protect you from getting smashed. There's a little rhyme which sums this up nicely:

"He was right, dead right, as he sped along;

but he's just as dead as if he'd been wrong."

The bottom line is that the motorcyclist wishing to survive urban traffic must adopt a "move it or lose it" attitude. Sidecarists with limited motorcycle experience need to understand that a sidecar outfit is perceived as a motorcycle by other motorists and that motorcycles are often given less respect than they deserve.

Evasive Action

Since the name of the urban traffic game is "move-it-or-lose-it", we must constantly be in the process of spotting potential hazards and moving away from them. We'll call this process "evasive action". Ideally, evasive action shouldn't have to be heart-thumping, eye-bulging panic stops, tire-chirping swerves or white-knuckle acceleration. By understanding the typical accident scenarios and predicting what the other vehicles around us are about to do, we should be able to make easy corrections to just stay away from trouble. Most of the time, we can do just that. For example, if you are being tailgated in deer country, you can encourage the tailgater to pass before you need to make a quick stop to avoid a deer strike.

But sometimes we just can't keep from getting boxed into a corner. We either make some drastic move within the last two or three seconds or get clobbered. Let's say you are riding down a quiet side street when a car suddenly shoots out of an alley. You must take immediate evasive action to avoid a collision.

Frozen on the throttle.

Perhaps one of the most significant eye-openers of the Hurt report concerns the evasive actions taken by riders faced with impending collisions. 99% reported 4 seconds or less between the time they realized a crash was about to happen and the actual impact. 61 % reported 2 seconds or less. So, what evasive maneuvers would you think these riders attempted in those last few seconds prior to impact? Guess what? About a third of the crashees did absolutely nothing prior to impact!

Maneuverability

Maneuverability is one of our best assets. A sidecar outfit can be turned very quickly. A proficient Ural driver can stop the outfit from typical 35 mph suburban speeds in perhaps 30 feet in ideal conditions. Of course, your actual stopping distance depends upon the skill you have developed.

When faced with an obstruction, we need to decide whether to accelerate, brake or

swerve, because we can't do more than one effectively at the same time. For example, when you spot a potential left turner, you could try to gas it and beat him through the intersection. Or, you could maintain speed and swerve around him. Or, you could prepare for a quick stop in a straight line. Let's consider the implications of these evasive tactics.

Accelerating

Accelerating to avoid a problem is a tempting choice and there are times when acceleration is the best tactic. But heavy sidecar rigs don't accelerate very quickly. And accelerating through a busy intersection is seldom a clever choice, for several good reasons: Accelerating increases momentum. And, car drivers have been known to beat the motorcyclist to the intersection and then slam on the brakes halfway across. The biggest drawback with accelerating is that it cancels out the other options. If you attempt to accelerate, you can't change your mind and do a rapid swerve or a quick stop.

Swerving

Swerving is a often a better choice than acceleration, because you haven't increased inertia and you can use the available traction for changing direction. Of course, swerving successfully requires that you know how to swerve and which way the obstruction is going to move. Cars don't always go where you think they are going. The good news is that swerving doesn't cancel out the other options; you could swerve, then straighten out and either brake or accelerate.

Quick stops

Hard braking gives you additional options. You can brake hard and come to a quick stop in a straight line or you can release the brakes at a slower speed and then make a more dramatic swerve without flipping the rig. So, hard braking is often the best choice of evasive action at intersections.

Smart sidecar drivers are already prepared for a quick stop as they enter a busy intersection. We've let the tailgating "shark" past, back in the middle of the block and now he's tailgating the bus ahead. We passed that "creeper" to avoid becoming a creeper sandwich; but now we've backed off to stay out from behind the bus. We're looking for left turners and watching their hoods and front tires, right? So, what more can we do to be prepared? Well, let's repeat five veteran techniques for making successful evasive maneuvers with a minimum of panic.

1. Get in the front brake habit. Stay in the habit of using the front brake every time you brake. The front brake is the most effective on the outfit. It is tempting to fall into the lazy habit of using just the rear brake and believing that you can reach for the front brake on those rare occasions when a quicker stop is needed. The trouble is, very few of us can out-think our habits. In an emergency we will do whatever we have been in the habit of doing. If you use the front brake all the time, you will use it during a quick stop without even thinking about it.

2. Practice. At least once each year, practice quick stops and swerves to maintain proficiency. Skill can only be improved through practice. Reading is OK to improve your mind, but you've got to practice if you want to hone your braking skill. Quick stops require that you be able to apply maximum braking on both wheels just short of a skid, whether on dry pavement or wet, uphill or down, on the straight or in a curve. You must be able to quickly separate braking from swerving and handle the techniques of hard braking starting in a curve. We will deal with braking and swerving practice in subsequent lessons.

3. Slow down 10. As you approach an intersection, decelerate just 10 mph, shifting down a gear as needed to keep engine revs up. Typical intersection speeds are 30 to 40 mph. Slowing just 10 mph, from 40 mph to 30 mph, reduces inertial energy by half, which

means the same brakes and tires can stop the same load in about half the distance. If you don't have to make a quick stop, you can easily get back up to speed after you've cleared the intersection.

4. Cover the front brake. Keep two or three fingers curled around the front brake lever in traffic and apply just a hint of brake if you suspect you might have to do a quick stop. Just reaching for the lever could take a half-second, plus maybe another half-second to start squeezing the lever. One second's worth of reaction time at 30 mph eats up about 44 feet of critical road space or just about the distance it takes to stop from 30 mph. If you are already on the front brake, you won't need more than a fraction of a second to squeeze harder.

5. Look where you want to go. As you ride along, make a habit of looking where you want to go, not at things you'd rather miss. If you want to hit a chuckhole, stare at it. It's a phenomenon called "target fixation". While you're cruising through intersections, keep your eyes moving to spot potential collisions, but spend some of your attention spotting escape routes or paths of travel you could follow if you need to make a sudden exit from a situation that's closing in. If a car suddenly gets in your way, don't stare at the car, focus instead on a path of travel that carries you around the car or a spot on the pavement where you will be stopped short of a collision.

Which brings us back to some observations we made earlier. Remember, the farther ahead you spot a problem, the more time you will have to deal with it. If you're sharp enough, you'll never need to do any "panic" evasive maneuvers. But when you do need to "move it or lose it" in the final 3 or 4 seconds before an upcoming smasho, having a plan of action and having practiced it will make the difference between a smasho and a close call.

PASSING

The >URAL prefers to motor along at a relaxed pace and you may find other drivers passing you more often than not. You should understand some common-sense rules for helping faster drivers to get around you. And there are times when you must pass other vehicles to separate yourself from hazards.

Our main concern when being passed by another vehicle is to not get in the way. When another vehicle is passing us, we need to be aware of that and be prepared to take evasive action to keep from getting clobbered. On the super slab we need to look behind both left and right to spot aggressive drivers moving up through the pack.

On secondary highways, getting passed can be an irritating business as the other vehicle pulls back in front, stirring up turbulent air and road grit and sometimes spreading a nauseous cloud of diesel soot. But increasing speed just encourages the other driver to cut in closer in front of us. Instead of getting incensed when we are passed, we ought to evaluate what's going on.

Traffic Speed

If we get passed by one or two hurried drivers in a hundred miles, that's just folks in a hurry to get to the radar trap first. But if we're being passed by everyone else on the road, it's a clue that we are moving too slowly. We ought to get up to traffic speed to avoid causing a problem, pull over more frequently to let faster traffic go by or choose a less traveled road.

Passing

Sometimes even we sidecarists need to pass other vehicles. For example, you may come up behind a slow-moving motorhome on a secondary road. After a mile or two several

vehicles pile up behind you and it is obvious the motorhome driver isn't going to speed up or pull off. By staying behind the motorhome you limit your view of the road ahead and also make it difficult for following drivers to pass. You may decide to pass or you may decide to drop back and allow following drivers more room to pass both you and the motorhome.

When passing another vehicle on a two-lane highway, what's important is to plan the pass to avoid collisions with either the vehicle we're passing or other traffic that enters the scene. It's not smart to depend on other drivers to brake or swerve to miss us. Since we'll be borrowing the opposing lane for a few moments, we need to choose a section of road no one else is likely to use at the same time.

Quick decisions and faster speeds can suddenly degrade into panic situations. We don't pass on bridges because there's no escape path except into concrete or steel. We don't pass at intersections because traffic can quickly pull out of a side street into our path. We don't pass on hills or in blind corners because we can't see enough of the opposite lane to know it is clear. In most states it is illegal to pass in such locations and good riders agree with the law.

Passing accidents occur when someone does something unexpected in the critical moments when the passer is hanging out in the wrong lane. For instance, a sidecarist with a clear road ahead starts to pass a groaning gravel truck. Then, just as the sidecar pilot gets up to speed, the truck starts a left turn into an unmarked driveway.

One way to avoid such scenarios is to scrutinize the road ahead well enough to spot any place where the other vehicle could make a sudden turn and avoid passing at that point. When you do decide to pass, make a habit of taking one last look in the mirrors before pulling out, to avoid collisions with other vehicles that suddenly attempt to pass you both. One way to avoid tangling with a vehicle being passed is to sound the horn as you come up abreast. Sounding the horn when passing is required by law in many states, but beeping seems rude, so most of us ignore the law. One polite beep when passing might be a smart tactic.

Politeness

Passing someone has the psychological implications of a put-down. We're "beating" the creeper down the road. It is perceived as especially rude to pull back in line too closely in front of the other vehicle. The slower driver may react to our pass by blasting the horn, waving nasty digits, speeding up, tailgating or even pulling out a handgun. We can help disarm the situation by signaling our intentions well in advance and allowing a minimum space of two seconds in front of another vehicle.

RIDING AT NIGHT

Remember old Paul Revere, pounding through the streets in the middle of the night? Wouldn't you think that Paul would have been smarter to do his fast riding in the daylight? Well, he had a schedule problem. He had to ride at night. Sometimes we motorcyclists face the same problem. We need to cover some miles and there isn't enough daylight. Or maybe we want to cross the Arizona desert under moonlight rather than beneath the scorching sun. Whatever the reasons for riding at night, we should understand the correct tactics.

The very first problem with night riding is that most of us have our bodies programmed for sleep at night. Unless we change the programming, it is extremely difficult to keep our eyelids propped open while staring into the darkness and listening to the hypnotic drone of

the engine.

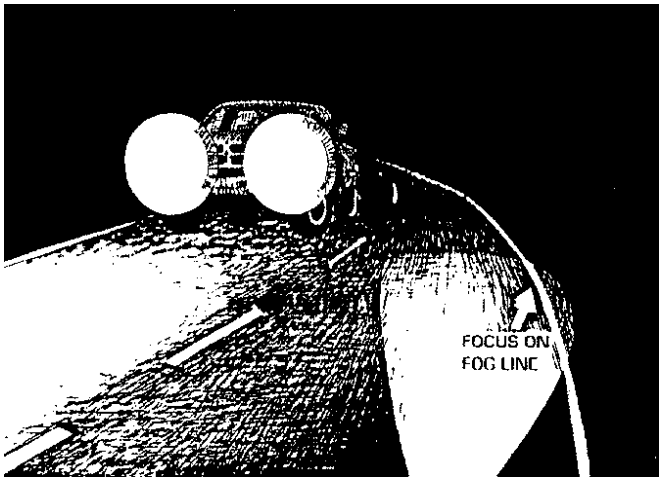
Perhaps the most important night-riding tactic is to take frequent rest breaks. As a practical technique, stopping for a coffee break at a restaurant provides a good cue for a subsequent stop at a rest area. If you don't drink coffee, drink a couple glasses of water.

The Eyes

Our vision also tends to fade as we get older and most of us age another year about every 12 months. One common problem is "floaters" that drift around on the surface of the cornea and interfere with clear vision. As the years go by we may become near-sighted or far-sighted and need corrective lenses. Then our "reading" bifocals may have the wrong focus distance for reading our motorcycle instruments. Some people gradually lose peripheral vision or start to form cataracts or lose the ability to distinguish colors. Because vision is so important to a motorcyclist, it is smart to have vision checked every couple of years, preferably by an eye physician ("ophthalmologist") who is trained to spot problems as well as dispense lens prescriptions. Deteriorating vision is a good reason to avoid night riding altogether.

Even if your vision is 20-20, the human eye has some odd night-time characteristics. Consider what happens when someone takes a flash photo of you while you're staring at the camera. The instantaneous flash of bright light overwhelms vision for a second or two. The same thing happens during a night ride when we walk out of a brightly lit building and stumble blindly over the curb while our vision receptors gradually adjust to the dim night-time level. That's one reason why many veteran truckers wear sunglasses in the restaurant at night and why experienced night riders wait a few moments in the dark before riding away.

Blinding Lights



But what do you do when you're cruising down a narrow road and an oncoming vehicle approaches with its lights blazing at you? You can't just shut your eyes until the vehicle passes. If you stare directly at the lights, your eyes begin to adjust to the high light level, but after the car passes it takes several seconds to adjust back to low light again. The trick is to avoid focusing on bright lights. Instead, as the other vehicle gets close, temporarily shift your focus to the white "fog" line along the right edge of your lane. Let your peripheral vision soak up the bright lights and save your important central vision for the dark road you need to see after the vehicle passes.

Before you head out into the darkness on your >URAL, check the lights, especially those on the rear end. You don't want to be hit at a stop sign because your tail light or brake light has burned out. If you intend to ride regularly at night, consider adding additional reflectors to your outfit and riding gear. Does your jacket and helmet have reflective

patches on the back? Would it help to wear a reflective vest over your leather jacket at night? Could you add some reflectors on the back of the sidecar?

Body Care

Even during the summer, night time temperatures can be surprisingly chilly. Don't forget to wear insulation under your crash padding and slip on your neckwarmer or balaclava. There are enough problems to deal with while riding at night, that you don't need to get hypothermic too.

Drunks

Remember that the most dangerous hours to be on the road are between 11pm and 2 am, especially on weekends. Those are the hours when the drinkers are heading home from the taverns. Your risks double during these hours. Drunk drivers tend to be erratic, wandering out of the lane, making sudden steering corrections or jamming on the brakes for no apparent reason. Give the drunks lots of room.

It's always smart to avoid alcohol during the ride, but it is critical at night. Not only does alcohol degrade your judgment, hearing and muscle control, it also upsets vision, including the ability of your eyes to focus and adapt to changing light levels.

Obviously, the risks increase after the sun goes down. If you have any reservations about midnight rides, just say "no". Take a day off work and make that rally transit in the daylight or have an early snooze tonight and get up at dawn to start that desert crossing. If you have a choice, choose daylight. If Paul Revere were around, he'd probably agree.

Chapter 5

URAL®
CLASSIC SIDECAR MOTORCYCLE

Chapter 5

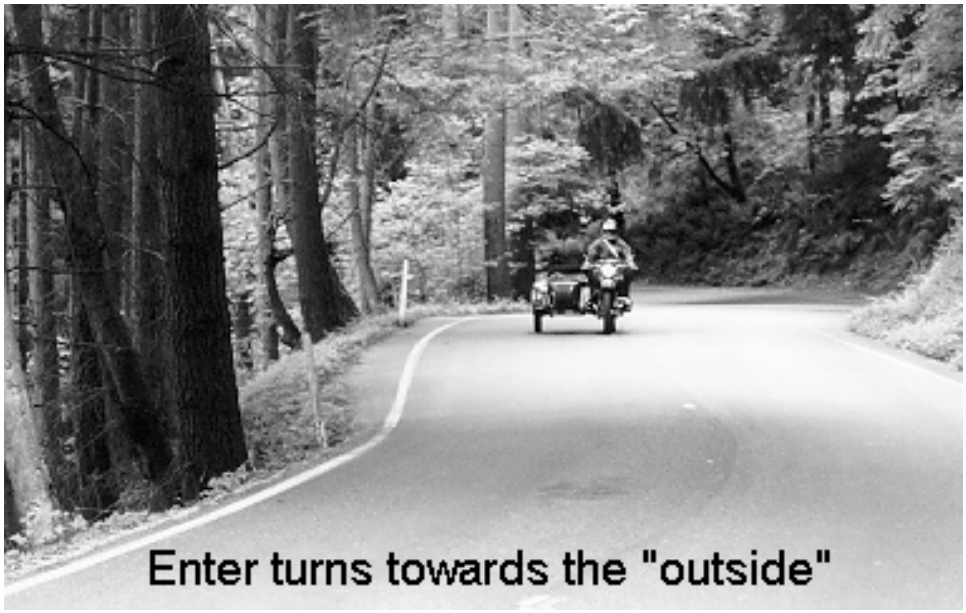
INCREASING DRIVING SKILLS

Now that you have practiced the basic control skills and studied some accident-avoidance strategies for riding in traffic, let's move on to more advanced techniques. First, we'll think about the dynamics of how sidecar outfits are controlled, then we will add some advanced exercises to practice on your machine.

Traction Control

One of the unique advantages of motorcycle/sidecar combinations is that a three-wheeler doesn't fall down just because one of the tires begins to slide. We can approach the limits of traction without losing control. For example, on a gravel road, we can accelerate or brake to the limits where the tires begin to spin or slide, yet not fall down or lose directional control. However, there are situations where losing traction can precipitate a rollover. Even if you ride conservatively, there are situations in which you must know what your tires are doing.

We call the rolling friction between the tires and the road surface "traction". The tire rubber actually presses into the tiny bumps and dimples in the pavement as it rolls across. Traction resists any forces pulling laterally on the vehicle, whether engine power, braking or side loads forcing the outfit into a turn. One important point to remember is that maximum traction depends upon how much weight is pressing down on the tire. For example, there is less traction on the front tire going uphill than going downhill, even on the same pavement.



Traction is a limited commodity. Even on rough dry concrete with excellent traction we can use it all up. For example, if we brake hard on the front wheel in an uphill left turn, the front tire could slide off on a tangent. There simply isn't enough traction for both turning and braking at the same time. Let's consider some tactics for controlling or "managing" traction.

On a twisty road, we can make the most of the available traction by following a path of travel or "line" that conserves traction. Since the tires use the least traction when rolling in a straight line, we can plan cornering lines with straighter curves than the centerline of the pavement. At the same speed, a cornering line with a larger radius of turn uses less traction than a smaller radius.

The advantage of following straighter lines through curves is more than just keeping the tires from sliding. Remember, that sidecar outfits have less stability than wider four-wheeled vehicles. By reducing the side loads on the tires, we also reduce tipover forces. The key to following smarter cornering lines is to enter turns closer towards the outside of the lane.

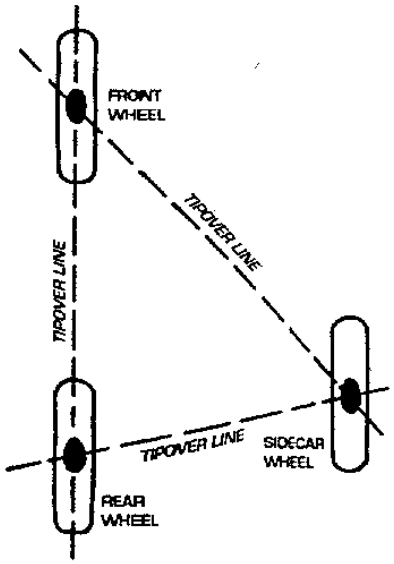
We can also help manage traction and side loads by correct throttle and braking

technique. In a level or uphill turn, we should roll on some throttle through the curve to help transfer more weight onto the rear wheel. With single-wheel-drive outfits, rolling on the throttle not only shifts weight rearwards, but also causes the rig to yaw towards the right until the sidecar weight is accelerated. That helps turn the rig in right-hand curves, but not in left-handers.

With the two-wheel-drive Sportsman, there is much less tendency to yaw while turning, but power delivery still depends upon keeping the tires firmly on the ground. If either driving tire loses traction, engine power transfers to that wheel and forward thrust is lost. So, it is just as important to manage cornering traction on the Sportsman as on any other outfit.

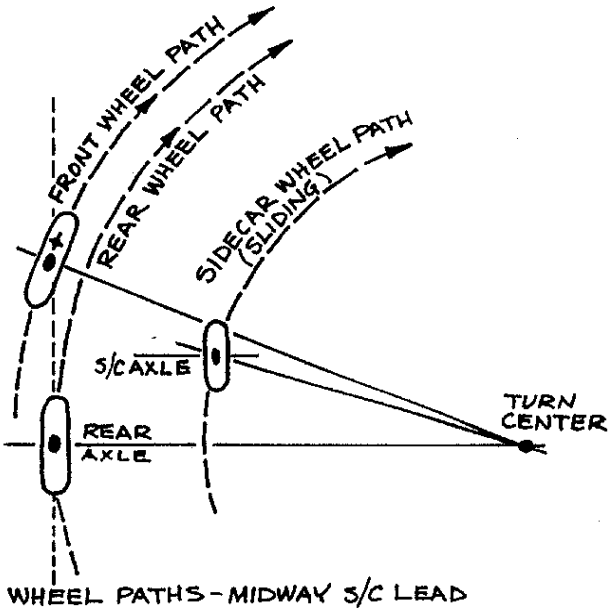
We should also note that rolling off the throttle uses traction. With the throttle closed, the engine acts as a compression brake. Braking on the rear wheel transfers weight forward, which reduces rear wheel traction even more. That's why suddenly rolling off the throttle or jamming on the rear brakes can cause the rear end to slide. If the outfit is in a tight turn at that moment, the rear end will slide sideways. Some veteran sidehackers do this on purpose to make a quick U-turn, but we don't recommend skidding the URAL sideways. If the "inside" tire suddenly catches traction, the outfit can be flipped over.

To better control traction and avoid groundloops, we need to consider tipover lines and study the correct techniques for "drifting" the outfit.



TIPOVER LINES

If you were to lift the sidecar wheel off the ground, the outfit would continue to be supported by the other two wheels. In fact, it is quite acceptable to tip the URAL sidecar up in the air to do sidecar maintenance. But consider that when the outfit tips up, the contact patches of the motorcycle tires are the hinge points. If we could draw a line on the ground between the two motorcycle tires, we could describe that as a "tipover line". Since we could tip the outfit over any two wheels, there are actually three tipover lines forming a triangle between the three contact patches of the tires.



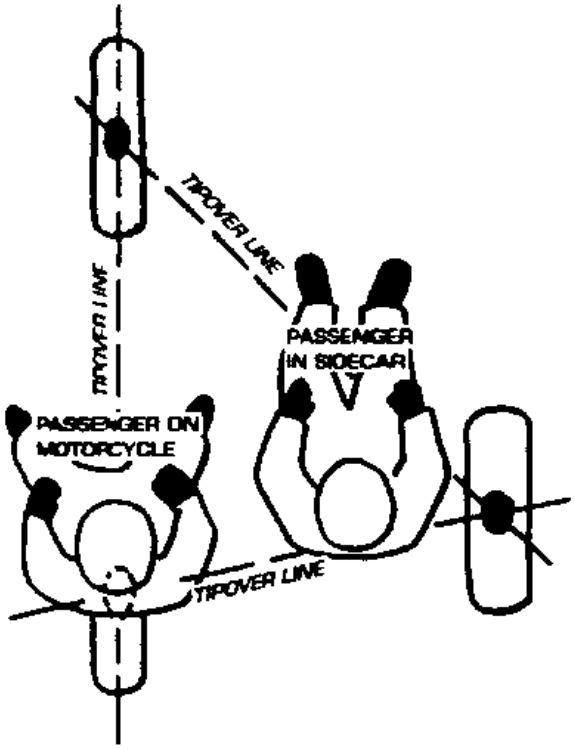
The farther apart the tipover lines and the lower the center of gravity, the more stable the vehicle.

Since URAL sidecar rigs have a relatively high center of gravity compared to the width of the wheel track, it is important to learn and practice correct cornering tactics.

You may have noticed that the sidecar axle on the URAL isn't in line with the rear axle of the motorcycle. The sidecar wheel is positioned a few inches ahead of the rear wheel. Sidecar wheel position has a lot to do with how a sidecar rig corners and balances.

A sidecar outfit would be most stable if the sidecar wheel were positioned about halfway between the motorcycle's wheels. But that position would make it very difficult to steer the rig, because the sidecar tire would have to slide sideways during turns.

Some sidecars are mounted with the sidecar axle exactly in line with the rear motorcycle axle. This provides easiest steering, but such outfits are much easier to tip over in left turns, because the tipover line is even closer to the motorcycle.



The URAL sidecar axle leads the motorcycle rear axle by several inches as a compromise between easy steering and tipover resistance. Sidecar wheel position in relation to the motorcycle (lead) is critical and should not be modified.

It is also very important how we load the rig, especially in terms of where passengers are carried. A heavy passenger carried on the rear of the motorcycle is already halfway outside one of the tipover lines. If the sidecar is lifted up only a few inches, the passenger's weight is quickly shifted entirely over the tipover line. If the passenger is carried in the sidecar seat, the passenger's weight is well within the left side tipover line. We'll consider the best ways to carry passengers and loads later on.

In right turns, the sidecar driver's weight also helps control tipover forces. Not only does the driver's weight generate centrifugal force, but the driver's gravity can shift outside the tipover line if the car flies or if the road slants the wrong way. That's why it is important for

the driver to slide towards the inside of turns.

Left turns can provide some quick surprises, too.

In a quick left turn, the outfit tends to roll and slide towards the right and the important tipover line is the one between the front wheel and the sidecar wheel. A heavy passenger in the sidecar generates a tipover force sufficient to lift the rear wheel of the motorcycle in a quick left turn. It is possible to "groundloop" the motorcycle over the sidecar. Knowing this, veteran sidecar pilots shift body weight towards the turn even in left-handers.

The two-wheel-drive Sportsman has a higher center of gravity that other models and also has different traction characteristics. Remember, that a rolling tire has more traction than a sliding tire. If the Sportsman is slid sideways and the sidecar tire suddenly regains traction, the outfit can quickly groundloop over the sidecar. We recommend you avoid sliding any URAL outfits sideways, especially on tractable pavement.

SLIDING AND DRIFTING

To understand how to keep from sliding, we need to understand more about it. A sliding tire actually has less traction than a tire that is still rolling on the road surface. A tire that is sliding sideways allows the tipover line to move sideways and allows inertial energy to dissipate. For example, on a loose gravel surface it would be more difficult to groundloop the rig during a tight turn because the reduced traction would allow the entire rig to slide sideways and settle down.

. The first important lesson about sliding is that a sliding tire doesn't care which way it slides. A sliding front tire tends to slide straight ahead whether it is steered left or right. With all three tires sliding, a sidecar driver wouldn't be able to steer and the rig would simply slide off on a tangent until it stopped.

The second important lesson about sliding tires is that if a tire regains traction it immediately wants to start rolling in whatever direction it happens to be headed. A sliding sidecar tire that suddenly grabs the pavement could yank the outfit into a new direction or flip the rig. But it is possible to control how much the tires slide even as they are still rolling. We call this "drifting".

Drifting is the fine art of using throttle and brakes to balance tire sliding while still maintaining directional control. We primarily use drifting in turns to help dissipate side loads and keep the rig on all three wheels.

In fast left-handers, we can use just enough throttle to drift all three tires without sliding out. In fast right-handers, we can drift the outfit by using throttle and front brake together. And we can help control tipover by shifting our body weight towards the inside of turns. Let's see how we do that.

USING THROTTLE AND BRAKES IN RH TURNS

The technique for drifting through right-hand turns is to use the front brake and throttle together. Rolling on some throttle helps push the rig around the corner, jacks the bike up on the suspension and transfers weight to the rear tire. The rear tire drifts slightly towards the left, helping dissipate some of the centrifugal force and keeping the sidecar on the ground.

Of course, if we simply rolled on more throttle in a right-hander, the rig would quickly

speed up, centrifugal force would increase and the sidecar would soon begin to fly again. So, the trick is to squeeze on just enough front brake to keep speed from increasing, even while we are rolling on the throttle. And don't forget that we're doing this while planning a smart cornering line and also sliding our weight off the inside of the saddle. It's complex, but it's the technique that is needed, especially when that turn ahead happens to be a decreasing-radius, off-camber "killer corner".

Later, in the exercises, you'll be practicing the technique, to the degree that you are physically able. First, you'll practice sliding off the inside of the saddle, as if in a sharp right turn. You want to shift your posterior now, not just your shoulders. Plant your right foot firmly on the footpeg and slide your "buns" as far as you can towards the sidecar while still keeping a grip on the bars. Hook your left knee over the saddle. The idea is to hang off, not fall off. Grip the throttle with two fingers and wrap the other two fingers around the front brake lever so you can operate the throttle and front brake simultaneously.

We'll help you through all of the steps in the exercises to follow.

QUICK STOPS

Back in our discussion of evasive maneuvers, we suggested that making a quick stop was a primary technique for avoiding collisions in traffic. A quick stop is also the best way to avoid a deer that leaps onto the road in front of you. A quick stop is simply bringing the outfit to a standstill in the shortest distance. Let's review the dynamics of braking and then consider how to practice quick stops on your outfit.

At speed, the outfit has stored energy we call inertia. In plain English, the outfit wants to keep rolling. To stop the rig, we try to grab the wheels with the brakes. And the wheels try to grab the road via tire traction. Remember, that traction is a function not only of the road surface and the stickiness of the tires, but also the force pushing the tire onto the road. Under hard braking, the effect of inertia is that the weight of the outfit seems to transfer forward. With more force pushing down on the front wheel, the front tire has more available traction and therefore much more potential braking force. That's why the front brake is so essential to quick stops.

Even though inertia "transfers weight" to the front wheel as the brakes are applied, the rear wheel and sidecar wheel continue to provide enough traction for braking. Quickest stops are made in a straight line, with brakes applied to all wheels just short of a skid. If the tires skid on a sidecar rig it isn't disastrous, but it won't stop as quickly as possible. During our quick stop practice, we will explore the limits of traction by intentionally skidding the tires and then learn to avoid skids

Since the URAL sidecar brake is connected to the motorcycle rear brake pedal, we can't modulate braking independently on the third wheel. If the sidecar is empty, the sidecar tire may skid. If the sidecar is loaded, more weight means more traction, but also more inertia to stop. The bottom line is to ignore the sidecar brake unless it consistently drags the rig into a yaw, which means it needs a simple adjustment.

But we shouldn't ignore the throttle. Remember, that rolling the throttle closed also adds engine braking on the rear wheel. With a single-wheel drive, rolling off the gas tends to pull the outfit into a swerve or "yaw". On the two-wheel-drive Sportsman, rolling off the gas applies engine braking to both the rear wheel and sidecar wheel, which limits yaw. But if either of the rear tires skids, engine braking will transfer to the other wheel, resulting in a yaw.

Since quickest stops are made in a straight line, hard braking is a lot easier when we use just the brakes and not the engine. We can disconnect the engine from the wheels by squeezing the clutch lever as we brake.

So, the quick stop technique is to squeeze the front brake and press on the rear brake simultaneously, adjusting pressure on the levers to apply maximum braking just short of skidding either tire. As the weight shifts forward, we can squeeze the front brake even harder, but we'll have to let up slightly on the rear brake. If the sidecar tire skids, we can safely ignore it.

Quick stops in curves

Making quick stops in a curve is a bit more difficult, especially if the road curves to the right. Hard braking in a right turn tends to lift the sidecar and drag the outfit towards the left. But if we're already practicing the correct right turn techniques, we are already prepared to squeeze harder on the front brake and make a controlled stop.

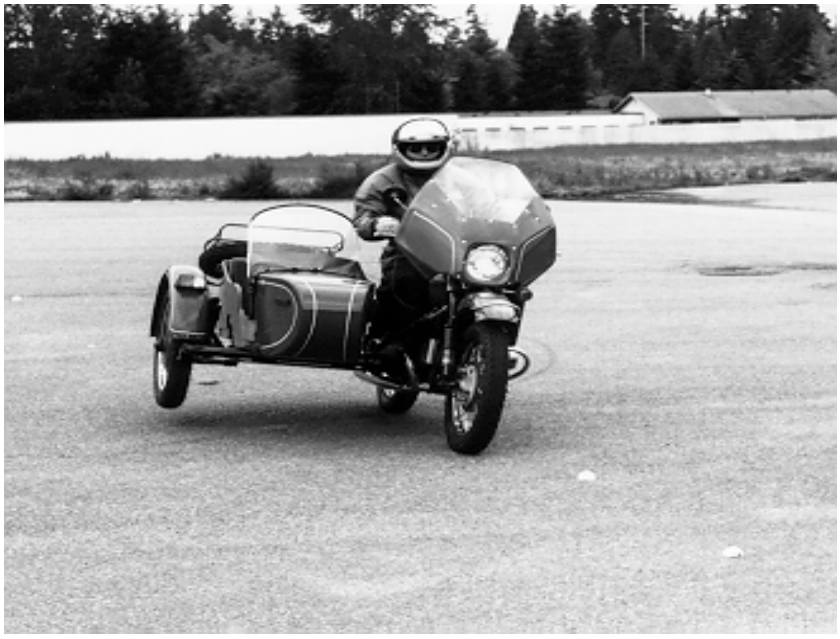
Making a quick stop in a left curve is less difficult, because the heaviest part of the rig--the motorcycle--is already on the left side. We will still make the quickest stop without skidding the tires, but if we do happen to skid, there is less risk of capsizing the outfit. And if we squeeze the brakes so hard that we skid the tires, the outfit will slide off towards the road shoulder--not into the opposing lane.

What's really important about quick stops is this: when we are suddenly faced with a hazard in our path we will do whatever we've been practicing. If we intend to do a quick stop for the occasional emergency, we need use the front brake every time we stop to develop the right habits.

SWERVING

There may be times when we need to make a quick swerve around something that suddenly appears in our path. For example, we may suddenly realize that the dark patch of pavement ahead is really a missing manhole cover.

A swerve is simply two quick turns one after the other. To avoid slamming into the open manhole, we could make a quick right turn, then a quick left turn to straighten out again. Or we could make a quick swerve into the other lane.



Of course, when a sidecar outfit is suddenly yanked into a turn, we should expect some strange behavior. In a swerve to the right, the sidecar will immediately fly, even with a substantial passenger aboard. But as we straighten out, the car will come back to the road again. In a swerve to the left, the rear wheel may momentarily slide sideways. And straightening the rig out requires a quick right turn, which will likely lift the car, too.

We don't really do anything different to make a swerve, we just do it a bit quicker than usual and there isn't time to prepare by sliding body weight around in the saddle or covering the front brake lever.

Remember, that traction is a limited commodity. If we need all the available traction for swerving, we shouldn't squander any of it on braking. So, if we're going to swerve, we need to hold a steady hand on the throttle and stay off the brakes, at least until we get straightened out again. When faced with a sudden hazard, our survival instinct is to roll off the throttle and slam on the brakes. If we're going to swerve, we need to fight that

unhelpful instinct. Obviously it's a lot easier to do an emergency swerve if we've practiced the right techniques beforehand.

STEERING REVISION AND FLYING THE CAR

Up to now, we've assumed that all three wheels of the sidecar outfit should stay in contact with the road all of the time. We have mentioned that the sidecar may lift up during a right turn and offered suggestions for keeping it down. There is a good reason for learning the basic sidecar skills without "flying the car". But now it is time to consider what happens when the third wheel begins to fly. We might even suggest that learning to control the outfit with the car flying is an important skill every sidecarist should master.

A three wheeler steers by direct steering. That is, to turn right, we point the front wheel towards the right. To turn left, we point the front wheel left. That's the way it works so long as all three wheels are rolling on the ground.

But a two-wheeled motorcycle doesn't steer that way, because it must be leaned into corners. To steer a two-wheeler to the right, the rider presses on the right grip to initiate a lean to the right. To turn left, the rider presses on the left grip. In other words, a two-wheeled motorcycle steers backwards from a three-wheeled motorcycle. Two-wheeled steering is called "countersteering" because the rider turns the handlebars counter to the intended direction of travel to initiate the lean.

Now, consider that a sidecar outfit with the third wheel flying instantly turns into a very out-of-balance two-wheeled motorcycle. How would you steer a sidecar outfit that happens to be balanced on the two motorcycle wheels? With the sidecar in the air, direct steering reverts to countersteering. Usually, the sidecar wheel quickly thumps back to pavement and the driver may not realize there was steering reversion. There is just the strange feeling that something was temporarily wrong with the steering. But in a continuous sweeping right-hander the sidecar wheel can fly off the pavement for hundreds of feet. In such situations it is important for the sidecarist to understand what is happening and maintain control of the rig.

Our suggestion for keeping the outfit under control is to get more familiar with steering

reversion. And the best way to get familiar is to learn how to fly the car on purpose.

Flying the car is not a matter of speed, but a matter of balance. Veteran sidecarists can fly the car at a slow walk. The trick is, once the car is flying, it is balanced by countersteering. That is, you lean the outfit more left by pushing harder on the left grip (and pulling on the right grip). Releasing the pressure on the grips slightly allows the car to drop a bit and the rig will curve off towards the right. If you relax pressure on the handlebars, the car will thump back to pavement and steering instantly reverts back to three-wheeled again.

The advanced exercise include flying the car on purpose and to make it easier, practice is with an empty sidecar.

FRAME STRESS DURING DRAMATIC MANEUVERS

As we progress from easy turns to more advanced maneuvers such as drifting, sliding the tires, emergency swerves and flying the car, we are increasing the stresses on the motorcycle/sidecar combination. Increased stresses can fracture bolts that haven't been kept tight, snap a loose wheel spoke or allow an under-inflated tire to slip on the rim. While the URAL frame is designed to handle sidecar loads, it is necessary to do some maintenance from time to time.

Chassis connectors

Connector bolts and collets may gradually loosen. Veteran sidecar pilots check all frame fasteners often, especially important connectors such as axle nuts and sidecar attachments.

Brakes

It is necessary to have the brakes adjusted correctly to be able to do quick stops. You should be able to squeeze the front brake lever as hard as you can without the lever contacting the grip. And, with the lever released, the front wheel should be free to rotate. If you have noticed a tendency for the outfit to yaw to one side during braking, you are advised to adjust the sidecar brake now.

Tires

Advanced maneuvers all depend upon having good tires and keeping them inflated to correct pressures. Tires are best checked by jacking up that corner of the outfit so that the wheel can be rotated as you inspect it. Look for tread condition and check for cuts, nails and glass shards. Tire pressures should always be checked "cold" (that is, before the outfit is driven and the tires have warmed up). If you discover that a tire consistently loses pressure, the inner tube and valve should be inspected and replaced if necessary.

Wheels

While you are inspecting the tires, spin the wheel, check that it is reasonably true and that the bearings rotate freely without any noises or side play. It is important with spoked wheels to have all spokes carrying a share of the load. Even one or two loose spokes can trigger wheel problems and even wheel collapse. When correctly tensioned, spokes will emit a "ping" sound when tapped. If loose spokes are found, the wheel should be removed and trued by a qualified mechanic.

These maintenance items are critical, but there are a number of other maintenance tasks to consider. You may wish to review the maintenance section in the URAL owner's manual before practicing the advanced exercises.

When you are satisfied that the machine is ready, it's time to practice the advanced skills on your outfit. If possible, have an experienced sidecarist coach you through the exercises.

Since it is always possible to make a mistake while learning something new, you are encouraged to wear abrasion-resistant riding gear and a quality helmet.

The advanced exercises are practiced with an empty sidecar. If you have physical disabilities which prevent you from sliding your body around in the saddle, you should carry at least 50 pounds of ballast in the sidecar.

The following exercises should be mastered in sequence. If you have difficulty with any exercise, go back and practice the previous exercise again. If you begin to get tired or frustrated, take a break. Advanced sidecar skills aren't easy, but the payoff is being in control of your outfit later as you explore the backroads.

URAL®
CLASSIC SIDECAR MOTORCYCLE

Chapter 6

OTHER RIDING SITUATIONS

If you have learned the important lessons about driving an outfit in traffic and mastered all of the advanced sidecar exercises, you are well prepared to handle your rig on the road. But there are a few other riding situations we should study, including unpaved roads, carrying loads and passengers and equipment failures.

CROWNED ROADS

Most roads are higher in the center than at the sides, to allow rainwater to run off into the ditches. This "crown" can be a help or a hazard to sidecarists. Sidecar rigs are normally set up (rigged) with the motorcycle leaning out towards the left. With normal road crown slanting off towards the right in our lane, the leanout brings the motorcycle near vertical and provides almost neutral steering.

Although the >URAL motorcycle and sidecar are attached rigidly to each other, the motorcycle leanout can be adjusted. If you discover that your rig consistently drags to the right on the roads you typically travel, you can increase leanout. If the rig consistently drags left, reduce leanout. Leanout is adjusted by screwing the upper sidecar struts in or out. We recommend that you talk to your authorized >URAL dealer if you have any questions about this.

In a right turn, the typical road crown slanting towards the right helps lean the outfit into the turn, which reduces side loads on the tires and helps keep the sidecar from flying. But not all roads have proper crown. The pavement may slant off towards the left in a right turn. Such "off camber" corners are particularly hazardous for sidecar drivers, especially if the car is empty or if the driver hasn't mastered advanced cornering tactics. The keys to avoiding a tipover on poorly crowned roads are: following smarter cornering lines, shifting body weight and controlling speed.

Slowing down for corners helps, because inertial forces dissipate quickly with reduction in speed. Entering corners at slower speeds also allows you to roll on some throttle during the turn, in order stabilize and drift the outfit. Downhill, off-camber turns are most hazardous because gravity and inertia shift weight forward onto the front wheel. That places more weight closer to the tipover line in left-handers. It is very important to keep speed in check all the way around downhill turns. In downhill left-handers, with the driver hanging off the left, it may be difficult to reach the rear brake pedal, so the front brake should be used to control speed.

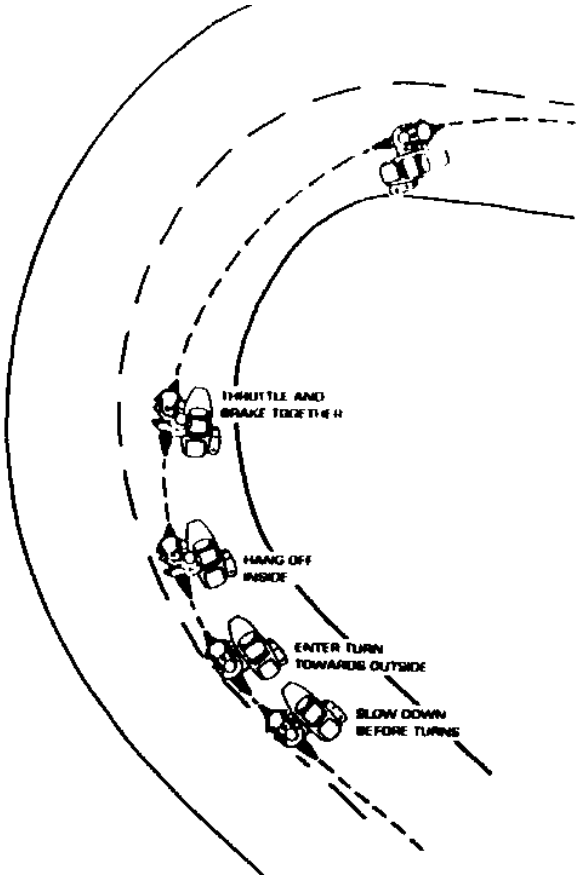
Note that in left turns, road crown often slants off towards the right. Expect the outfit to lean over even farther towards the sidecar during left turns. The hazard is that the rear motorcycle wheel can start to lift and it is possible to groundloop the motorcycle over the sidecar. That's why veteran sidehackers hang off the left side of the rig going around left-handers and follow the smart cornering line that takes the outfit closer to the centerline at the middle of the turn. The road is usually flatter towards the center.

Practicing the skills we have introduced in the advanced exercises helps you keep the outfit under control even when you encounter strange road crown shapes, off-camber

corners and turns on steep hills.

CHANGING RADIUS OF TURN

Just as roads occasionally have corners with strange slanting crowns, we must also expect the odd curve with a changing radius of turn. When the turn changes radius unexpectedly, our skillful cornering plans get upset. Obviously, we would prefer to have some idea of where the road goes before we put our tires over it. Veteran sidecar pilots look as far ahead as possible to scrutinize turns. Sometimes we can see all the way around the turn before we enter it, but more often, we can't see the turn exit until we're right in the middle of the corner.



Consider a turn that starts tight and then eases into a larger radius as it goes around. Such an "increasing-radius" turn is not a problem, because we can safely increase speed as we go around. And allowing the rig to turn a little wider also helps dissipate tipover forces.

Decreasing-radius turns are the ones we call "Killer Corners", as in Figure 7. As we realize that the turn is tightening up, we must turn the rig sharper. But steering towards the inside increases tipover forces. If we turn tighter, the outfit may tip over. If we don't turn tighter, we will run off the road. We need to slow down to turn tighter, but if we roll off the gas to slow down, tipover forces are increased. The situation is even scarier if the decreasing-radius Killer Corner occurs on a steep downhill section or the road crown slants off the wrong way.

How do we survive the Killer Corners? One important tactic is to make a practice of slowing down for all turns and especially, those "blind" turns where you can't see all the way around. It's a lot easier to speed up than slow down. It also helps to practice the smart cornering line that enters every turn towards the outside of your lane.

But what is most important is simply to practice advanced cornering techniques even when you don't have to. Practice using the front brake and throttle together, even in a gradual right turn. Remember, that you can reduce speed by braking on the front, even without rolling off the gas.

In a surprise situation, you'll do whatever you've been practicing. So, when the sharp right-hand curve you are rounding suddenly turns into a Killer Corner, you are already prepared. You are already hanging off towards the inside and using throttle and front brake together. You're all set to squeeze on a little more front brake to tighten the turn and drift the rear end a little wider. For you, Killer Corner can be just another turn in the road.

LOOSE AND SLICK SURFACES

One of the unique advantages of >URAL outfits is that you can explore unpaved roads and even back country where there are no roads. But before you head out to those unpaved areas, let's consider the special tactics needed to keep the outfit under control on loose surfaces such as gravel or slick surfaces such as mud or snow.

In general, loose and slick surfaces are handled the same way. Such surfaces have reduced traction, which affects engine thrust, braking and steering. Let's consider how we might ride a road covered by loose gravel.

As we start the outfit rolling, the rear wheel may spin and throw gravel instead of pushing the rig forward. We can help control wheelspin by easing the clutch out more gradually and using just enough throttle to turn the rear wheel. We can also help by sliding our weight back towards the rear wheel to increase rear wheel traction.

With the two-wheel-drive Sportsman, the sidecar wheel may spin if there is no load in the sidecar. You can help control traction by shifting your weight more towards the sidecar.

Once the rig is moving, expect steering to be easier but less responsive. The front tire tends to drift in low-traction turns, so the outfit may be sluggish to turn. On loose or slick surfaces, you can help steer the outfit with the throttle. In a right turn, rolling on some throttle will drift the rear end wide and point the outfit more towards the right. In a left turn, rolling off the throttle will help point the outfit more left.

With the Sportsman, front wheel steering will be more responsive in level turns, because engine thrust is equalized between the two drive wheels. The throttle can still be used to help slide the rear end and point the rig in the desired direction.

Warning: It is much easier to slide the outfit sideways on low-traction surfaces such as gravel, grass or ice. But avoid sliding the rig sideways over bumps or grooves that might suddenly catch a tire and cause a tipover.

Driving up steep hills, there may not be sufficient traction for the tires to keep the outfit moving. You can help conserve traction by shifting weight back in the saddle and using just enough throttle to keep the wheel turning but not spinning. You can also use inertia to assist engine thrust. Increase speed before starting up the hill to build inertia. Then allow speed to decrease towards the top.

Driving down steep hills, there may not be enough traction to stop. And, remember that inertia increases rapidly with increasing speed. It is important to slow down at the top of hills and use both engine compression and wheel braking to keep speed from increasing. Since rolling tires have more traction than sliding tires, apply only as much braking as possible, short of skidding the tires.

When driving the outfit on rough dirt roads, veteran sidecarists often stand up on the

footpegs and allow their legs to soak up the bumps.

As with paved roads, unpaved roads have odd crowns, hills and radius of turns. The same smart cornering lines that work on paved roads also work on gravel or dirt roads. Hanging body weight off towards the inside of curves also helps on loose or slick surfaces, but front brake techniques must be modified. With reduced traction, there often is barely enough traction to get the front end turned. There isn't enough traction for braking while turning. However, short bursts of throttle or rear wheel braking can be used to drift the rear end sideways and keep the outfit level. Dirt bike riders offer the advice: "When in doubt, gas it."

We don't have any "parking lot" exercises to help you practice riding on slick or loose surfaces. Instead, we recommend spending some time driving a gravel or dirt road. Fill the tank and go exploring. Just take it easy while driving on unpaved surfaces becomes more familiar.

CARRYING PASSENGERS AND LOADS

Another of the advantages of a sidecar rig is the ability to carry passengers in greater comfort and safety and more space to carry loads. While the >URAL is engineered to carry extra weight, we must use some precautions about how we load that weight on the outfit.

People who might otherwise avoid motorcycles can often be talked into a ride in the sidecar. Children especially enjoy the novelty of the three-wheeled motorcycle. When carrying inexperienced sidecar passengers, there is the temptation to show off a bit for them, but the wise sidecarist knows how scary advanced riding skills may be for the new passenger. They will enjoy the experience best if you drive conservatively during their first sidecar ride.

It is important that passengers or loads be carried in the sidecar, not on the back of the motorcycle saddle. The rule of thumb is that there should always be as much weight in the sidecar as on the back of the motorcycle. A passenger sitting upright on the back of the saddle is already balanced over the left tipover line. A modest right turn or road crown slanting left is sufficient to overbalance the sidecar so quickly that the driver is likely to lose control. A passenger sitting in the sidecar is well inside the tipover lines.

If two adult passengers are to be carried, the heaviest passenger should be in the sidecar seat. When carrying an adult passenger plus a child, both should be in the sidecar. The utility sidecar is designed to carry cargo, not passengers. With the utility outfit, the only logical seat for an extra passenger is on the back of the motorcycle saddle, but with an empty box, that creates a tipover hazard. Unless the cargo box is carrying a load heavier than the passenger, it is best to avoid carrying a passenger on the Utility rig.

Even with a loaded sidecar, a passenger seated on the back of the motorcycle should be instructed to lean into turns like the driver.

Heavy loads carried on a sidecar rig should be balanced over the sidecar axle and secured to prevent shifting. Lengthy objects such as boards or ladders must be secured to prevent sideways movement during turns. When carrying such loads on a sidecar, be prepared for other drivers to wander into your lane as they gawk in amazement at your unique rig.

Remember that extra weight affects performance. It takes more power to move a heavier load down the road andmore distance to brake to a stop. Two adult passengers on a >URAL outfit add considerable extra weight. On hills, use lower gears both to ascend and

descend andbe more cautious about keeping downhill speed in check.

TIRE FAILURES

Back at the beginning, we mentioned that sidecarists must be rugged individualists capable of solving their own problems independently. That statement is especially true of motorcycle tires. Tires take considerable abuse and tire failures are the most common motorcycle breakdown. Automobile tire shops and service stations are not usually equipped to handle motorcycle tires and motorcycle shops may not have tires suitable for sidecars. When faced with a flat tire, the sidecarist may have to solve the problem with little assistance.

Since the >URAL has spoked wheels, the tires require inner tubes. The inner tube holds the air pressure inside the tire. A slowly deflating tire is usually a result of an innertube puncture from some sharp object such as a nail. Innertubes can also be punctured by a spoke being tightened with the tire still mounted. Tubes can also disintegrate and allow the tire to deflate suddenly. We call such sudden deflations "blow outs", although the tire itself may survive intact.

When a tube loses pressure while riding, the deflated tire loses its grip on the wheel rim andthat wheel begins to wiggle around on the rim. The "rubbery" feeling on that wheel is usually our first indication of a tire problem. If a blowout occurs at highway speeds, the tire has enough centrifugal force to stay more-or-less in place on the rim. But as the outfit slows down below about 25 mph, the wiggling gets worse. For this reason, the driver with a flat tire should get the outfit stabilized and avoid any sudden changes of speed or direction. Gently roll off the throttle, avoid braking on the affected wheel and ease the rig off onto the road shoulder.

One of the unique features of >URAL sidecars is that most models have a spare tire carried on the rack. All of the wheels on the >URAL are identical, so the spare can be used on any corner of the rig and wheels can be rotated to equalize tire wear. However, changing a >URAL wheel is not like changing the typical automobile wheel. We highly recommend you take the time to practice changing a wheel at home, to familiarize yourself with the tools and techniques in a more relaxed atmosphere than alongside a busy highway. The wheel changing procedure is described in the Owner’s Manual.

Since most contemporary vehicle tires are tubeless, repairing a tube-type tire requires skills that most North American tire shops have long forgotten. You will either have to fix it yourself or find a repair shop which can. When replacing an innertube, mark the tire to ensure it returns to the original location on the rim. It is best to replace rather than patch innertubes. You may wish to carry a spare innertube on your travels, carefully wrapped in a protective covering. If you aren't familiar with mounting tube-type tires, contact your >URAL dealer for assistance.

The tires used on >URAL outfits are special sidecar tires with flatter tread and stiff sidewalls. Tire specifications are listed in the Owner’s Manual. Your >URAL dealer should be able to provide correct replacement tires. Whenever you replace a tire, a new innertube should be installed and the wheel rebalanced. If the wheel also needs truing or spoke tightening, that work should be done while the tire is off the wheel.

Tire failures are more likely to be avoided when the tires are kept inflated to correct pressures and worn tires are replaced promptly.