The Little A-Cs"

Forward

I am not quite sure what to call this book. It is not exclusively dedicated to hobbyists and restoration nor necessarily to helping folks with working machines. It certainly is not an owners, parts, or service manual. It is simply a book containing the indepth type of information I was looking for when we bought our first tractor, but could not find. It is an extension of the enjoyment we find in the preservation of knowledge related to history. Our hope is that you can read, re-read, learn, criticize, correct, and hopefully enjoy it.

Our interest in tractors began as an interest in working our small farm to produce our own food and grew from where tractors were a means to an end to where they were the end in most cases. Though we do not show tractors, we seldom miss the opportunity to restore one as if it were headed for the show and we never miss the chance to view others excellent efforts at the shows. We are not sticklers for originality but appreciate the painstaking efforts of many who carry their art to this degree.

I also must point out that we do not hold this series of machines in any higher regard than the other excellent machines of the time period. Though our interest in tractors began with Allis Chalmers, we find the same fascination and excitement for a Ford 9N, Farmall B, or John Deere M as we do for the tractors spoken of in this book. To discuss any of the other great machines would detract from the objective of focusing in on the details and the details are what this book is about.

1. Introduction

We have restored tractors from this series and have several unrestored models sitting around the barn yard. Our enjoyment these machines comes not from their uniqueness, rarity, nor collectability, of which there is little, but rather how diverse the models and variants were. It goes without saying that we also just enjoy the history and mystique of tractors and this series provides a very convenient breed to express that enjoyment. Big enough to be tractors, but small enough that nearly everyone feels comfortable driving them, and lastly simple enough that most

folks dont mind putting a wrench to them now and then. They make both inexpensive toys and great low-end workhorses.

1937 Perspective

For some of us growing up in the mid to late 1900s, it is valuable to consider what the world was like in 1937 when tractors such as these were built. Though the move from a predominantly agricultural society had begun, there were still many millions of small farms that were working farms providing the family food and at least a partial income for their operators. Tractors had been completely integrated into all large scale farming operations but were far too expensive for the majority of farms. Walking through the 1937 countryside, you would still likely see mostly horse teams and farmers working the land together.

This backdrop would provide an excellent market for good, cheap, and small tractors for the first company to produce one.

Today's Perspective

Tractors are toys to some and a means of getting back to the land for others. The move back to the land from the suburbs is one factor that has brought many of the older tractors back to life. A modern small tractor that would be useful on a hobby farm or subsistance homestead might run $15,000.00. This tractor might be used to produce $1,000.00 worth of produce a year. During the course of the 15 years it would take to amortize it, it will have broken down several times with the cost of parts and repair ever pushing it's amortization ever further out. It is no wonder that people look so closely at the older overbuilt machines of the 40s, 50s, and 60s as a viable alternative. Paying $500 for purchase and $500 for parts nets the modern small farmer a very usable and economical tractor.

Competing with the small working farm for the older tractor is the tractor enthusiast or hobbyist. These individuals are interested in preserving history through the restoration and show of these machines. The restoration of old tractors has the same lure that having an antique wagon wheel has but is more active and exciting. Going to a tractor show to view history is exciting and worthwhile. Too often, the trail of how things used to be grows cold before the interest is there to document and preserve. Fortunately with tractors this is not the case.

If you are reading this book, you likely fall into one of these categories.

2. What are they?

This series was really the first modern small-but-serious tractor produced. It was built by Allis Chalmers to create a new market out of the several million small farms across the United States that could not justify the cost of a tractor and were still using horses for plowing, discing, hauling, and other farm chores. At the time of its introduction there were no other mainstream tractors in the $500.00 range that were designed to accomodate the small farmer general purpose needs. There were 4 distinct models put out over a 20 year period. The manufacture of the B model was continued throughout this period while the other models overlapped each other. These were the Allis Chalmers B, C, IB, and CA. AC also produced 2 stationary versions of the engine from these tractors known as the B-125 and 60H.

The B, C, IB, and CA share a significant family resemblence. They are variations on a common theme. The entire series represented an extremely cost effective tractor for the small farmer that could accomplish virtually any farm task in moderation. So numerous were these machines that they are still very common on hobby and specialty farms. The fact that these machines are so readily available keeps them from becoming overly expensive collector machines and out in the field doing the same chores they did 40 years ago. Even so, it is a rare tractor show that does not contain at least one of this series. They

are easy to haul, easy to find parts for, and a wealth of information is available to guarantee a reasonably accurate restoration for those so inclined to do so.

In the garden, the power to weight ratio coupled with the length provides stability while still having the ground clearance necessary to cultivate. The power and gearing changed over the years and models but from the start was enough to pull from a single bottom 14 inch plow to a dual bottom 16 inch depending on soil condition, more than sufficient for most small acreages. During the course of production the horsepower more than doubled and later hitch systems even lent themselves to easy 3-point conversion opening up even more possibilities for implement use.

3. History in Brief

The B

The first (and last) model to be built was the B. Production began in 1937 with less than 100 units. These early Bs were the only model in the series to use a different engine block. In fact many of the components of the 1937 were not shared with later machines. The first 100 seemed more as if they were a pre-production prototype to get sales interest going while they tooled up to produce a similar machine in 1938. The 1937 used a Waukesha engine, different sheet metal (though nearly identical in appearance), different front end, steering gear, hubs, spindles and on and on. Needless to say, the 1937 is a rare find and an exception to the normally non-collectable B.

In 1938, the B production began in earnest with a real AC-built engine and finalized components. The initial machine specifications were as given in the Nebraska Tractor Tests.

1938 Allis Chalmers B	
Bore & Stroke	3 1/4 x 3 1/2
Cubic Inch Displacement	116.1
Drawbar Horsepower	10.31 (Distillate Fuel)
Brake Horsepower	14.00 (Distillate Fuel)
Governed RPM	1400
Gross Weight	2620 lbs (included added test weight)

Note: Distillate fuel used for testing caused horsepower output to be significantly lower than what people experience in the present when using gasoline.

The specifications would change over the course of the production run as more power was continually needed and improvements in hitching came about. Aside from this the B remained basically unchanged for nearly 30 years (1937 to 1957 with units sold as late as 1959). The most significant change was in 1947 when it received a major horsepower increase through the use of larger sleeves to increase bore and again in 1950 with governor changes to run at higher RPM. The updated specifications were as follows:

1950 Allis Chalmers B	
Bore & Stroke	3 3/8 x 3 1/2
Cubic Inch Displacement	125.2
Drawbar Horsepower	15.66
Brake Horsepower	21.17
Governed RPM	1500
Gross Weight	2250 lbs

Though many a Ford N-series or Farmall owner will contest it, several noted references and individuals feel that the B was machine that finally allowed the small farmer to switch to tractor power and retire the horses. Its original list price certainly would support this at under $500.00. Since so much of a small farmers land would need to be dedicated to providing feed for the working team, a cash outlay such as this would certainly pay for itself shortly in increased farm output.

As with all machines in those days, the B had many implements built specifically for it. Many have followed the tractors through the various owners but most of the time newer implements are retrofitted (read that jury-rigged) to the older machines.

The B was a fairly narrow tread machine with a slightly shorter wheel base than its relatives, the C and CA. This fact makes it easier to move around between farm and shows than all models with the exception of its close brother the IB.

The IB

The IB was produced initially as part of the AC B serial number series but was seperated in 1946 into a completely seperate series. It was born out of the need for industrial machines that could easily move through factories for utility hauling and pushing. Most IBs did not have any options installed for farm work though they are considered an excellent chore tractor now. The most common configuration had simply a heavy front bumper on the front and a stationary drawbar. The IB was quite simple to create. The dropped final drive housings that normally provided the high crop clearance on the B were simply rotated forward one bolt position dropping the entire rear of the tractor down 6 1/2 inches. The front was dropped by building a straight axle with short spindle tubes that bolted directly to the front radiator support. This configuration was exactly duplicated in the mid-50s by International Harvester Corporation with the very popular Farmall Cub Low-boy. While the Low-boy was considered a farm chore tractor, the AC IB was never marketed as such. Instead a heavy bumper arrangement and non-hydraulic rear hitch was used to make it appealing to the industrial market.

Many unusual components had do be developed to accomodate the odd drive train of this machine. As a result, parts are more difficult to locate for the IB. With less than 3000 IBs produced, it is a bit more collectable than the normal B.

The specifications for the IB were the same as for the B with the exception of its drawbar pull. Since the tractor was never tested at Nebraska and the industrial market had no similar rating organization, only supposition can be made concerning the actual figures. Differences in weight and geometry would indeed alter its pulling characteristics.

The C

The AC C was a natural progression in that for some tasks, such as cultivating, the B had power but too small a dimensions to increase its row crop capability. The B did not have a wide enough stance to handle 2 row work for the majority of crops. Additionally the BE engine had sufficient headroom to

increase bore and RPM allowing even more power to be produced. As horsepower eating PTO devices were becoming increasingly important, additional power would be welcome to most small farms. AC had also attempted to downsize its larger machine (the WC) in 1939 by using the B engine on a WC frame. This underpowered machine did not sell and was generally a failure. This left a hole in the AC line that would better be filled by upscaling the B. Thus the C was released.

The C had used a wider set of final drive castings, conical cast hubs and wide pinion axles to obtain the necessary width to effectively work 2 rows. The front end was offered standard as a tricycle model as these were becoming the row crop front end configuration of choice. An adjustable wide front was also offered that was compatible with the wide rear end. These items combined with the increase in horsepower from bore and RPM increases, made the C a full 2 row tractor for most farm purposes.

Specifications as tested were:

1940 Allis Chalmers C	
Bore & Stroke	3 3/8 x 3 1/2
Cubic Inch Displacement	125.2
Drawbar Horsepower	14.15
Brake Horsepower	20.27
Governed RPM	1500
Gross Weight	

The differences between the B and C go further than the width of the stance and power productions. Many subtleties have resulted in the mixing of parts that just dont fit or look rather odd. For example, the retrofit of a wide C front axle on a B may look straightforward when one picks up the parts at a salvage yard but will result in a lot of head scratching, cutting and welding, when one tries to actually mount them. They are so different that the grill, radiator support, steering gear and drag link must all be swapped. Looking at the rear fenders quickly, you might think they are the same but when placed side by side, they share no similarities.

The C sold between the years of 1940 and 1950 before coming into stiff marketing competition from other manufacturers who were producing significantly more complex and capable hydraulic hitch systems, live PTO, and of course ever more power.

The CA

The introduction of the AC WD brought many engineering improvments to the AC line that in some cases surpassed anything else on the market. Many of these items could be transferred directly to the series covered in this book. The AC CA was the implementation of these features in a smaller tractor. To the casual observer, the CA may look identical to to a C with different rims. On closer inspection, it is a different machine from the engine back (with a few exceptions) and for that matter from the engine forward. Still the changes were subtle enough that appearances could easily deceive. The fact that this machine had heavy rear axle castings, axles, hydraulic pump from the WD, a 4 speed transmission, draft control and over twice the power of the original B, made it a very desirable working machine. All this and the weight is only a few hundred pounds above the C.

Specifications as tested were:

1951 Allis Chalmers CA	
Bore & Stroke	3 3/8 x 3 1/2
Cubic Inch Displacement	125.2
Drawbar Horsepower	17.83
Brake Horsepower	24.79
Governed RPM	1650
Gross Weight	2763 lbs

The most important features necessary to be competitive in 1950 were live PTO and more powerful hydraulics. The CA provided both with the the split and clutched rear right pinion axle and the 4 piston WD hydraulic pump. In order to use the increased volume of hydraulic fluid, it was fitted with heavier rams and a redesigned hitch known as the "Snap Coupler". This easy to use hitch could not win over the growing standardization of the Ferguson System hitch known as the 3 point but did have advantages when it came time to hook up an implement. Features like the Power Adjust Wheels were an AC original and available only on the CA and WD at that time. This feature would eventually be applied to every major tractor brand before the end of the decade. Ergonomics were improved with the addition of a shock absorber pan seat. This was a departure from the rest of this series but necessary to compete since every other brand had already gone this way.

The CA was an excellent method of quickly marketing a tractor with the features of the later D-14 without having to retool.

4. Competing Tractors

During the period that these tractors were produced, numerous machines were marketed that competed directly with the various models. When the race begun, AC started with a small but crucial headstart. Shown below are some of the more prominent that came out in the same period. Interestingly, though AC sold only a handful of these tractors in 1937, they had already launched a massive advertising campaign directed at the horse farmer. Even though the other companies clearly were tuned in to the market, AC may have had a few crucial months head start on the market. This would be critical when you see who they were up against.

Tractor	Year Released	Horsepower
Allis Chalmers B	1937	10.31 (distillate)
John Deere L	1938	7.06
John Deere H	1938	11.67 (distillate)
Ford 9N	1939	17.43
Farmall A	1939	12.27
Farmall B	1939	12.06
Oliver 60	1940	16.9
Case V	1940	15.07

In 1937, when the B first appeared, the other models here had not been released, were not marketed to a great extent or were not quite at the same price performance ratio as the B. From a marketing standpoint, the B had the entire field. It is my own viewpoint that success in this area depended greatly on the fact

that this was a new market and thus had few of the normal brand loyalty issues associated with it. Sure, there would be name recognition with small horse farmers for most of these companies from the horse drawn implements that they also built, but generally there would be little experience with the "living & breathing workhorse" tractors that had been produced for so many years. They might have had more loyalty problems in retiring their horses.

At the onset of production there was virtually no competition from a cost standpoint as no real farm tractor had ever been marketed for under $500 by any companies with the ability to produce in numbers.

5. Appearance

From 1937 to 1957 the entire Allis Chalmers line with the exception of the A was styled along the same lines. The grills were mated to the hood in such a way as to begin a curve that would rise at the engine and fall back down to cover the front of the tank. This line would continue to the rear of the tank culminating in a bullet shape. Though family resemblence is quite evident, the B (and other models of this series) looks far more graceful and integrated than any of the other AC machines of the time. The lines of the grill, hood, and tank are markedly integrated and streamlined. The crowning point of this series is the point where the tool box gracefully wraps around on itself just below the tank but still allowing completion of the lines that began at the lower side of the grill.

These tractors seem to inspire a mistaken feeling of frailty at first sight due to the narrow torque tube. This sleek casting actually was designed to allow good visibility without sacrificing the stability. Though not interchangable, the same lines were retained through the 60s on the D-10 and D-12. Different from the other AC machines, the remainder of the machine seems to "grow" from that midpoint both to the back and the front.

6. Identifying Numbers

One of the first things that some people want to know and others need to know is what model and year their tractor is. The historical significance and even the value may depend on the serial number and resulting identification that comes with it. Additionally, it may be necessary to get the correct parts and in some cases return the tractor to its original state. Without the knowledge of when it was built this would be quite impossible.

In all cases (excepting the early IB), this series can be definitively identified by looking on the right upper transmission casting, just ahead of the shift lever, for the tractor serial number. This serial number will begin with B, IB, C, or CA. If you have an IB but the serial number shows it to be a B, it would indicate that this is one of the pre-1946 Bs that have their serial numbers buried in the B range (the year will still be accurate in that range). If you find that you have a C or B but the serial number shows the opposite, it would unfortunately indicate that the transmission case has been replaced with a used case.

The following serial number list was provided by making slight modifications to a list provided by a major wholesale 3rd-party tractor parts manufacturer (TISCO). This list is basically the same as that used by tractor parts dealers to aid in providing the correct parts to customers.

Serial Numbers

Year	B	C	CA	IB
1937	1	N/A	N/A	N/A
1938	101	N/A	N/A	N/A
1939	11800	N/A	N/A	N/A
1940	33394	1	N/A	N/A
1941	49721	112	N/A	N/A
1942	56782	12389	N/A	N/A
1943	64501	18782	N/A	N/A
1944	65502	23908	N/A	N/A
1945	70210	30695	N/A	N/A
1946	72301	36168	N/A	1001
1947	73370	39168	N/A	1003
1948	80056	51515	N/A	1010
1949	92295	68281	N/A	1282
1950	102393	N/A	14	1556
1951	114528	N/A	305	1879
1952	118674	N/A	10395	2219
1953	122310	N/A	22181	2570
1954	124202	N/A	31424	N/A
1955	124711	N/A	32907	N/A
1956	126497	N/A	37203	N/A
1957	127186	N/A	38618	N/A

The engine number is located on the left rear casting of the engine block. The engine number will start with BE, CE, or CR. If your C has a BE engine, it was likely a replacement, if your B has a CE engine and appears to be prior to 1946, this also was likely a replacement. If you have a tractor with a CR engine, it definitely indicates that it was replaced. All C and CA machines used the CE engine.

There may be a date located on engine block at the upper right front. This is a date of manufacture but is predominantly found on the earlier engines. The latest date I have found thus far was dated 1943 on a stationary BE engine originally sold to the US Navy.

In discussing the serial number with a former AC Dealer in Oregon, I discovered that it was possible to come up with a tractor that did not have a serial number. Indeed I own one such example. The reason was that replacement transmission cases were shipped without serial numbers and and it was the dealers responsibility to restamp the original number on that case. If the dealer did not take the time to do this, the tractor would be un-numbered for all time. The machine we have could still be identified as a 1940 B based on casting marks on the engine.

7. Similarities and Differences

If you are like me, one of the most fascinating parts of owning and working on older tractors is to know the possible configurations within a given line and the interchangibility that comes with this knowledge. From a purist point of view, the only original tractor is a tractor that has the same castings and components that it left the factory with. For other restorers, it is sufficient to have the type of parts that came with the original but not necessarily the ones that were on it. For the majority, it is sufficient to have functional components that typify the tractor model. Of course there are always those that don't care about these issues and just want the machine to work. For them a 1975 Nissan muffler may just have the right fit and look. This section should provide a few items of interest for all of these folks.

Engine. The engine is the heart of any tractor and these are no exception. Looking at the horsepower to displacement numbers quickly tells you that the engine is not stressed even in the final form at 1650 RPM. This contributes to the fact that only in the last few years are they needing rebuilds. Even comparing the horsepower of similar tractors of the time shows a

difference in the amount of horsepower exacted from similar sized engines. This engine could get by with this due to the relatively light weight of the machine and and long wheelbase for the weight. It could put more power on the ground by making better use of the engine and front end weight. Though major components are not interchangable, one sees similarities even in the later Power Crater versions used on the D-series.

The engine stayed basically the same from 1938 to 1957 with the bore and RPM changing the performance characteristics. Since the stroke and outside diameter of the sleeves remains constant through the series, the engine block is interchangable throughout this series as are most components such as the crankshaft, camshaft and rods. The exception is the 1937 since it was not manufactured by AC. Non-interchangable (either due to lack of originality or actual non-fitting) parts are as follows:

Engine Block - Certain B-125 stationary engines used a fuel pump. These blocks have the cutout required for mounting. Though unnecessary to use the fuel pump on the tractor, certain stationary applications may require it rendering a non-fuel-pump block incompatible. From an original restoration standpoint, casting marks should be carefully analyzed when switching blocks.

Lifter Assembly & Valve Cover - There were 2 distinct versions produced that if replaced, require the replacement of both components. The difference is simply that the early valve cover bolts on with 2 nuts while the later cover bolts on with 4 nuts. The Lifter assembly must have the correct number of studs to match the valve cover. Originality buffs will need to locate the 2 stud and nut cover and assembly for tractors from 1938 to 1942. For restoration of machines beyond 1942, these components must be of the 4 stud and nut type.

Water Pump - later water pumps have an extra drilled & tapped plug that allowed hookup to the later D series (and non-diesel I Series). The later unit was provided originally on the CA and the late B but is non-original when used on 40s vintage machines (still it will work). The water pump gasket and shaft kits work on both. True restorations on 1938 to mid-1950 must use the non-bypass version.

Thermostat Housing - Three different castings were made. The issue here is simply originality. The earliest unit is the tallest and does not hold a thermostat. The latest unit has bypass line that can connect to the water pump via a hose and fitting. If an early water pump is used in conjunction with this housing, the hose fitting hole must be plugged. The most common housing is the medium sized housing with out the bypass hole/plug.

Oil Sump Pickup - Early versions used a tubular screen in the bottom of the oil pan. Later models used a round pickup as seen in most 50s and 60s automobiles. The early version was thin cast metal and is frequently unsalvagable. The round version is a 3rd party component and may be located on other American engines of the time.

Governor - Both shaft and weights were produced in 3 incarnations. It is safest to purchase the assembly when replacing.

Exhaust Manifold & Muffler - Three exhaust manifold configurations were manufactured causing minor difficulties when installing a new muffler. Additionally, if the tractor is set up for running on "tractor fuel" (a form of stove oil), the more common manifold will not allow the

preheating of the intake tract as is necessary for combustion. The configurations are identified by the presence or absence of the heating chamber covering the intake tract. When the sheet metal shield is placed over this type of manifold, the intake is sufficiently heated to allow proper combustion of the low octane fuels. Without the heat shield this manifold operates normally as a gas manifold. This manifold has a single mounting point for the muffler and thus is predominantly used with the underhood muffler or straight pipe. The other two manifolds are gas only with the only difference being that the earlier version has a single muffler mount point and the later version has two mounting holes. The upright pipe of the 1951 and later machines required the two bolt configuration to hold the muffler. The upright pipe can still be used on earlier versions by using a straight pipe through the hood and clamping a correct diameter upright above the hood. In this case, one would not use the original equipment style upright pipe.

The engine blocks have many various numbers cast in them depending on the year (aside from the stamped engine number and AM part number). A 1943 vintage machine has the manufacture date cast while examination of other years failed to find this. This date was located toward the right front underneath where the manifold bolts on.

Transmission. The CA is the unusual machine in the transmission area. It was equipped with a large 4 speed which shared many of its components with the later D Series tractors rather than the 3 speed-equipped Bs and Cs. Bs, Cs, and IBs share all components of the transmission but when you are salvaging parts remember to always replace gears in pairs to keep the transmission quiet and to insure that you aren't hit by a production change. The clutch-to-transmission shaft did undergo a production change from a normal U-joint style connection to a less expensive collar & pin arrangement. We presume that this was done to reduce cost and simplify repairs (the collar would never need repairs). This did not effect the transmission shaft itself.

Final Drives. The final drives of the B & IB were identical using the same gear ratios, bearings, seals and shafts. The differences were as follows. The IB's were rotated forward to lower and shorten the machine. The C's case was cast wider (due to the 2 row goal) to accomodate the longer pinion axle, and the lower axle used a more standard inner hub assembly with lug bolts rather than the single bolt used to attach the B and IB hub. Lastly there were 4 different bull-to-pinion gear ratios with one of the higher ratios being the most common. The lowest ratios were provided during the early production where steel wheels were optional and standard (during World War II).

The finals on the CA were altogether different. Rather than being perfectly vertical like the others, the power was transmitted at an angle rearward similar to the D-series. The finals are larger and heavier in general. The right final had a clutch in the middle of the pinion axle to allow the driver to stop forward motion without effecting the use of the PTO. To explain it is just as if your car broke an axle on one side causing both wheels to stop turning due to the differential turning the side with the least resistance (ie the broken one). This was a simple and effective method of implementing live pto without a complete redesign to the power train. When coupled with the 4 speed transmission, the low bull-to-pinion ratio provided a greater speed range on both ends.

From the differential, pinion shafts were use to transfer power to the outboard pinion and bull gear arrangement. The pinion shaft had an oil tube surrounding it. I have yet to find one intact when opening the finals. The bearings at the differential and pinion gear have shims that allow restoration of the original factory clearance. These shims are removed to take up slack induced

by wear. This can eliminate the noise so commonly heard eminating from the rear end while underway. The rear bearings and seals remained the same thoughout all the models and are readily available off-the-shelf components.

Rims, Wheels & Eccentrics. The rims of the B, C, & IB were similar though the early production B used a 7 inch rim and the clamps used a larger diameter eccentric bolt, a different eccentric body, and the rims had a section of angle iron welded on to fit into the eccentric body. This made the Hub, rim and eccentrics incompatible. These were used into 1940. The later B, the C, and the IB employed eccentrics that would press out on a rise that extended inward around the rim. Some rims had this rise in only 4 position while most had it around its entire inner diameter. Retrofitted rims were used by owners that were similer to the Cub, MH Pony, MH Pacer, and several orphan brands like the Earthmaster. These rims had 4 square loops and matched up to the bolt holes on any of the hubs. These would never be original equipment but from a working standpoint are excellent. AC offered 4 different widths for the standard 24 inch wheels including 7, 8, 9, and 10 inch. There were unusual diameter rims offered for 2 rare variants (the Asparagus and the "28 inch tractor"). These are seldom seen and have no aftermarket manufacturer sources. The Asparagus used a 38 inch rim implemented by steel brackets welded to the rim that joined up to the bolt holes normally used for the clamps. The last rear configuration was the steel wheel models that were common during Wartime production. There were different wheels for the B and C that closely resembled the wheels used on the rubber tired version. Rubber tire retrofits have long since made these quite rare.

For those unfamiliar with eccentrics on tractor rims. The eccentric was a bolt that had a non-concentric surface that allowed it to tighten as it was turned. In other words, you could slip the rim on easily while the flat side was outward, then when the bolt was rotated to the inside, the hub would be locked against the rim. The IB, B, and C used 2 eccentrics on each wheel and 2 standard bolts and clamps. The CA had 4 eccentrics to lock it down.

Three different wheel to hub assemblies are found are found on the B, IB, and C. The most common are a near flat single bolt wheel on the B and a conical lugged wheel on the C. The third was very nearly a composite of the 2 and is more unusual. It had the appearance of the single bolt style but the wheel was held on with lug bolts. The lug nut adaptor bolted to the standard single bolt axle. It was produced to allow a slight increase in width for the B by being able to turn the wheel around at the hub. The Conical wheel used on the C is also found on some late production Bs and british versions. This wheel allowed a wide 3 1/2 inches of wheel spacing adjustibility.

The CA used a 24" power adjust wheel (PAW). This was an AC original but was copied on many other brands from then on. The PAW had spiral rails welded to the rim. The eccentrics put pressure on these rails when in operation. When adjustment was needed, the eccentrics were loosened allowing the rim to spin freely on the eccentrics. The engine was then used to turn the inner wheel (by turning the axles with 1st or reverse depending on the direction desired) on the rails which in turn would pull the tire and rim in or out. Due to the 24" size, the PAW rims are difficult to find and expensive when you do. Most PAWs manufactured today are 28" and will not fit on the CA. The wheels, eccentrics, and rims on the D-series look identical but are 26 inch and will not interchange.

Steering & Front Wheels. Steering differences were pronounced between all models and years. Redesigns and production changes provided 6 different models from 2 different manufacturers. Generally the compatibility is found between the C and CA and the B and IB. The C and CA used a front and rear steering gear which reversed the direction that the rear steering gear needed

to go for left and right. The drag link on the C and CA connected to the gears built into the front pedestal and radiator support. Thus the C and CA had a heavy cast pedestal and radiator support. This allowed the use of both dual and single wheel tricycle configurations in addition to the standard adjustable wide front. No fixed width wide front was ever manufactured for these units. The areas where incompatibilities appear for these models are the early C models where a short rear steering arm and compensating drag link were used and the late production CAs where a different torque tube was used. The late CAs have different external mounting brackets for stabilizing the rear steering gear arm. The front pedestal on the CA is interchangable with the C but holes must be cut in the grill for the cultivator mounting bosses.

The B had three different configurations of adjustable wide fronts and the fixed width arched axle. The fixed width axle is by far the most common with the square-tube-stock adjustable being the next most common. Few examples remain of the other adjustable configuration as production ended in 1939, but they were arched with adjustment being provide at the spindle as opposed to the normal method where a portion of the axle beam adjusts. The rear steering arm is aimed down on the B and connects to the drag link via a ball socket. The C and CA used a nut and bushing to connect the drag link with their ball & socket being a part of the drag link. The B axles had the steering arm directly connected to the front left spindle and a tie rod to turn the right wheel. The front also used a cast ball as an integral part of the front steering arm. Generally these differences make the B steering completely incompatible with the C and CA.

Due to the lowered nature of the IB, it had a fixed width but narrow front axle beam and very short spindle tubes. The steering gear is compatible with the B but many other steering components will not interchange.

Steering wheels, shafts, and tubes are interchangable across the line with the exception of the IB. It uses a short tube and shaft that is mounted at a more radical angle. This was to compensate for the shortening of the Torque Tube. When locating a replacement steering wheel, the MH Pony and Pacer used the same 3rd party produced wheel. This was manufactured by Sheller.

Five front rim configurations were found on these tractors. The most common were the 5 lug integral wheel and rim. These are commonly available even today from aftermarket sources. They mount to the bearing-carrying hub that bolts to the front spindle axle. These were used on most B, IB, C, CA, and all dual wheel tricycle models. The single wheel tricycle version is rare and non-interchangable with any of the other models. It mounts by a single axle that extends out both sides of the wheel and hub bolting to the forks extending down from the pedestal.

The remainder of the rim configurations use the single bolt mounting directly to the spindle axle shaft. The predominant wheel in this category is the 2 piece wheel and rim that uses clamps to hold the 2 together. The others were the steel wheel version and an unusual integral rim, wheel and hub that did not use lug bolts.

Torque Tube. The torque tube had many variants. The B had 4 configurations that included the version with the starter boss, the one without, and the industrial which was shorter and had a starter boss, and the final configuration that matched the CA. This tube was probably used to allow mounting of late CA midmount implements and simplify the parts inventory. The short tube became the IB component when it was seperated from the B serial number series. The C **had additional bosses added to hold the**

steering arm support bracket. The CA added again more threaded bosses for implement mounting.

Sheet Metal

Grill. The grills came in 5 styles plus a chaff screen applique which could be placed over the normal expanded metal to further protect the radiator from straw and chaff. The 37 B looked the same as the rest but used different mounting holes and was reinforced to make up for the fact that it did not use as heavy a mounting bracket. The mounts for the 37 were different as a result of the different engine, the later AC engine used front mounts on the vertical face of the engine while the earlier engine had its mounting bolts on the lower horizontal face. The B and IB retained the grill appearance even though they were a different item. These grills completely encompassed the bottom of the radiator support due to the fact that no steering components were involved. With the advent of the Cs front cast housing and integral steering gear, came the need to have a significant cutout on the left lower portion of the grills side. The CA was identical to the C grill but had 2 additional holes cut in front to allow access to the new cultivator mounting holes that were cast in that machines radiator support. In general, these 4 variants must be considered non-interchangable though their appearance is identical to the casual observer. The last grill was used on auxiliary power unit applications such as balers and combines where straw and chaff could clog the radiator. These units had tight screening plus Frequently the primary grill screen is damaged beyond use. This can be replaced by using 1/2 x 1/4 expanded / extruded metal cut to the appropriate size and wire feed welded in place**.**

Hood. The hoods had minor variations due to muffler options and fuel type. The 4 possible muffler/exhaust pipe options account for the size of the hole used to allow the protrusion. The CA and late B had a larger hole that allowed the smaller diameter upright pipe to fit directly on to the manifold. If a larger diameter muffler is used the hole must be widened or an extension pipe used to bridge between the manifold and the muffler. The most common hood uses a small hole to allow exit of the straight pipe or the output of the underhood muffler.

The dual fuel models had additional holes cut for the mounting studs and fill hole of the gasoline (starting fuel) tank. These were placed on the right side of the hood.

The B-125 and 60H stationary versions of the BE, CE, and CR engines had a hood that will work on the tractor version with one exception. There was an extra hole at the rear of the hood to accomodate the stationary versions gas tank filler cap. This should be filled with a sheet metal plate to restore originality.

The 37 B had the exhaust manifold on the opposite side.

Tool Box. The Tool box provides the support for the tank and covers the steering tube and rear gearbox. It is known as a tool box due to the door on the side that allows access to the unused space it provides. While all machines had the Tool box, there were differences due to the electrical option, model, and the tank mounting.

(The original 1937 B and later non-electric starting Bs and Cs had a tool box that extended to the steering post. The 1937 had rubber strips that covered the sheet metal edges and eliminated any vibration. This was dropped on the 1938 and above. Early B and C tool boxes provided the bolt

holes to line up to tank mounts on the bottom rear of the tank. This was changed on the later models by using a strap from the top rear of the tank that connected to an angle iron welded to the rear face of the tool box. While either can be adapted to the other, it would be difficult and dangerous to adapt the new tool box to the older tank (it would require welding the strap on the tank and likely killing oneself). If the older tank is used, you must use the older mounting method.

The non-electric start Bs and Cs had a clip to hold the starting crank when not in use.

The electric start models (B, C, and all CAs) had the rear portion of the tool box cut off to make room for the battery box but were otherwise identical. These shortened versions were made for both the older and newer tank style.

The IB Tool box is smaller and does not have the door due to its reduced torque tube length. .

Battery Box. The battery box underwent few changes during the years. The lid was removable after which one side would come off allowing complete accessibility to the battery. On the IB there was insufficient room for the battery box in its normal position due to the shortened torque tube. As a result, the mounting was moved to the side to allow it to bolt to the wheel guard mounting plate.

Wood insulators were used on the top and the bottom of the battery with top insulator containing 3 holes for the battery caps. On the IB an extra wood block was inserted in the side to shim the battery due to the boxes slightly larger width.

Reasonably good reproductions are available new from a couple of different suppliers. The sheet metal is thinner but not to the level of other replacement boxes such as those made for the Farmall Cub.

Instrument & Control Box. The instrumentation is pretty austere. Immediately viewable from the drivers seat is the Ammeter. The box that holds it also contains the magneto kill switch or ignition switch, depending on which type of spark generator the machine has, and the light and charge level switch if the machine was equipped with electrics. The CA had an additional oil gauge to allow monitoring of the draft control known as the power booster. This gauge would should how much hydraulic oil pressure was being applied to your implement lift arms. Since the control box had no room for more gauges, this one was attached to the upper surface of the steering shaft cover tube. Also left out of the instrument box was the oil pressure gauge which was mounted directly to the oil filter bracket. Viewing this gauge while running requires a good lean out the the right, not something you want to do in when working in an orchard but normally easy enough.

Tank. The tank was formed from 2 pieces of pressed steel. See the discussion under Tool box to find information about the rear mount. The front mount was simply a casting that allowed the tank to sit atop it with holes to accomodate the bolting down of a strap that would hold it, the hood, and the woven padding snugly in place.

The gas cap was very unique and should be preserved if possible. No reproduction is presently manufactured. It has a relatively flat metal cover and a "wing" that protrudes rearward to allow the use of the thumb when removing it. This same style cap was employed on the radiator.

Wheel Guards (fenders). The fenders on most tractors of this era were called wheel guards rather than fenders. I would suppose this is due to the fact that they did not completely cover the tops of the tire and were rather a piece of sheet metal seperating the operator from the tire. Most people call them fenders today anyway.

There were three styles used. The B and CA both used a guard that folds out at the top by about three inches from the vertical surface at the bottom. The C fender was more upright, with the top surface protruding only about an inch. This guard was probably an attempt to avoid the tire rubbing when set to the narrowest width (the wheel cone turned inward and the rim bolted to the inside). C guards are more difficult to locate and should be preserved if possible. The B fender will fit due to the seat mount and angle stock used to hold it on being the same on both. The later B and CA guards had a hole for light mounting and even optionally used the mid-50s bullet style AC light with red bezel. These are beautiful lights and if appropriate for the model are a crowning touch atop the right guard.

The IB used the same fenders that employed on the styled WC and WD. These are large fenders for the little IB and look like complete surround-style fenders on the small 24 inch tires. When used on the 28 inch tires of the WC and WD they were more like guards.

Operator Platform. The B and C had no operator platform per se. One of the great difficulties of these machines is getting on and off. One places a foot on the tube stock that mounts the fender, seat and hitch angle iron mount, and steps up. Then a quick contortion allows a spin and slide into the seat (which is fortunately wide) while clearing the steering wheel with the right foot. The IB is the same but has floor boards and is closer to the ground which make it a bit easier. Also, stepping on from the back is possible and preferable with the IB.

When the CA was released it had a bonafide platform in back. While not a place to stand while operating (none of these are stand-up-and-drive tractors), it is a help when getting on. The platform is of heavy sheet metal and finally make these machines look "finished" due to its covering the skeletal appearance of the rear end. It does complicate some maintenance by requiring its removal for access to certain bolts and nuts.

Electrical. As expected, the electrical system is quite simple. Tractors of that time period had no cabs thus had no options for heat and radio, even a horn would have been considered superfluous. Many farmers felt that even a starter or lights were gimicks and gadgets for a tractor. Even nowadays, I appreciate the simplicity and low maintenance of the crank starter. It is usually much easier to start an impulse-coupler equipped magneto tractor after sitting all winter than to get the battery back in shape and use the electric starter.

The most basic option was the non-electric which simply had the magneto and a kill switch. The kill switch would ground the magneto and stop spark generation (rewiring this one is easy). The electric starter and light options increased the complexity but were still trivial when compared to todays Chevrolet that has no less than 2 miles of wire snaking through every nook and cranny (and requires Mr Goodwrench to figure it all out).

The magneto systems were equipped with an impulse-coupler which would wind as you slowly crank and fire a significantly hotter spark at low RPM. When I first began in the tractor business, I assumed that crank starting involved "spinning" the engine to cause it to fire similar to a Fordson or Model T. I had no idea that this little invention would allow you to slowly move the

engine an 1/8th of a turn and have it spring to life. You can pretty much determine if your impulse coupler is functional by an audible click every half turn of the crank. The impulse coupler is buried inside the Fairbanks Morse FMJ magneto or Wico X. Though I have never tried it, the FMX magneto is reported to work for this series of tractor.

Beginning in the 1950s the magneto was replaced on the B and CA with a normal battery ignition. Gone were the days of easy springtime crank starts and simplicity. This system used a Delco-Remy distributor, coil and different distributor drive than the magneto systems. The coil bolts to the rear of the distributor drive housing. Obviously, the battery became an integral part of this system and some charge would be needed for the machine to start (short of pulling the tractor around with your car to start it).

All electrics-equipped units were shipped as 6 volt positive ground, that is to say, the positive battery pole is connected to ground and the negative pole was snaked through the tool box to the starter. The tube that supports the steering column was the place where the ground wire was to connect to the tractor. Since most people are familiar with negative ground battery hookups, most machines have been switched to negative ground. Though it is not difficult, there are a couple of items to think of when making the switch back. This is covered in Chapter 9 as is the general requirements for switching to 12 volt.

Until the last few years of production the generator was a 3 brush with cutout relay. The charging was controlled by the operator with the use of the 3 position light switch. The first position is just above a trickle charge. The second position would raise charging to 2 to 3 amps and the lights were turned on. The third position would bump up the charging amperage over 12 amps and turned the lights off. Due to the constant high-charge characteristic of the third position, running for long periods of time in the third position, would result in overcharging and damage to the battery. These generators were made by both Delco-Remy and Autolite throughout the production. They are easy to rebuild or replace as rebuilts are common.

The non-third brush generator used on late production machines (B and CA) employed a standard regulator similar to what you find on any 50s vintage automobile. Charging was then automatically controlled on a demand basis. These were Delco-Remy units.

Starter motors used were compatible throughout the series with the exception of the stationary engines. These used a slightly different housing for the starter drive. The drive housing is the correct length but has the lock hole drilled at a different position making it impossible to keep the starter in place. When the cast housing is swapped with your original, the stationary engine starter may also be used.

The correct starter switch must be used when changing from an Autolite to a Delco-Remy starter and vice versa. These are non-interchangable due to the width of the starter mounting screw holes. The Delco-Remy piece is readily available from most tractor parts dealers. The Autolite part is still available through Agco-Allis.

The common headlight used was a round back 5 inch Guide Tractor Light. These are non-sealed beam lights using a bulb and seperate bezel. A direct replacement for this light assembly is not available though 4 1/2 inch round backs do work. The replacements have too shallow a rear shell to look completely original. Originals may be obtained in salvage yards off the WC, WD, and most letter series Farmalls (A, B, C, H, and M). Late production models may have had the

pointed shell as introduced on the D-14 and D-17 in 1957. These are also available on many of the letter series Farmalls and the Cub.

The rear road light used was a non-descript round light that mounted under the seat at an angle facing downward. The rear lens was clear allowing it to double as a work light while the top rim had an opening and red lens to serve as a safety road light. The black bullet style light used in late production was very unique and difficult to replace. This light mounted on the right rear wheel guard. The red bezel for this light is still available but the housings are not. The IB had a small bullet style light similar to the running lights found as side markers on trailers and flatbed trucks. The appearance is very close to those sold today by auto parts stores.

On many stationary and auxuilary engine versions, an oil pressure switch and water temperature switch system was integrated with the magneto grounding switch to allow automatic shutdown if engine oil pressure was lost or water temperature exceeded normal. This switch was dropped in later production. If your tractor does have this system, it is likely that a previous owner used a B-125 stationary engine for parts.

Drawbar. The non-hydraulic B and C drawbars were simplistic cast bars that connected either to the front side of the final drive housings facing forward or the rear side of the final drive housing facing rearward. The drawbar had several seven holes to allow pulling from not only the centerline but offset to the left or right. An triangular extention plate was available to bolt onto the drawbar to provide the ASAE mandated distance from the PTO shaft. This allow standardized hook up when using the PTO with 3rd party manufactured implements requiring driveshafts such as manure spreaders. The B and C used different width drawbars to allow for the fact that the final drives were farther apart on the C. A limited-swing swinging drawbar was available for the B and C that bolted to the standard drawbar.

Late production Bs, could be fitted with a snap coupler bell. When so equipped, different mounting brackets and a different drawbar were employed. I have no information on this system nor examples to document. When so equipped, the snap coupler would allow for easier hitching and compatibility with the many CA implements but would not provide the benefits of the CA Power Booster draft control.

The CA fixed drawbar came in 2 varieties depending on whether the machine was equipped with the snap coupler bell or not. The early non-snap coupler versions connected to the hitch mounting bracket that bolted to the bottom of the transmission and differential castings. This used additional support brackets that connected to the final drive housings and seat mount angle iron brackets. This stout arrangement was replaced when the snap-coupler bell was added to the tractor with an arrangment that was similar to that used on the WD, WD-45 and later D-14 drawbar. These employed an boxed extension that bolted on to the rear differential case. The actual drawbar hooked in to the snap coupler bell and rested on the above mentioned bracket. This arrangement was much simpler to remove when switching back to the normal snap coupler hitching.

The IB used a plate with brackets that connected to the fender mounts. The plate had a cast assembly bolted to it with a movable hook to accept a pintle style hitch on a trailer. The hook could be opened by pulling a rope.

Power Take Off. Not all machines were equipped with a PTO rear case. The hydraulics were dependant on having the PTO case due to the location of the cam drive shaft being located in that case. As a result non-PTO machines could not have hydraulics. On machines without PTO, a sheet metal cover was bolted to the rear of the differential case. Most IBs were shipped in this manner due to the lack of need for PTO on industrial machines though when hydraulics were required the machine would have PTO. Machines without PTO can be converted easily by bolting on a unit from a salvage yard. Though the CA could be ordered without hydraulics, the PTO case was standard equipment.

PTO equipped systems were initially sold with 1 1/8 inch shafts as was the norm until the early 50s. The early B could be shipped with a PTO shaft that did not have the cams necessary to drive the hydraulics until 1940. After this time, the 1 1/8 shaft had the cam drive. The 1 1/8 shaft was replaced with a 1 3/8s shaft on the CA and B in the early 50s. The CA shaft used 4 cams versus the 2 needed for the other models piston pump. These shafts are not directly interchangable.

Early non-hydraulic B and C PTO cases were a different casting from the hydraulic version. The later non-hydraulic versions had a plate to cover the hole where the pump would have gone. The CA case used a similar plate. CA PTO cases were non-interchangable with B and C styles though are shared with the early D-10 and D-12 cases.

The belt pulley shaft housing was integral with the PTO case exiting at a right angle on the left side of the case. The early belt pulleys were cast iron while the later units, starting in 1939, were of pressed steel. The cast iron pulley is a valuable and sought-after component.

There were two types of safety PTO covers provided. The early machines had a tube that could be bolted on to the PTO seal plate that completely covered the shaft when not in use. I have never seen one of these, presumably because once removed, it was difficult enough to put on that it would never be used again. The later cover remained in place without interference of belt or shaft and had the ASAE specified shaft cover mounting cut-out. This was essential a large right angle plate with a hole cut for the PTO shaft and holes to mount on the PTO seal plate.

Hydraulics. All hydraulic pumps used on this series were of the high pressure piston pump variety with matching one-way high pressure rams. While these pumps were more complex than the vane and gear pumps used on many other machines, the piston style pump was far more reliable and long lasting than the other pumps. This is graphically illustrated on the Ford NAA where prior to the end of the production year the vane pump was switched to a piston pump and the dealer notes are insistent that maintenance on the pump requires replacement with the piston model. Since the piston pump is more expensive to build this must say something about piston pumps. The switch to gear pumps was only expedited by the move to low pressure systems and the fact that it was much cheaper to replace. Though there are more components to the piston pump they are not difficult to work on and most of the time a small amount of effort will restore these to functioning condition without replacement of any components.

Function of the pump began by engaging (pulling up) the rod that actuated the PTO. The PTO shaft had cams to push the pumps in and out generating flow, spring loaded ball valves allowed one way flow, and a shaft that directed the flow turned to open and close various orifaces thus determining which valves would be activated. A final relief valve was provided to allow pop-off when pressure reached a predetermined point. The predetermined point was determined by the distance the relief valve was pressed into the casing. Pretty simple huh? On the CA, adjustment

of the valves was controllable by screw in and out controls changing the speed of rise and fall. The B and C pump had only a hold position control.

As mentioned earlier, the CA employed a larger pump and in fact the same unit that was used on the WD. This pump had four pistons versus the two used on the B, C and IB. Though most parts for these pumps are not available, they are seldom needed and if the salvage yard cannot provide help, rebuilts are available.

The B and C could be equipped with one or two small rams. If the two ram version was provided a three-way switch was mounted under the right side of the seat rails that allow the independant actuation of right, left, or both rams. When used with the switch, the hoses are connected to the top outlet of the pump. If the tractor was equipped with a single ram, the side oriface of the pump is connected and the pump actuation control is the only control used. The CA and late B used a larger diameter ram with a longer throw. All rams were single acting meaning that they were pressured up and gravity combined with release of a valve would push the fluid back into the PTO oil sump thus lowering the implement or load.

Since these are high pressure rams, they are not replaceable with the common low-pressure rams found nowadays. Rams that would be appropriate for custom applications would be found on the WD, WD-45, AC remotes, and any loader rams up to the AC #14 and #17 loaders. Care must be taken when employing large volume rams since the PTO case will be drained when attempting to fill these. Hooking up a seperate sump is difficult to say the least when the pump is integral to the case as it is with these tractors.

The CA was equipped with a draft control system known as the Power Booster. It had the capability of adding a portion of the weight of a mounted implement to rear end of the tractor at times when wheel spin was eminent. The system would sense the extent of pull rearwards of the implement. When it reached a preset (adjustable for conditions) pull, the rams would actuate lifting the implement. The greater the pull the more the rams would lift providing better traction. When pull lessened, as would occur when soil condition changed, the rams would begin to lessen the lift. The result was that the tractor would adapt to the various conditions found in a field and improve time and fuel consumption (needless to say eliminate the continuous need to watch your plow and adjust it).

The CA also had a transport valve which allowed plug-in hookup of a remote implement ram. An example of the use of such a ram would be to control rear wheels on a disc when transporting or turning at the headland. This would allow the CA to work a high-capacity implement than could normally be mounted.

Seats. The B and C used a bench seat that many considered to be the first consideration ever provided to comfort for the farmer. The 28" x 15" x 6" (the 6 is assumed as I have never found an original in good enough shape to measure) foam and spring pad was quite luxurious even by todays standards. The frame for this seat was different depending on whether the tractor was equipped with foot brakes or not. The frame on the hand brake version was constructed simply of 1 1/2 inch angle iron while the foot brake version used a 4 1/2 inch tall side plate. The seat back was attached to 2 rounded bar stock pieces that bolted under the seat. On the 1937 and some 1938 units, the back was wooden while most of the machines used a pressed steel back.

The IB had a standard pan seat with spring steel backrest commonly seen on the WC and WF.

This was mounted on a frame surrounding the transmission and differential case. Of the 2 models made, the most common was the later unit using wrapped spring steel cantilevered rearward. The early version had a coil spring directly under the seat.

The CA seat was a large pan similar to those found on the WD and later D series only slightly narrower. This seat was supported by a shock absorber system as had become the norm with other manufacturers for some years. The shock absorber connected to the PTO case. This arrangement was continued into the D-series (D-10 and D-12) machines.

Controls. As an option, the B, C, and IB could be equipped foot brake controls. These were located on the right. They could be used individually or together. Brake locks were provided that used an eccentric plate that could be flipped into position when the brakes were depressed. The CA was similar.

The clutch was located on the left and had curious bar that allowed the clutch to be placed in the disengaged position for starting. You depress the clutch and flip the bar which lodges against the forward wheel guard mount. This reduces drag on the engine for easy starting.

The PTO engagement lever is located to the right of the transmission case. In the down position it is disengaged. When pulled up, the PTO, Belt Pulley and hydraulic pump are all engaged.

The hydraulic control is located under the seat to right. It is active once the PTO is engaged. In the forward position, implements are down and fluid freely returns to the PTO case. When pulled all the way up, the fluid is permitted to pass to the rams and the implement lifts. When released, it is spring loaded to return to the middle or hold position.

The shift lever is self-explanatory. No shift ball was provided when these machines were originally sold but the shift ball available through Agco Allis for the D-14 is a perfect fit. For those using the tractor as a work machine, this is a welcome upgrade and can even pop on and off without damage for shows.

8. Cosmetics: What did they really look like?

There are many reasons why an old machine should be painted. My first tractor had so much rust on it, from years of having no paint, that most of the bolts would not turn. This turned into a very serious problem when I tried to adjust the PAW eccentrics. I had to tear it down completely to break loose the components and restore their function. In the process, I ended up cleaning and painting the entire tractor (a 5 minute job turned into 2 months). From that point on, I realized that the paint on the tractor was far more than a cosmetic or show issue. Suffice it to say that every tractor, no matter what its intended use, should have the paint kept intact.

The type of cleanup and paint (meaning the time spent on cleanup and the money spent on paint) is determined by what the tractor will be when its done. For a working tractor, complete stripdown and disassembly is not cost effective. Likewise matching the original color would be wasteful as the cost will be 5 to 6 times more per gallon. The same holds true for decals and lettering on the working tractor. The mylar decal sets sell for 1/3rd the price of individual and accurate sets used for the show tractor. It is also important to remember that with a working tractor, the condition will deteriorate immediately upon use. It is not possible to retain a pristine appearance if the tractor is to do its job (or even run for that matter). Gasoline, oil, exposure to the Sun, tree branches, furrows (scraping the rims), birds nesting in the barn, etc, etc, etc all take their toll. In 5 years of work, you will need to start the process all over.

The show tractor is quite different in that to accurately represent the tractor as it came off the assembly

line, the colors of each component and the position and quality of the decals coupled with the assembly of the original components are critical. The shade of paint can be matched and the quality decals can be purchased but putting it all together as it was can be challenging
with these tractors. The problem is generally trying to determine which years used which colors and decals. This is confused by the fact that often there were differences in the same model and year. Some individuals have asserted that this is due to rather loose quality control and a tendency to allow each manufacturing crew to do it their own way. The facts shown in the next section are accurate and based on the review of many black and white pictures coupled with scratching the paint on many machines and components to find the original colors. Unfortunately the conclusions are purely speculation or more aptly an educated guess.

Colors

Driving home from work one day, I noticed a C, that I had restored and sold, was out plowing across the valley. It was a sunny clear day so I stopped to watch for a moment. The brilliant orange color shining in the sun combined with this machine doing a hard days work (the rear finals were buried to their axles due to the plow being set incorrectly) was quite inspiring. The poppy-orange color used on these tractors was referred to Persian Orange #1. The majority of tractors have been repainted with what I call near-Persian Orange #2 (somewhat of a cross between the 2 colors leaning more towards the #2 color) as that is the readily available color on the market. The #1 color is more washed out and less red than that available without having the color custom mixed. The use of Persian Orange #2 began in 1959, long after any B, C, IB, or CA tractor was manufacturered.

I have seen working tractors painted by brush with whatever color was available and it is hard to criticize because any paint is better than none. On the other hand, it is inexpensive to purchase the enamels sold as AC Orange. This color, as noted above, is similar to the correct paint and even appears on the majority of show tractors. It is available from several manufacturers in spray cans, quarts, and gallons and sells for about $25 per gallon. For a working tractor, it is more than sufficient. Cleanup can be limited to the use of an angle grinder with a wire brush. Disassembly can be limited to only those parts that come off easily such as wheels, hood, grill and wheel guards. This keeps the time invested down to a level that is practical. If decals are desired, the use of Mylar strip decals is sufficient and will replace all the original safety warnings

9. Tips, Tricks and Maintenance

I wont bother to duplicate the wealth of information that is needed for basic internal combustion engine, transmission and drive train of tractors. Instead, this section is limited to the specifics problems and requirements that I have encountered on these particular models and the items that for some reason are not covered in the manuals.

Manuals

Most information pertaining to maintenance and repair procedures is covered in the manuals available for the individual models though unfortunately you must locate at least two manuals to get the whole story. There are other texts that zero in on specifics of components that are extremely valuable and these should be included also. The other category of reference material includes those books and manual that while not necessary are important to those who have become tractor fanatics like myself. While others are curled up in front of the fire with a good novels, we fanatics are curled up in front of the shop stove with the parts breakout manual and serial number reference books.

The basics are the AC Dealers Service Manual and the AC Operators Manual. If you have an IB, this will mean settling for a B Operators manual. Fortunately everything applies. The operators manual covers items not covered in the service manual and is necessary. The AC Dealer Service manual is sold as a 3 section manual covering the G, B and C, and CA in individual sections. Reprint dealers frequently reprint these sections as individual manuals which is convenient if the other 2 are irrelevent to you. The B anc C Service manual adequately covers the IB. An additional manual that is required is the Intertec Shop

Service Collection that covers all ACs of that time period. AC was somewhat brief in describing certain procedures and the Intertec (also called I&T) Manual fills in the gaps quite nicely. A third must-have book is a general reference that will provide even more background. Though I cannot recommend a specific book, the Motors and Chiltons references of the time period are extremely valuable in helping to understand theory and procedures for engines built in the 40s and 50s. This type of book can be skipped if you have a background in engines and don't need the basics.

A book that people frequently leave out of their library is the parts manual. To a degree this can help in identifying parts for purchase but more importantly it provides breakout of assemblies that can really aid in reassembly or just knowing how to get something apart.

The books that zero in on specifics such as "How to restore your Magneto" by Niel Yerigan (Published by Motorbooks) and "How to restore your Farm Tractor" by Robert Pripps (Published by Motorbooks) can go a long way to building your confidence prior to starting a project.

Maintenance Problems

When working on these and other tractors, many procedures have hidden pitfalls. I cannot pretend to cover all the factors related to general tractor maintenance but can provide a few items I have found that pertain only to this series. In some cases, performing your work can lead to a damaged part while other cases could present a hazard to you. Before working on your machine, thoughly review the AC Operator's manual, Service manual, and the Intertec (I&T) manual for tips on proper maintenance. Here are a few items that are not covered or are not evident.

Rear Wheel Removal - The pivot point for the front axle allows the front of the tractor to radically tilt. If the rear wheels are removed without thorough shoring of the final drives and wedging the front axle (to block pivoting action), you may drop the entire tractor on the floor. Obviously if you are underneath this can be a deadly problem. The problem becomes more severe when you are also removing the final drives. In this case you must carefully block then entire frame and even then when the first final comes off, the instability due to unbalanced weight can bring the tractor down.

Final Drives - Don't presume that you can remove a final drive casing with out a hoist of some sort. The are deceptively heavy. Once you begin removal, it must be pulled out as straight as possible to avoid damage to the axle, seals, bearings, and retainer.

Brakes - When you remove the finals or just pull out the brake linings for replacement don't forget that there is likely 50 years of asbestos dust lurking in the case. Appropriate precautions for the handling of asbestos should be taken.

Splitting the Tractor - Splitting your tractor at either end of the torque tube presents the same pivot problems discussed above for the front end and has another pitfall in that the entire rear of the machine can pivot forward and backward on the tires. If the wheels and tires are removed, this problem becomes more pronounced. It is possible to box the rear with timbers or employ a seperate hoist to overcome this.

Flywheel Removal - When removing the flywheel bolts you will find that there is insufficient surface area to hold it up without the bolts in place (i.e. be ready for this heavy piece of metal to fall on your foot when you pull the bolts).

Starting Problems

Many people have a tendency to purchase new starters and batteries for their old tractor to try to make up for the fact that they turn over so slowly and can be difficult to start. Before spending the big money on these items, check over the battery connections. With the age of these machines usually comes rust and corrosion at the ground hookup and and starter. While not obvious, this can have a major impact on reducing amperage to the starter. Even worse is the practice of putting smaller 12 volt cables on the

battery, this is common since premade cables are only available in the lighter gage wire. When these conditions are put together and combined with corrosion at the terminal, it is a wonder that it would work at all. If you excessive resistance at the ground, it will show up as excessive heat. Correcting this will help correct starting. The place to check this is at the steering column ground bolt where the battery box and wire attach.

The starter switch can be a source of problems. After completely removing the Negative cable (remember this is the hot one on a positive ground system) from the tractor, this switch can be remove with 2 screws allowing you to examine the contact surfaces of both the switch and the starter. To work correctly the center rod must be completely insulated from the casing throughout its full in-and-out range. I have rebuilt these but I would not recommend it as it is too difficult to locate suitable parts.

It dies when it gets hot?

There are many reasons for this problem to occur but if it is not severely overheating and you are getting sufficient fuel to the engine, it is likely that you have a faulty condensor. Whether battery ignition or magneto, the condensor shows that it is failing by getting warm and ceasing to function (or total failure which comes under the heading of "no spark").

Erratic Running

I have had a C and B both run start easily and run for a few minutes only to begin faltering at any speed above fast idle. The first reaction for most people is to rebuild the carburator because this suggests insufficient fuel and a clogged float valve. A far simpler problem may exist on this tank. The connection point for the sediment bowl on these machines is the lowest point in the tank and there is no screen and tube extending up into the tank on the original equipment valve. It is easy for the rust of the years to clog the opening under such conditions. Many other machines have at least a lip to prevent this problem and many aftermarket sediment bowls have an extended screen and tube that rises up an inch. Removal of the sediment bowl can quickly determine this and the fix is obvious. Of course stopping the rust in the tank may be a bit more work (such as coating the tank) but at least you will be running for the time.

Carburator Float Valve Leaking?

You might wonder at something this basic appearing here. The only real issue with this tractor series is that the majority of carb float valve replacements that are contained in the common kits listed for Zenith carburators may not fit. This has been a common problem due the the later replacements using a different depth seat and valve to match. Don't throw the old one away until you try it. Also not to get your hopes up and leave you high and dry, it is likely the float or valve that is the problem if this problem exists. The manuals cover the necessary adjustments on this carburator.

Timing your Magneto

The magneto is timed by locating top dead center, turning the cogs on the side that mates to the drive gear until the rotor lines up to the number 1 plug wire and then mounting to the engine. Dial this in by rotating the magneto counterclockwise to till the case touches the block. Now locate TDC again by taking the engine through its strokes. When #1 TDC compression stroke is reached again, slowly rotate the magneto until it clicks and tighten. This should be very close to perfectly timed.

When you are crank starting your tractor to test your timing job, be especially careful and follow instructions provided in the AC Operators manual on the correct way to hold the crank. If the timing is off, it will backfire and do its best to break your arm, thumb or whatever else is in the way as the crank violently takes a counterclockwise swing.

Switching Back to Positive Ground

Returning the tractor to its original 6-volt positive ground is something that is required with nearly every original restoration. The procedure is:

- Remove Battery cables from the battery
- Turn the battery around (if it is backwards in the battery box) such that the positive post is at the rear.
- Open the instrument and wiring box and reverse the connections on the ammeter.
- Connect the ground cable from the positive post to the rear battery box mounting bolt. This will bolt throught the steering post and should be clean of rust and paint.
- Remove the fan belt from the generator pulley.
- Using a jumper cable from the negative battery post, momentarily "motor" the generator by touching the outer post extending from the casing. Be careful not to touch ground in the process. Motoring repolarizes the generator, failure to do so may damage it.
- Re-tension the fan belt and connect the main starter lead to the negative post of the battery.

Switching to 12 volt

The pros and cons of this switch are simple. The 6 volt should be kept intact if you are restoring for show. The system will function adequately. If you are using the tractor for work, the 12 volt system will make sure your machine is ready to work everytime you are (like during that heavy winter snowfall). Besides, the conversion is reversable if you take care to retain the original wiring.

Switching the system to 12 volt requires the following components.

- Alternator and regulator (preferrably internal regulator)
- Light bulbs for original head and tail lights or complete replacement lights.
- Generator or alternator mounting bracket for top mount.
- A tube stock shim and long bolt to hold the shorter alternator bottom mount in place.
- Battery
- Ballast resistor for battery ignition model's 6 volt coil or 12 volt replacement coil.

Existing components that can be reused are:

- Ammeter (leads will require reversal for the switch to negative ground)
- Starter and Starter switch (should not be cranked excessively under 12 volt without giving cooling period)
- Wiring (Wiring that is designed for 6 volt should be more than sufficient as the amperage at 12 volts is reduced by half).

Components that will not be reused are the Generator, Cut-out relay and light bulbs or lights. Additionally the light switch should be connected such that it only activates the lights meaning the 3rd position high-charge will be unused. Any new standard regulator will automatically control charging levels on an as-needed basis**.**

If the alternator you select will not tension correctly with the existing top mount (that bolts to the frontmost manifold stud), you may find that slotting some bar stock on one end and drilling a single hole on the other end will produce a reasonable mount when attached to the leftmost water pump mounting bolt. If this method is used, a replacement bolt should be used that allows for the extra length. If this bolt is removed to install a new mount, remember that the coolant can flow out from the water jacket as if this were a drain hole. You may want to drain the radiator prior to doing this. Also there is the possibility of inducing leaks from the water pump-to-block gasket.

When connecting your 12 volt system, you will no long use the third position of the light switch. This is the connection that uses the resistor. This position is for raising the charging rate with the lights off which will be superflous with the new regulator. As mentioned above, to allow reversal of the conversion, the wiring should not be altered. Retain the "3rd Brush" lead by simply insulating and tie wrapping it up by the alternator. Also use a small pigtail to convert from the old style connection to the new Alternator/Regulator lead connection.

Do not throw away your unused components. Remember that while you may use this tractor as a working machine and have no interest in showing, there may come a time when it may become a "collector" machine either to you or a future owner. The Generator, Cutout, unused wiring, lights or bulbs and belt tensioning bracket may be needed in the future for this purpose. Store them in a dry location and remember to include them with the tractor if you sell.

Governor Troubles

The governor controls the speed of the engine by monitoring the your preset throttle position (on the throttle quadrant) and adjusting the RPM up or down depending on conditions. A spring keeps the carburator set to the minimum RPM you select. Any engine load is sensed by the weights falling back toward their resting position which pushes the rod to increase RPM. It is located on the upper right front of the engine block and is turned by the same gear that controls the magneto or distributor drive.

The governor consists of simple hinged weights that pressure the protruding carburator control rod based on centrifugal force. The rod should move freely to allow rapid RPM adjustment by the governor. The system is oiled by a oil line that connects to a fitting on the head. The line must be kept clean to insure that the governor is well oiled. Additionally the bushing that allows the movement of the rod must be smooth and non-scored. Lastly the hinge points of the weights must not be sticky so as to alter the characteristics of the design. If you have difficulty moving the rod by hand or with the throttle arm, it is likely that the governor needs to be opened up, cleaned and possibly the bushing replaced. If you have trouble moving the rod, the weights won't be able to move it either.

Jerky Hydraulics

The piston style hydraulic pump is reliable and will probably give sufficient service for as long as the tractor will exist if it has not been abused. If the pump seems to be jerky in raising the lift, it is likely that one of the pistons in unable to provide flow due to a bad valve. A bad valve simply means it is allowing 2 way flow when it should be allowing only one way flow. The supply side valves consist of a spring, ball, and seat. The I&T manual provides a good description of removal. What to look for is foreign objects, gunk, a broken spring or spring that has lost its tension, or a ball and seat that is out-of round. A simple method of determining which valve is disfunctional is to remove the pump, set the intake pipe in a small can of fluid and vigorously pump the piston by hand. You will get flow from a good valve while one that is not closing properly will fail to pump any oil and would be the one you would want to remove.

If the implement raises correctly but tends to fall back on its own, check the return valves as the balls are likely not returning to their seat due to identical problems as described above. On the B and C, this can also be caused by overadjustment of the screw on the actuator rod. On the CA, there are several adjustments that can cause incorrect operation of the fall rate and hold. The AC Owners manual has information concerning this.

Another possible problem causing jerky operation would be bad surfaces and seals in the ram. In this case you should see excessive quantities of oil escaping from the chevrons (expensive little seals at the end of the ram tube).

Hydraulic Oil

A common problem arises when you get ready to fill the hydraulic oil and transmission case. The manuals provide outdated specifications and nomenclature for the oil used in this casing. Since the oil is shared for both the hydraulics and the transmission and differential it will have special properties of being designed to lubricate gears and bearings while being non-foaming and lighter than gear oil. All Farm Cooperatives and Feed stores (that carry oil) will have a hydraulic oil that is designed for shared sumps. Go to this type of store and ask for it. I have found that most auto parts stores can get this type of oil but will be of little help when you ask for it.

Gaskets and Seals

Engine gaskets and seals are still off-the-shelf items for these machines and are readily available. Drive train gaskets are not. You will have to make many of the gaskets that are used throughout the system such as PTO cover, final drives, pinion castings, and hydraulic pump. The gasket material sold in bulk by auto parts stores is sufficient for these purposes but care must be taken when selecting the thicknesses for certain components. These are:

- Outer Pinion axle Bearing Cover
- Radiator support to Lower steering gear support
- Differential to pinion casting

These are singled out because they are shimmed surfaces to adjust the play in these components. The differential and steering shims are important because they determine the contact patch of bevel gears. If you select thick gasket material, you alter the shimmed depth. During removal, retain a section of the OEM gasket and try to match this. You will likely find that these are very thin. Re-shimming involves considerable trial and error (and no one likes to tear something apart more than once).

Oil pump gaskets are also require critical tolerances. These gaskets should be paper thin. I have used thin manilla envelope stock successfully. High quality gasket sets such as those currently provided by Yesterday's Tractors provide these, but other sets we have sold from the most common distributors do not and they will have to be fabricated.

The final drive cover gaskets should be made from cork stock as these covers are frequently beat up from their low position and may not mate perfectly.

All seals are still available from multiple manufacturers. Agco Allis can supply these as can any good bearing house as long as you have the AC part number or a replacement part number off the seal itself. The replacements will be of the neoprene variety rather than the original leather or felt style.

10. Using the Little Allis'

You locate an excellent AC B at a price that is absolutely amazing. The paint is good with no signs of rust, the engine starts with ease and doesn't miss a beat, and the tires still have those little rubber molding marks on them that indicate their newness. The implements that may have come with your newfound treasure are long gone but this doesn't bother you because you're not sure what you will need anyway. You write a check and go rent a trailer. After an excited trip home, you unload, start it up and drive it around in circles for a while. The next day you decide it's finally time to put your little workhorse to work and hook up your little garden tractor's trailer to it. Hmmm. Your garden tractor could do this *AND* cut the lawn. It's time to go get some implements worthy of a "real" tractor. After weeks of calling every implement dealer in the state you discover that you can buy a bigger trailer, put a ball on the drawbar (to jockey your boat around the driveway), or hook up a chain to any large heavy pieces of metal to create the ever-present and popular "drag" (you quickly realize why a drag is so popular).

After dragging the driveway 3 times and moving the boat to 4 unique locations, you realize that this is not quite living up to the picture in your mind of the perfect furrows made as your plow knifes the garden and

the pulverizing disk breaking up the soil and creating a fine seed bed. And what about all those blackberry bushes you had planned to mulch into oblivion and the elimination of hours of tedious fence post hole digging. After a few weeks of deliberating, you drain your savings account for the down payment on a Kubota 4x4 with all the implements and hide the AC out behind the garage. After a year or so, you decide to sell the little AC and put a ad at your local feed store

"Small Farm Tractor for Sale, Ran when I parked it,
1 1/2 inch trailer ball, chain, and homemade drag
included. Best Offer or trade for ?"

It sells after a short time at only a small loss and you swear off old tractors for good.

What went wrong? If you are reading this book, you, like me, probably believe very strongly in the utility and capability of 40s and 50s vintage tractors. There are obvious differences in the capabilities of the older machines and their newer 4x4, lightweight, expensive counterparts. Many Cons but some definite Pros. For those that are familiar with both mechanics and how to prepare and equip a tractor to work, the cost vs performance will often tip the scales in favor of the older machines. Unfortunately, for the uninitiated, the hitch styles, lack of implements, traction, different components (like magnetos or wierd sized PTOs), and lack of safety features represent extremely formidible and real problems.

Hitch and Implements

Possibly the most important component on the tractor is the hitch. It is what allows you to get your work done. One of the reasons the B, C, and CA are so economically priced is that they frequently don't have a hitch that is immediately usable. The reason is the proprietary nature of their hitches. Often an individual will get their machine home only to find that the only job it will do is pull a trailer or drag an implement around. For the individual with a 40s and 50s tractor, there are only 2 options.

- Buy the tractor with the proprietary implements you need.
- Upgrade the tractor a modern 3-point hitch that will let you use the myriad of new and used implements on the market.

Proprietary Implements

Finding a machine with all its original proprietary implements and have them match your requirements is not always easy. Not only are the implements frequently missing after 50 years but those that exist are frequently not suited to the small landowner or homesteader of today. Implement technology has changed so drastically that aside from the plow, disk and cultivator, none of the implements you want existed at the time these machines were built. Additionally some implements that were available may not exactly match your needs. A good example would be the sickle bar mower. Many people find this mower available with a B, C, or CA and assume that they will be able to "keep the trails clear" or clean up the all the undergrowth that has taken over their fields. While the sickle bar mower was great for cutting hay in the pasture it may get a bit irritating when you have to sit there and wait for it to saw through those little alders plus having to resharpen the teeth on every pass. It just was not designed to dothe job of a rotary brush cutting mower like a Bush Hog.

One proprietary implement that is still available is a large multiblade grounds-finishing mower. One company producing such a product, specifically to fit these machines, is Woods. While not cheap, the overall package of the mower deck and a B or C will actually run less than high quality garden tractor (such as the Cub Cadet) with a deck capable of a 50 to 60 inch swath (and its a lot more fun to mow your lawn that way).

The 3 Point Hitch

The second option is easy but for some reason escapes most folks. They would spend $15,000 for a modern tractor before spending $350 or less for a new factory-built 3 point hitch designed specifically for the B, C, or CA. The enterprising shade-tree fabricator can do even better by purchasing a few dollars worth of steel and a set of lift arms and jacks. This can be done for about $80 (of course you have to have the welder and drill). When you have the 3 point, a whole world of implements becomes available.

To make use of many of the implements, you will need to adapt the earlier models of the B and C from a 1 1/8 inch PTO shaft to a 1 3/8s. It may also be necessary to use a converter that doubles as an overrunning clutch for implements such as the rotary brush cutter. These are readily available through any tractor dealer. For PTO implements, these machines should use the 540 RPM variety.

Once you have a 3 point hitch you must be sure to size any of the implements to the tractor. For example, in 99% of the cases, a 2 bottom plow will be unsuitable for all machines in this series with the exception of the CA. A 3 point mounted 2 bottom will not only be difficult to pull, it will be quite heavy when in the up position and make steering extremely difficult (if the front wheels are even on the ground). Another good example is the rotary brush mower. Keep the width down to 4 feet or the engine won't have the power necessary to cut heavy grass or brush. Remember that on these non-live PTO systems, an implement such as this will push the tractor even after you put the clutch in, creating an extremely dangerous situation when you are near hills or have objects in the way.

Front Weights

AC manufactured weights for attachment between the front radiator support and the front of the torque tube. Though they carry the weight high, they are still quite handy to keep the front end on the ground when using mounted implements. Since most machines had these, they are still relatively easy to come by and worth the time to find. Very early Bs had weights that hung from the arched front axle. These are more difficult to find.

Traction

The ability to make the little tractor work depends greatly on the quality and setup of your rear tires. If your machine came with marginal rear tires or they have no added weight, it is likely you will not get the traction necessary for even small jobs with a drawbar implement or plow. Remember that when the 1951 B was tested at Nebraska, it required 1750 pounds of extra weight to achieve its horsepower rating and slippage percentages. The calcium chloride solution recommended by AC can still be purchased from most rural tire dealers. Frequently they can come right out to your place and fill the tires (this is preferable to hefting a filled 24 inch tire on the back of your truck for the trip home from the tire store). Do not use radiator antifreeze in your tires, it is not only illegal in most states, but could really destroy a good garden for at least one season if you lost a tire full while working.

When you use the Calcium solution, be sure to take care of any leaks immediately. It will begin to rust the rims literally overnight if it starts to seep from the innertube.

Safety

It is impossible to say enough about safety with old tractors. I can only compare it to my 100s of thousands of miles of riding motorcycles. If one does not retain that healthy fear, respect, and constant vigilance, one should not do it. Old Timers were constantly telling me, "once you lose the fear, park it and don't get on it again.

Older tractors cannot be retrofitted to be as safe as a modern machine with off-the-shelf components... they do not exist and will not. It is too expensive for aftermarket companies to retrofit the engineering

necessary. There is simply not enough profit margin to cover the liability. You may be able to build acceptable safety margins into the machine but chances are you are not an engineer and your concepts and designs will remain unproven until it really counts. Do what you can to improve the safety of your machine, but in the long run the following partial list of hints may also prove helpful (these tips actually apply to the new "safer" machines also):

- **Drive the tractor by yourself** - No riders and no one even near. The safe distance must even increase further if you are using the PTO. With many tractors of the B, C, CA, and IB vintage, you cannot even run the hydraulics without the PTO engaged so their use mandates a solo performance (not even a spectator). When you are done with the job, go get the family and show them the results, that will keep the day a good and happy one.
- **No side hill operation** - It sure seems that all tractors were designed with acres of flat land in mind. They tip over quickly enough that jumping off is a nice dream but nothing more. It is absurd with the reflexes God provided. Ain't gonna happen, so you have to plan ahead and just not do it in the first place. You have probably heard stories about people who have flipped and "jumped" off. Being thrown off and lucky enough to land where you won't get crushed is not quite the same thing as "jumped" to me. Also, don't be misled into thinking that a wide front-end will eliminate this problem.
- **Watch your mounted implement weight** - Even with front weights and a disk that was designed for the tractor, I have brought the front wheels off the ground when going perpendicular to the incline of a hill. Be ready to drop the implement at any time by releasing the hydraulics.
- **Do not pull immobile or sliding loads** - If you want to pull stumps, you need a backhoe or a big crawler, not a wheel tractor. As far as sledding or dragging loads, they can hang up unexpectedly and flip the tractor. An old fellow in the valley took me into his barn to show me his only vintage tractor among many large modern production machines. It was a Ferguson TO-35 in all original shape and he told me it was his fathers. I was noticably impressed and excitedly asked him if he was going to restore it someday. He just said "nope" and pointed to a bend in the steering wheel and told me "That's what killed my father". He proceeded to tell me how his father had a sled for carrying firewood and it simply dug in one day. We didn't say much more as we walked from the barn and I had a strong feeling that he was teaching an upstart know-it-all tractor restorer a valuable lesson. Possibly one that saved my life!
- **Don't drive among trees and stumps** - These tractors have more torque than you expect. When the rear wheels get stopped, the front end will come up. Getting the clutch in fast enough may not be possible. They also have no qualms about climbing right up a stump and tipping over.
- **Don't let anyone under a load held up by hydraulics** - A hose can break, a valve can let go or a seal can fail. The load will come down and with a vengeance.
- **Read the owners manual** - Even though they were written long ago, they contain many valuable safety tips (don't fuel when hot, don't get off the tractor with the PTO running, how to hold a crank). In fact, many of the older books on agriculture are valuable sources of safety information. They stressed safety due to high farmer mortality rate prior to the invention of the common safety features found on today's tractors.

If it seems this section is all gloom and doom, remember that the use and/or restoration of tractors should add enjoyment to your life. There is no better way to add enjoyment than to never have a tragic accident.

11. Tune-up Data, Quantities, and Specifications

B (101 - 64501)

(applies to IB of same years)

Engine Model: BE
Engine Number: BExxxxxx (on right rear cast mounting flange of block)
Ignition: Magneto, FM & FMJ, WICO X, Clockwise Rotation
Points: Gap .020
Valve Adjustment: Int & Exh .010 Hot

Generator: DR 1101357, 1101413, 1101363, AL GGR4801, GBM4823, GAS4169, GBM4816, Cutout DR 150T w/ DR150R Res.
Starter: DR 1107043, 1107096, AL MAW4031
Spark Plugs: Gap .035, AC R45, Champion J8C
Carburetor: Z161J7, Z61AJ7, MS TSX154, MS TSX305, MS TSX470, MS TSX486
Timing Mark: On Flywheel, TDC is line with F
Idle Speeds: Rated 1400, High Idle 1850, Low Idle 400-500
Firing Order: 1-2-4-3
Oil Filter: NAPA 1101, WIX 51101, Cap. 4 quarts with filter change
Engine Description: 4 Cyl, 3 1/4 Bore, 3 1/2 Stroke, 116 CID, 94 psi (gas), 84 psi (low octane)
Horsepower: Drawbar: 10.31, BHP: 14 (on Distillate Fuel)

B (64501 and up)

(applies to IB of same years)

Engine Model: CE
Engine Number: CExxxxxx (on right rear mounting flange of block)
Ignition: Magneto: FM & FMJ, WICO X, Battery Ignition Dist.: DR 1111735,1111745 w/points DR1HV or DR9HM, Cond. DR22, Cap DR67, Rotor DR50, Clockwise Rotation
Points: Magneto Gap .020, Bat. Ign. Gap .018-.022
Valve Adjustment: Int & Exh .010 Hot
Generator: DR 1101357, 1101413, 1101363, AL GGR4801, GBM4823, GAS4169, GBM4816, Cutout DR 150T w/ DR150R Res.
Starter: DR 1107043, 1107096, AL MAW4031
Spark Plugs: AC R45, Champion J8C
Carburetor: Z161J7, Z61AJ7, MS TSX154, MS TSX305, MS TSX470, MS TSX486
Timing Mark: On Flywheel, TDC is line with F
Idle Speeds: Rated 1500, High Idle 1850, Low Idle 400-500
Firing Order: 1-2-4-3
Oil Filter: NAPA 1101, WIX 51101, Cap. 4 quarts with Filter Change
Engine Description: 4 Cyl, 3 3/8 Bore, 3 1/2 Stroke, 126 CID, 115 psi (gas), 99 psi (low octane)
Horsepower: Drawbar: 15.66, Belt: 21.17

C (1940-1950 all)

Engine Model: AC CE
Engine Number: CExxxxxx (on right rear mounting flange of block)
Ignition: Magneto, FM & FMJ, Clockwise Rotation, WICO / Battery Ignition, Dist. DR 1111735,1111745 w/points DR1HV or DR9HM, Cond. DR22, Cap DR67, Rotor DR50
Points: Magneto Gap .020, Bat. Ign. Gap .018-.022
Valve Adjustment: Int & Exh .010 Hot
Generator: DR 1101357, 1101413, 1101363, AL GGR4801, GBM4823, GAS4169, GBM4816, Cutout DR 150T w/ DR150R Res.
Starter: DR 1107043, 1107096, AL MAW4031
Spark Plugs: AC R45, Champion J8C
Carburetor: Z161J7, Z61AJ7, MS TSX154, MS TSX305, MS TSX470, MS TSX486
Timing Mark: On Flywheel, TDC is line with F
Idle Speeds: Rated 1500, High Idle 1850, Low Idle 400-500
Firing Order: 1-2-4-3
Oil Filter: NAPA 1101, WIX 51101, Cap. 4 quarts with Filter Change
Engine Description: 4 Cyl, 3 3/8 Bore, 3 1/2 Stroke, 126 CID, 115 psi (gas), 99 psi (low octane)
Horsepower: Drawbar: 14.15, BPH: 21.83

CA (all)

Engine Model: AC CE
Engine Number: CExxxxxx (on right rear mounting flange of block)
Ignition: Magneto, FM & FMJ, Clockwise Rotation, WICO / Battery Ignition, Dist. DR 1111735,1111745 w/points DR1HV or DR9HM, Cond. DR22, Cap DR67, Rotor DR50
Points: Bat. Ign. Gap .018-.022, Mag. Gap .020
Valve Adjustment: Int & Exh .012 Hot
Generator: DR 1101357, 1101413, 1101363, AL GGR4801, GBM4823, GAS4169, GBM4816, Cutout DR 150T w/ DR150R Res.
Starter: DR 1107043, 1107096, AL MAW4031
Spark Plugs: AC R45, Champion J8C
Carburetor: Z161J7, Z61AJ7, MS TSX154, MS TSX305, MS TSX470, MS TSX486, MS TSX670, MS TSX701, MS TSX815, MS TSX844, MS TSX912, MS TSX931
Timing Mark: On Flywheel, TDC is line with F
Idle Speeds: Rated 1650, High Idle 1950-2075, Low Idle 400-500
Firing Order: 1-2-4-3
Oil Filter: NAPA 1101, WIX 51101, Cap. 4 quarts with Filter Change
Engine Description: 4 Cyl, 3 3/8 Bore, 3 1/2 Stroke, 126 CID, 115 psi (gas), 99 psi (low octane)
Horsepower: Drawbar: 17.83, Belt: 22.69