"Tattoo the above quotes on your brain" as Ernest used to say. Better yet, paint them as signs to hang in your shop where you can look at them every time the going gets rough.

It was with this incentive that the manual you're holding was done. With its nearly 150 different parts not even a simple quadricycle is necessarily easy. However, if approached one part at a time, the job becomes much easier.

Usually when you buy a set of plans for a project such as this all you get is a copy of a magazine article or everything crowded onto a few sheets of paper.

In this manual you will find a complete drawing of each part - nothing is left for you to guess about. A lot of parts are simply a piece of bar stock, angle or tubing cut to length with one or more holes drilled in it.

This is not to imply that you can't go off the beaten trail and modify or redesign to your own desires. To do so is encouraged.

The idea that this horseless carriage could be approached as a class project crossed our mind. Since it utilizes several machine shop operations, each student could be assigned a few parts to do according to their ability and skills. When completed, let the auto body shop do the painting (I hate painting). Then drive in the homecoming parade! The Industrial Arts Dept wins, hands down!

The same could apply to friends or neighbors who go join together to build each a car with different ones making all of certain parts.

A few tools I consider a necessity (either owning or having access to) and they are: a cut-off saw, a drill press, a hand grinder, an accurate square (combination & large carpenter's square), a bottle of layout blue and the means of accurately scribing layout lines on the stock. Always center punch all holes before drilling.

We could not avoid the use of a lathe in a minimum of places. These parts could be "farmed out" to a machine shop. However, this is going to cost you. Better yet if you are in a school shop class. Maybe you have an acquaintance who owns a lathe - be nice to him!

To proceed very far in a project where metal is used, a welder is a necessity. I used a 225 amp AC (buzz box) and an assortment of 3/32, 1/8 and 5/32 Dia. No 6013 rods.

I'm not going into how to run a lathe, weld or any other shop skills. To do so would be
beyond the scope of this plans manual. To learn or do these skills is up to you.

Before you start making scrap iron, study this manual and drawings. Obtain catalogs from suppliers and if you have access to the internet, look at and bookmark the suppliers we have referenced.

Plan where you are going to work on your car. Although desirable, a large shop isn't necessary. Henry Ford utilized a coal shed for a car similar to what you're undertaking.

Visit your local steel supplier. Depending on your location, you may have access to a well stocked supplier. If you live in a rural area, look for a welding shop that might have some scrap or be willing to order for you. Also, consider letting a good welding shop do your welding, especially if they are equipped with a MIG welder. Maybe he would like to build one for himself!

Search the internet, especially Ebay auction. We found the transaxles used on the horseless carriage plus future projects, on Ebay. When you need a little R & R from the shop, sit down and rest at your computer. Use this time to further your knowledge of what's available out there.

— Start with the Frame —

It is only a suggestion that you start with the frame. The frame is not unlike the foundation when building a house. Since all the other components rely on the frame for alignment, great care must be exercised when laying out each individual piece of the frame.

The frame is a hurdle that cleared will commit you to finishing your car. The only machining process is to accurately cut each piece to length; drill necessary holes on a drill press and either weld them together yourself or have it done by a welding shop.

If space permits, set the frame on a couple of saw horses. Every time you enter your shop you will see it and it will trigger your mind to the idea that, "By golly I'm really building a car - from scratch - by myself". "I wonder when the next parade in town is." I, also, recommend that you do not paint the frame until all the other parts have been made. As you progress making the parts some of them can be loosely assembled to the frame. Seeing you car take shape is a thrill you'll never forget.

We chose to detail each piece of the frame individually for both clarity and to be able to do all the drilling on the drill press. It is imperative that all the holes be drilled perpendicular and unless you have better ability than I, it can not be successfully accomplished with a hand held drill.

Another important requirement for the frame is for it to be welded flat and square. This can only be accomplished by close attention to your cut-off saw being adjusted absolutely square. You must adhere to the overall dimensions. There are no tolerances specified - only the actual dimension shown. However, your finished part should be within plus or minus 1/64 of an inch.

With the exception of 2 small brackets, the frame is constructed from 1 1/2" X 1 1/2" square steel tubing with a wall thickness of .120 inch. All cuts are square and if properly cut, all parts should clamp up, forming a square frame. Needless to say, the clamping should be done on a flat surface.

Study drawing No. 062, noting the hole locations. It is very important that close attention be given the orientation of each frame piece before welding begins. It can be very discouraging to have to scrap out a welded frame simply because you failed to double check part placement. However, should you have to re-do any parts, frame and otherwise, here's another Ford quote to remember:
"Failure is the only opportunity to begin again, more intelligently." — Henry Ford

We builders of small cars and tractors are lucky in the fact that as a result of the abundance of riding lawn tractors, there seems to be quite a number of transmissions, new and used, available. I found and bought several through Ebay auction on the internet.

They are typically either manual shifting, 4 or 5 speed transaxles or of the hydro-static variety. The transaxle used in the prototype horseless carriage in this manual is of the later. Ours was a new "in the crate" Hydro-Gear (manufacturer) No. 0500. The cost was $175.00 - quite reasonable considering Sears Roebuck got over $600 for a replacement when they were available.

All these transaxles have a 3/4" X 30" wide axle. Since this was too narrow for the tread width we wanted, it was decided to make extensions to attach directly to the axles and then mount the rear wheels directly to the extension.

The criteria we established called for a maximum speed of 20 mph - hopefully a bit slower. Most lawn tractor transaxles are designed to be attached to either an 18" or 20" OD rear wheel, providing a top speed of not over 10 mph. By attaching a 26" bicycle type wheel directly we managed to achieve a top speed of less than 15 mph - quite satisfactory for our application.

Another reason we chose to use a hydrostatic transaxle was no clutch mechanism was needed. It drives directly off the engine. Driving the car for the first time, some people are quick to note "There's nothing to do with my feet." "Where's the brake!" The hydrostatic transmission has a small brake that we utilized for a parking brake. The "road brake" is something the transmission supplies for free! Yes, you have dynamic braking - move the motion control lever back to neutral too quickly and you'll experience the braking. On a loose surface the rear wheels will sometimes drag.

One simple motion control lever is all that's needed to go from neutral to fast - back to neutral and then into reverse. Since hydrostatics will run in reverse as fast as forward, a limit was built into the guide to limit reverse speed.

Since the entire design was predicated around a Hydro-Gear Model 0500 transaxle, if another transaxle is chosen then you must study the frame and control mechanism, noting if there's any impact on the design and dimensions we have.

Our transaxle came without a driven pulley and cooling fan. Yes, hydrostatics produce heat and fans are used to force air over the unit.

Also, if buying a new hydrostatic unit, it may be shipped with a plug installed to prevent oil loss during shipment. In usage this plug must be replaced with a vent to allow the transaxle to "breath."

Since our unit had been originally designed for use by Sears Roebuck, we found the pulley, fan, and vent parts available from Sears parts department. We have provided part numbers in the back of this manual.

One more feature unique to hydrostatic transaxles is the by-pass feature. To push machinery with engine shut off it is necessary to dis-engage the hydraulics. This is accomplished by a small lever on the top that must be linked somehow to allow the lever to be held in the by-pass position. Later you will see how we did this in a straight forward manner.

**Purging the Transmission**

During manufacture, storage and ship-
ment of hydrostatics, air can become trapped be in the internal hydraulic passages. When your carriage is complete, purging is done by the following procedure:

1. On a level surface, apply the parking brake, activate the hydro by-pass feature and start the engine. With engine running slow, move the motion control lever fully forward and hold for 5 seconds. Move lever to full reverse position for 5 seconds. Repeat this procedure 3 times.

Note: During this procedure there will be no movement of drive wheels. The air is being removed from hydraulic drive system.

2. Move control lever to neutral position and shut off engine. De-activate the hydro by-pass feature. Re-start engine, de-activate parking brake. Sitting on carriage, slowly move the motion control lever forward until the carriage moves forward about 5 feet. Return the lever to neutral and repeat this procedure 3 times.

You carriage transmission is now purged and ready for use.

In cooler weather (50 degrees F. and below) allow both engine and transmission to warm up a bit before using.

You will note that there's no drain plug on the bottom of the transmission. They come filled from the factory and because of their sealed design, will never require draining and refilling. Should you wish to check the oil level you can do so by removing the vent fitting and measure the level with a make shift "dip-stick."

Hydro-Gear recommends an oil level of between 1.6 and 2.1 inches with the unit level. It comes pre-filled with Mobil HD 20W50 motor oil.
The Design Processes to Follow in Small Car Design

“Paying attention to simple little things that most men neglect makes a few men rich.”
— Henry Ford —

Most people will never undertake the task of designing and building anything, let alone an actual automobile that they can ride on when finished. They may venture into model building and invest upwards of a thousand dollars into a radio controlled airplane or car.

Some of these models are complex and highly technical. However, hobby shops abound in materials, kits and other supplies that remove the fears of undertaking model building. You may have friends who have preceded you in these areas. However, building an actual car is a field traveled by few. Intimidation sets in and you simply don’t know where to start. Most people will seldom proceed further than the dreaming stage.

Spend a lot of time thinking — thinking about how such men as Henry Ford, Ransom Olds and others proceeded when they undertook to build their first cars which launched giant industries. Where did they start?

Let’s start with something simple. Say, for example, you wife wants you to build a shelf for her to place some books. You would analyze the projects like this:

1. Is the shelf free standing or does it extend up from the floor as a book case or hang from the ceiling?

2. What materials and finish will you use.

3. Where will you obtain these materials.

4. Will you buy existing parts or will you obtain the raw materials and custom build from “scratch?”

5. How much can you spend on the project?

6. What tools do you have and what will you need to get to properly finish the job?

Most people will seldom have all the materials at hand and if they don’t want to buy more tools, they will work around what they already have. It would then be logical to look around your nearest home center to see what’s available and compare prices.

The point I’m trying to make is even with a simple shelf project you will spend a lot of time thinking, investigating and planning before you pick up a tool or board. The same applies to small car design and building. The only major difference is you don’t have a “car center” or hobby shop for car builders where you can look at what’s available.

There’s a lot of useful things available but it takes a little detective work and digging to find them. Search Ebay Auction on the internet for all applicable categories and items. Flea markets and carport sales can sometimes be a source of something we can use.

Look in an ad paper that most communities have. Its possible for someone to give you an old riding mower just for hauling it off.

Above all be resourceful.
Once you have completed the frame and all the parts and are sure they fit and function to your satisfaction, you should paint them to a color or colors of your choice. With the exception of the wooden body parts which were painted red, our car was painted black.

— Front Axle & Steering Mechanism —

Lay your frame, right side up, on a pair of saw horses. We began by assembling the front axle and steer mechanism first. This is covered on Assembly Drawing No. 073. While the steering shaft No. 055 and related parts can be assembled at this time, the column No. 050 and parts above it will have to go on after the front body has been attached.

Everything is pretty much straight forward with the exception of the front axle. It is attached to its support brackets, No. 001 by its two threaded studs. We have shown a blown apart view of the springs, washers and nut. We use a dual compression spring arrangement with one telescoping the other. Use both fender washers and rubber washers in the approximate arrangement shown. The 5/8 Nylon lock nut is adjusted to your satisfaction. The Axle is, also, attached by two trailing arms, No. 056 which are called out on Assembly Drawing No. 077. We recommend adjusting these arms to achieve approximately a 2 degree positive caster on the axle. The tie rods utilize 3/8 ID shim washers, No. PP 222 to allow better movement of the ball ends. The tie rods attach to the bottom of the pitman arm and to the top of the spindle arm.

— Transaxle Mounting —

With the transaxle supported, attach both the rear hubs and associated parts to the axles. Refer to Assembly Drawing No. 070. Use shim washers No. PP 241 to adjust the space between the pillow block bearing No. PP 214 and the hub to allow both the right and left pillow blocks to center on the frame sides. Try to use the same number of shim washers on each side. Our car required 5 on each side.

With your rear hubs assembled onto the transaxle, this is a good time to go ahead and mount the transaxle to the frame. Leave the 3/8 mounting hardware loose for final adjustment. Before the torque bracket is mounted the transaxle will swing down. As long as the vent plug is capped, no harm can happen.

While referring to Assembly Drawing No. 076, use a combination square set to 6 5/8 inch position the rear axle on each side to this dimension from the back edge of the frame. Thus done, the center line of the axle will be 7 inches from the rear of the frame and square to it. When this is accomplished, you should tighten down the 3/8 mounting bolts holding the pillow blocks to the frame and shown in Assembly Drawing No. 070.

Referring to Assembly Drawing No. 077, attach the torque bracket No. 005 to the frame with 5/16 hardware. Swing the transaxle upward and with the all-thread bolt No. 061b and 5/16 hardware, attach it as close to level as you can see. Temporarily snug down the driven pulley and use a 2 ft. carpenter’s square or suitable straight edge laid across the top of the pulley to acquire equal vertical distances to the frame cross members at the front and back of the transaxle. Tighten the torque bracket hardware to secure the transaxle in its correct position.

At this time, by referring to Assembly Drawing No. 076, you can loosely assemble the transaxle support angles, No. 022L and 022R to the frame. Now, using 5/16 hardware, loosely attach the transmission support
brackets (2) No. 023 to the support angles. Use No. 061b (4) and 5/16 hardware to attach the brackets to the transaxle.

The load on the transaxle is carried by the ball bearing pillow block already attached. Therefore, the brackets just attached should be secured to the transaxle so as to not add or subtract to the up/down load on the pillow blocks.

Another thing to double check at this time is the 15 1/2 inch dimension between the angles No. 022L and 022R. Since the rear body cover attaches to these angles, it is imperative that this dimension be held.

— Engine Support and Mount —

Again, referring to Assembly Drawing 077, start attaching all the engine mount pieces to the frame. You will note that the sub-assembly No. 032 does not locate the engine mounting holes. Since any number of different engines can be used on this car, we have left it up to the builder to locate and drill these holes to match his particular engine. While the literature supplied with some new engines will have the dimensions of the mounting holes, this isn't always the case. The way we located the holes for the Honda 5.5 hp engine we used was to take a piece of cover stock card (about .010 thick) and cut a hole the size of the crankshaft in the center of it. Placing this over the crankshaft and marking the direction of the cylinder, we took an Xacto knife and cut holes matching the mounting holes.

Removing the card and turning it upside down, I centered it on the engine mount platform sub-assembly and center punched each mounting hole. The engine aligned perfectly.

The throttle bracket is attached to the left-rear of the engine mount No. 032. This bracket was designed to accommodate the Honda engine we used. Depending on the engine you choose, you may have to devise a different means of attaching the throttle cable.

— Control Shaft Assembly —

Moving forward on the frame we come to the shaft assembly that contains both the motion control and the parking brake. The shaft itself is No. PP 204, unaltered, supported by two bronze pillow blocks, No. PP 213 which are, in turn, mounted to the frame via mounts No. 012 attached to the frame with 1/4 inch hardware.

With the shaft protruding flush with the pillow block on the left, lightly secure the collar, No. PP 239. Position the pitman arm, No. 049 with the motion control rod assembly No. 059 is lined up with the control arm on the transaxle. Lightly tighten the set screw to hold it in place.

The parking brake lever assembly is moved to the left, contacting the pitman arm. There will remain a space between it and the right hand pillow block which is filled up with shim washers, No. PP 245. Use only enough to take up the major slack - the parking brake must be able to move without moving the motion control mechanism.

The pitman arm of the motion control should be pointed about straight down when the transaxle arm is in neutral. With proper movement assured, tighten down the pitman arm set screw so as to clearly mark its position on the shaft.

Now, leaving the pillow blocks securely mounted remove the shaft and spot drill a large dimple, centered on the above made mark. It should only be deep enough to allow the set screw to mount the pitman arm securely enough to insure against its movement on the shaft.

Re-assemble in the order removed.
Remove the set screw from the pitman arm and coat it and its threaded hole with permanent Loc-Tite (red), re-install and securely tighten into the previously drilled dimple.

Position the left collar No. PP 239 to allow free movement of entire shaft mechanisms. Remove set screw and coat it and its threaded hole with Loc-Tite (blue), re-install and securely tighten.

The protruding end of the shaft has a spline which will later be used to mount the operator’s control arm.

— Engine Mounting —

This is a good time to go ahead and mount the engine, belt, pulleys etc. After mounting the engine you can install the pulley and hub, Nos. PP 235 and PP 236. Tighten just enough to hold in place. Mount the driven pulley, fan, bellville washer and jam nut on transaxle. Go ahead and tighten this down.

Install "V" belt No. PP 246 and align the driving pulley so the belt is running parallel to the frame. Tighten down the pulley/hub on the engine.

The belt is tightened by means of a threaded rod on the engine mount No. 032. This rod goes through bracket No. 016 and is secured with double 5/16 nuts. Do no over tighten the belt. Ours has about 3/4 play and never slips.

This would be a good time to install the hydro by-pass mechanism. A hydrostatic transmission will not freewheel unless the internal hydraulic line is opened. The 0500 transaxle has a small, spring loaded, external lever to accomplish this. This lever must be pushed or pulled, overcoming its spring and held in this position in order to move the car with the engine off.

Assembly Drawing No. 072 shows the parts involved. Two brackets, No. 006 and 007 are mounted to the frame with 1/4 inch hardware. The balance of assemble is self-explanatory. The various nuts are adjusted to allow the spring to return to neutral. The Nylon lock nut is adjusted so it will be pulled out past bracket No. 006 allowing the threaded rod to drop down into the slot, locking the by-pass on. A red knob adds the final touch.

— Adding the Front Body —

Before we can continue the front, wooden body must now be added to the frame. At this stage of assembly the steering shaft should be protruding upward. Carefully lower the body over this shaft. Secure the body to the frame using 1/4 inch hardware through the frame into the previously installed "T" nuts in the floorboard.

Now you can install the steering column No. 050 down over the shaft. It is secured with 5/16 hardware. There should be a collar No. PP 239 already installed loosely above the pitman arm. Pull the shaft up through ball bearing No. PP 223 and secure with the retaining ring supplied with the shaft. The bearing should fit snugly into column. With the bearing resting all the way into the column, raise the collar below to limit the up and down movement of the shaft. Remove the set screw and apply Loc-Tite (blue) to both it and its threaded hole. Re-install and tighten securely.

— Adding the Seat Supports —

Attach the right and left seat supports at this time. Before adding the seat you should add the control panel and parking brake bracket. To the control panel you will mount the throttle cable and the key operated kill switch. The right hand seat support has #10 - 32 tapped holes for attaching the above. After the seat is added, you can mount the motion control bracket and lever. Study the pictures.
Before the addition of the remaining body assemblies (seat & transmission cover) make sure all the controls function properly and all hardware is tight. The throttle bracket shown is what we used to install the Honda 5.5 hp engine used. Other engines may require a different throttle arrangement.

On the Honda engine we temporarily removed the gas tank to get to the ignition. The supplied kill switch was removed and its wire removed from the coil. A new wire was installed between the coil and the keyed kill switch. The remaining terminal on the switch must be wired to the frame.

You will note that we removed the parking brake lever from the transmission and reinstalled it pointing down. This places it in a position to match up to the actuating rod from the lever under the seat. Adjust to lock nut on the transmission lever to assure the brake being free when the parking brake lever is released. Adjust the locknuts on the brake rod to position the brake in the off position and, also, apply spring pressure on the brake lever when activated.

The drive pulley is installed on the shaft and positioned to be in line with the transmission pulley. Tighten the two bolts on the pulley hub to clamp it to the engine shaft. The application of Loc-Tite (blue) to these bolts is a good idea. If the shaft is drilled and tapped (usually 3/8 - 24 thd) you can fasten a large fender washer to prevent the loss of the pulley.

With the engine sufficiently to the rear, install the "V" belt (No. 4L340) and tighten the nuts on the belt tightening rod until the belt is tight enough to prevent slippage (ours has about 3/4 inch deflection). Secure the double nuts on the adjustment and tighten down the bolts on the engine mount clamps. Do not over tighten - just enough to firmly hold the engine.

When you are ready, attach to seat assembly to the supports with 1/4 - 20 cap screws in four places. Next, attach to motion control guide to the right hand arm rest with 1/4 inch lag bolts.

Attach the motion control lever to the splined shaft as shown. The splines allow course adjustments and the rod ends on the control rod facilitate fine adjustments. Adjust until the transmission is in neutral when the control lever is against the notch in the guide attached to the arm rest.

We added an air (squeeze) horn to the left arm rest. No detail of the mount is given because the horn must be obtained where available. We bought our's off Ebay. The same applies to the two oil lamps we added to the front body. They are strictly for looks and not light! Again, no detail of the mounting is given because you must find your own lamps and figure some way to mount them. We found our lamps on Ebay auction.

The seat cushion was originally made for go-karts with wide seats. Since it simply slips over the seat back, it provides an inexpensive way of "upholstering" the seat.

A final touch is the addition of the floor mat made from PP No. 227. Make a pattern by measuring where it goes and cut to match.

Gas up and start the engine. Make sure the transmission is in neutral, the parking brake on and the by-pass knob pulled out and secured. This is the right time to purge the transmission as explained earlier.

Climb on and be prepared for a thrill of a lifetime when you go around the block for the first time. Be prepared to be stared at, smiled at and be able to answer the first person who asks, "What the hell is it?" Explain that it's your version of Henry Ford's first car!

— Happy Motoring! —
— Notations on Hardware —

Through out our assembly drawings we haven’t mentioned anything about the many uses of bolts, washers and nuts. To do so would have complicated the clarity of the assembly.

Holes provided in the various parts have been drilled to normal clearance diameters for the bolt used. These holes are usually 1/32 in. larger in diameter than the bolt intended. In the picture on this page, the bolts referenced are 5/16. Therefore, the holes would be 11/32 in. Dia.

We strongly recommend the use of Nylon lock nuts everywhere you have room for them. We, also, recommend using a flat washer under the head of the bolt to avoid scratching fresh paint with both the bolt and wrench.

Almost all attachments to the frame are through holes in the tubular frame. Care should be taken to not collapse the tubing by tightening too tight. We used double fender washers to add strength in these situations. The picture on this page illustrates what is recommended.

It is recommended that you buy all nuts and washers in lots of 100. You will save a lot and eliminate many trips to the hardware store.

The pictures of the two bolt heads show the head markings that indicate the category or strength of the bolt - the higher the category, the higher the strength of the bolt. A category 2 bolt will have no head markings and is, therefore, the weakest of the categories. You always add 2 to the number of head markings.

In assembling this car, we recommend using Category 5 bolts through out with the exception of axle attachment and anything to do with the steering mechanism, which should be category 8. The expense of better hardware will be minimal compared to the overall cost.

Use Loc-Tite (blue) on all set-screws and areas where lock nuts do not apply. **On the cap screws that attach the rear spindle to the hub, we strongly recommend using permanent Loc-Tite (red) on the threads.**
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
4. Break all corners and sharp edges.
5. Finish: Choice of builder.

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PART DESCRIPTION
SUSPENSION
SUPPORT BRACKET

SCALE
See Notes
PART NUMBER
001
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: 3/16 X 1 1/2” steel angle.
4. Break all corners and sharp edges.
5. Finish: At a later assembly.
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: 3/16 X 1 1/2" steel angle.
4. Break all corners and sharp edges.
5. Finish: At a later assembly.
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: 3/16 X 1 1/2” steel angle.
4. Break all corners and sharp edges.
5. Finish: Builders choice.

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PART DESCRIPTION
CORNER BRACKET

SCALE
See Notes
PART NUMBER
004
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
4. Break all corners and sharp edges.
5. Finish: Choice of builder.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/8 X 1 1/2" steel bar stock.
4. Break all corners and sharp edges.
5. Finish: Choice of builder.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/8 X 1 1/2” steel bar stock.
4. Break all corners and sharp edges.
5. Finish: Choice of builder.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.

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PART DESCRIPTION
MOUNTING BRACKET

SCALE PART NUMBER
See Notes 009
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 7/8" Dia CRS.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
6. This diameter to match ID of Tiller Arm No. 035

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PART DESCRIPTION
TILLER ARM MOUNT

Scale
See Notes
011
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from .080 wall 1” X 1” square tubing.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/8” X 1” bar stock or use a standard corner bracket.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
6. Depending on engine used, a relief for engine mounting bolts may be required.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
4. Break all corners and sharp edges.
5. Finish: Builders choice.

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NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/4” X 1” bar stock.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
** Increase existing holes to .750 dia.

Weld rod to bracket

30 degrees

3/8 dia CRS - 10 1/4" long
3/8 x 16 UNC thd - 1 1/4 long

Weld both sides

NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make arm from 1/4" X 1" bar stock.
4. Break all corners and sharp edges.
5. Finish: Recommend finishing after next assembly.

** Bearings installed in next ass’y can be eliminated and holes left as is.
NOTES:
1. Quantity required per car: 1
2. Finish: Builders choice.

** If holes were left 5/8” dia. then eliminate bearings and use part as is.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 3/16 X 1 1/2 X 1 1/2 angle.
4. Break all corners and sharp edges.
5. Finish: Builders choice.

Revised 01/29/05
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NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from .120 wall X 1 1/2 X 1 1/2 square steel tubing.
4. Break all corners and sharp edges.
5. Finish: Builders choice.

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NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/4” X 1” bar stock.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/8" X 1 1/2 X 1 1/2 angle.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/8” X 1 1/2 X 1 1/2 angle.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/8" X 2" steel bar stock.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/4” X 1” bar stock.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/8” X 1” bar stock.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
6. Notch detail: Notch may require final shaping on assembly to assure smooth off/on movement.
NOTES:
1. Quantity required per car: 1
2. Place floorboard with head of “T” nuts facing up.
3. Glue together using builder’s choice of joinery: Dowels, biscuits or screws.
4. Sand smooth and finish per builders choice.
NOTES:
1. Quantity required per car: As called out on drawing.
2. Use dimensions given - Do not scale drawing.
3. Material: 3/4 cabinet grade plywood or builders choice.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Note that the 5 c'bored “T” nut holes are all 1 inch from edge of board.
5. Finish: Recommend finishing after next assembly.

5/16 dia - c'bore 3/4 dia x 1/16 deep  
Install 1/4 - 20 "T" nuts flush to surface  
5 places
NOTES:
1. Quantity required per car: 1 Top, 1 Rear.
2. Use dimensions given - Do not scale drawing.

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NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/8” X 4” steel bar stock.
4. Break all corners and sharp edges.
5. Finish: Builders choice.

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NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/8" X 4" steel bar stock.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from parts called out.
4. Break all corners and sharp edges.
5. Finish: At this level all parts should be finished.
6. Engine mounting holes to be located on choice of engine. Note the Proposed crankshaft centerline.
7. All parts must be square and 9” dimension observed.

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NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Parts called out.
4. Align parts as shown and weld.
5. Finish: Builders choice.

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PART DESCRIPTION
TILLER ARM MOUNT -
WELDED ASS’Y

PART NUMBER
033
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/8" X 1" X 1" angle.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
PART DESCRIPTION

EXTENSION

TILLER ARM

PART NUMBER

036

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NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/2” brass pipe or equiv.
4. Break all corners and sharp edges.
5. Machine to fit inside tiller arm, No. 035.

See Notes
NOTES:
1. Quantity required per car: 4
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/4” X 1 1/2” bar stock.
4. Break all corners and sharp edges.
5. Finish: Finish at next assembly.
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/8” X 1 1/2” angle.
4. Break all corners and sharp edges.
5. Finish: Finish at next assembly.
NOTES:
1. Quantity required per car: 1 left & 1 right.
2. Use dimensions given - Do not scale drawing.
3. Material: Make from .080 wall 1” X 1” square tubing.
4. Break all corners and sharp edges.
5. Finish: Finish at next assembly.

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NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from .080 wall 1” X 1” square tubing.
4. Break all corners and sharp edges.
5. Finish: Finish at next assembly.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Parts called out.
4. Align parts as shown and weld.
5. Finish: Builders choice.
6. A simple welding fixture is advised.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Parts called out.
4. Align parts as shown and weld.
5. Finish: Builders choice.
6. A simple welding fixture is advised.
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 3/4 - 16 UNF category 5 bolt.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
6. This diameter to match ID of Spindle Flange No. 044
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.

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PART DESCRIPTION
REAR SPINDLE -
WELDED ASS’Y

SCALE
PART NUMBER
See Notes
045
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
No. 046

.250 dia. Roll Pin
press flush to surface shown
typical 3 places

NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/4" X 4" bar stock.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts.
4. A satisfactory arm (No. PP 240) could be made from 1/4” thick bar stock.
   Dog leg in part not necessary.
5. It is recommended that parts be clamped on a scrape piece of 5/8” dia.
   CRS to insure alignment after welding.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from part and material depicted on drawing.
4. Break all corners and sharp edges.
5. Finish: Builders choice.

Center tube on 1" dia. hole & weld all around

Make column from 1 1/4 dia. schedule 40 tubing which measures approx (1 3/8 ID x 1 5/8 OD)
NOTES:
1. Quantity required per car: 2 each.
2. Use dimensions given - Do not scale drawing.
3. Material: Make from bar stock (Sizes depicted on drawing).
4. Break all corners and sharp edges.
5. Finish: Builders choice.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/8" X 1 1/2" Aluminum angle.
4. Break all corners and sharp edges.
5. Finish: Leave natural aluminum or paint - builder’s choice.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/8” X 2” Aluminum angle.
4. Break all corners and sharp edges.
5. Finish: Leave natural aluminum or paint - builder’s choice.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/8” X 1 1/2” Aluminum angle.
4. Break all corners and sharp edges.
5. Finish: Leave natural aluminum or paint - builder’s choice.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts.
4. Break all corners and sharp edges.
5. Finish: Builders choice.

Weld All Around

Make from PP 205

No. 008

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STEERING SHAFT - WELDED ASS’Y

SCALE  PART NUMBER
See Notes  055
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts and material depicted on drawing.
4. Break all corners and sharp edges.
5. Finish: Paint rod before attaching nuts & ball ends.
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts and material depicted on drawing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts and either 5/6 - 24 all thread rod or 5/16 dia CRS with threads cut to dimensions shown.
4. Break all corners and sharp edges.
5. Finish: Builders choice or left with existing finish.
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts and material depicted on drawing.
4. Bend rod to dimensions given to allow free travel on installation.
5. Break all corners and sharp edges.
Notes:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts and material depicted on drawing.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
6. At final assembly, bend rod slightly to allow it to just touch guide.
No. 061 a
1 Req'd
For Belt Tightener

Make from 5/16 - 18 UNC "All Thread Rod"

No. 061 b
5 Req'd
For Torque Bkts

Make from 5/16 - 18 UNC "All Thread Rod"

No. 061 c
1 Req'd
For Hydro By-Pass

Make from 1/4 - 28 UNF "All Thread Rod"

NOTES:
1. Quantity required per car: Depicted on drawing.
2. Use dimensions given - Do not scale drawing.
3. Material: Make from material depicted on drawing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts.
4. Clamp frame parts square and flat before welding.
5. Finish: Builders choice.

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FRAME - WELDED
ASS’Y

PART NUMBER
062
**NOTES:**

1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from .120” X 1 1/2” X 1 1/2” square steel tubing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from .120” X 1 1/2” X 1 1/2” square steel tubing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from .120” X 1 1/2” X 1 1/2” square steel tubing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.

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NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from .120” X 1 1/2” X 1 1/2” square steel tubing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from .120” X 1 1/2” X 1 1/2” square steel tubing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from .120” X 1 1/2” X 1 1/2” square steel tubing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from .120” X 1 1/2” X 1 1/2” square steel tubing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
NOTES:
1. Assembly is typical of both rear hubs.
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts.
4. It is imperative that spindle be attached firmly and socket head capscrews be secured with permanent (red) Loc-Tite.
5. Set screws in bearing hub should be secured with (blue) Loc-Tite.
6. Finish: At this assembly parts should already be finished.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts, 1/4” bar stock & .120” X 1 1/2” X 1 1/2” square tubing.
4. Threaded rods can be made by cutting head from 7 1/2” 5/8 NC bolt
5. Clamp axle parts square and to dimensions shown before welding.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts and material depicted on drawing.
4. Final adjustment to be done at assembly of car.
5. Break all corners and sharp edges.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts.
4. Arm of steering spindles should be drillout out to .375 dia.
5. Column # 060 and related parts are installed after floorboard of front body has been installed. After this then slip collar # 239 up until it contacts bearing # 213. Secure with set screw coated with (blue) Loc-Tite.
6. Finish: At this ass’y parts should have been finished.

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NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
4. Break all corners and sharp edges.
5. C'bore face of hub to dimensions given.
6. Finish: Builder may paint exposed raw metal if desired.

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NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
4. Break all corners and sharp edges.
5. Drill out 3 existing holes to dimensions given.

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PART DESCRIPTION
REAR HUB SHEAVE -
MACHINED

SCALE PART NUMBER
See Notes 075
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts.
4. Make sure the 7 inch dimension is maintained between center line of axle and end of frame before tightening hardware.
5. Parts 022L & 022R should be 15 1/2” apart - outside to outside.
6. Finish: At this ass’y parts should have been finished.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts.
4. Make sure engine mount #032 is free to travel fore and aft before tightening hardware.
5. Loosly attach hardware on clamp bars (#024).
6. Finish: At this ass’y parts should have been finished.
NOTES:
1. Quantity required per car: 2 (mirror image)
2. Use dimensions given - Do not scale drawing.
3. Material: 3/4 cabinet grade plywood or builders choice.
NOTES:
1. Quantity required per car: 1
2. Assemble per drawing.
3. Glue together using builder's choice of joinery: Dowels, biscuits or screws.
4. Sand smooth and finish per builders choice.
NOTES:
1. Quantity required per car: 1.
2. Material: Parts as called out on drawing and glued in place.
3. Type of joinery such as dowels, biscuits, screws is builders choice. It is recommended that long screws be used to reinforce the joint between seat back ass’y and arm rest ass’y.
4. Finish: Round over all edges possible, sand and finish in color of builders choice.
**NOTES:**
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Install 4 “T” nuts and press flush into c’bored holes.
5. Finish: Recommend finishing after next assembly.

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NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: 1/2 cabinet grade plywood or builders choice.
NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: 3/4 cabinet grade plywood or builders choice.

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PART DESCRIPTION
SEAT BACK
REINFORCEMENT

SCALE | PART NUMBER
--- | ---
See Notes | 083
NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: 3/4 cabinet grade plywood or builders choice.
Left Hand shown
Right Hand is mirror image

NOTES:
1. Quantity required per car: 2 - one as shown - one a mirror image.
2. Use dimensions given - Do not scale drawing.
3. Material: 3/4 cabinet grade plywood or builders choice.
NOTES:
1. Quantity required per car: 1.
2. Glue together. When dry, saw base to angle shown.
3. Material: Parts as called out on drawing.
Notes:
1. Quantity required per car: 1 LH (087L) as shown & 1 RH (087R).
2. Glue together. When dry, saw base to 15 degree angle as shown.
3. Material: Parts as called out on drawing.
NOTES:
1. Material: Make from called out parts.
2. Wheel No. PP 216 must have hub drilled 9/32 dia (3 places) to match drive pins on hub - see drawing No. 046 & 047.
6. Finish: At this ass’y parts should have been finished.
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* W. W. Grainger has outlets in most larger cities. You need to contact the one closest to you. Look in a phone book for a larger city near you.

** McMaster-Carr has several locations. They have such a user friendly website that the easiest way to order from them is on the internet.

Always check our website: www.smallcarplans.com for links to the latest in suppliers.
The motion control linkage for the 319-0500 transaxle was designed to move the control rod to the rear for the car to move forward. Just the opposite is needed when using a 319-0650.

By looking at drawing No. a091 you will see 2 extra pillow blocks have been added to the underside of the frame. To provide clearance for the parking brake lever, a 1/4 inch spacer block No. a090 is added.

The parking brake was left in its original position. It, however, is now mounted on an 18 inch piece of 5/8 dia. CRS. It will require another collar to hold it in the proper location. See drawing No. a094. The lever assembly could be welded to the shaft if you desire.

The installation of the motion control to underneath the frame requires the control rod No. a092 to be reshaped. The bending dimensions and angles are approximate and will require some “fine tuning” for correct operation.

This modification, also, requires the control lever to be longer. See drawing No. a093.

The 3/8 dia holes used to mount the top pillow block must now be drilled clear through to underneath the frame. Naturally, longer bolts will be necessary.

If you haven’t started construction on the frame, we have inclosed drawings of the frame members plus the control shaft bearing mount. Actually, this now becomes just the parking brake bearing mount.

I am sorry for it to be necessary to make these modifications. This is the price I am paying for calling out a specific transaxle and it, like others, being an “endangered species.” In future designs I may have to be a bit more general in specific call outs.

Good luck and if you encounter any problems, email me and I’ll try to help you.

Everett Moore
FOR USE WITH TRANSAXLE No. 319-0650

NOTES:
1. Quantity required per car: 2 each.
2. Use dimensions given - Do not scale drawing.
3. Material: Make from 1/4” x 1” bar stock.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
FOR USE WITH TRANSAXLE No. 319-0650

Notes:
The parts called out on this drawing are required to accept the Hydro-Gear 319-0650 transaxle. See text for instructions on making this change.

The motion control rod, No. a092 should be fit by adjusting ends and/or bending to allow full movement without interference with frame members.
FOR USE WITH TRANSAXLE No. 319-0650

NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts and material depicted on drawing.
4. Bend rod to approx. dimensions given and fit at assembly.
5. Break all corners and sharp edges.

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FOR USE WITH TRANSAXLE No. 319-0650

NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts and material depicted on drawing.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
6. At final assembly, bend rod slightly to allow it to just touch guide.

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MOTION CONTROL
LEVER ASS’Y 0650

SCALE
See Notes
PART NUMBER
a093
FOR USE WITH TRANSAXLE No. 319-0650

NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make arm from 1/4” X 1” bar stock & shaft from 5/8 dia. CRS.
4. Break all corners and sharp edges.
5. Finish: Builder’s choice.
FOR USE WITH TRANSAXLE No. 319-0650

NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from .120” X 1 1/2” X 1 1/2” square steel tubing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.
FOR USE WITH TRANSAXLE No. 319-0650

NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from .120” X 1 1/2” X 1 1/2” square steel tubing.
4. Break all corners and sharp edges.
5. Finish: Finished at next assembly.

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Weld brackets to frame as shown - 4 places

Locate both brackets to this dimension

Bottom View

FOR USE WITH TRANSAAXLE No. 319-0650

NOTES:
1. Quantity required per car: 1
2. Use dimensions given - Do not scale drawing.
3. Material: Make from called out parts.
4. Clamp frame parts square and flat before welding.
5. Finish: Builders choice.
FOR USE WITH TRANSAXLE No. 319-0650

NOTES:
1. Quantity required per car: 2
2. Use dimensions given - Do not scale drawing.
3. Material: Make from .080 wall 1” X 1” square tubing.
4. Break all corners and sharp edges.
5. Finish: Builders choice.
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<th>&quot;A&quot; after page no. denotes Assembly Drawing</th>
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Drawing No’s below are used if the 0650 Hydro Transaxle is substituted.

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