

**PS**  
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**THE  
PREVENTIVE  
MAINTENANCE  
MONTHLY**

1951 Series

ISSUE 14



**BULLDOG  
EDITION**

# BE SELFISH WITH THIS TANK



Let's face it now, this is another one where it's more to take you and to get to where you'll need to shoot at somebody who's shooting at you.

If you gotta go, get in the first shot, and get back in time for dinner, you'll have to keep your fighting well fed, well groomed, and in general good health. You take the best care of yourself when you take care of conditions that affect you.

This, as President Eisenhower said a few weeks back, is the sort of thing we call "enlightened self-interest."

The special issue of PE Magazine is to help you take care of some of those conditions. As your newspapers and magazines tell you what goes on in the world by the day and week, PE is your month-to-month technical newsmagazine of what's happening with your equipment between issues of TMs, TRs and other references.

Nearly all of what's in this issue is new since TM 9-730 (June 21). In fact, there's so much new during all the time a vehicle like the T41 is proving itself in production. Ordnance is ready to give you all kinds of help when and where you may need it.

Wherever there's a T41 you'll most likely find Ordnance Corps Technicians, Ordnance Inspectors-Inspartners, and/or Cadillac service representatives who are ready, willing, and anxious to answer your questions, get you service on parts that may not be listed in the Supply Catalog you have on hand, and keep you posted on special tools and equipment you'll need for special situations.

It's up to you to take full advantage of all this help. Read what's here before you ride. Be selfish. Be enlightened. Learn how to get where you're going and get back again.

## attention major unit commanders

This issue of PE Magazine is devoted entirely to the Light Tank Family of vehicles and will be of greatest use to units whose mission will include some relationship with the M series tanks. Others will find the issue useful for orientation only. You'll want to plan

a special distribution to get the most copies to where they will do the most good. Each crew member should have a copy for ready reference, and one of the special data cards should be kept handy for use when starting and running tanks.

## KEEP OUT OF TROUBLE

Avoid walking on lathings—they bend

Avoid stepping on battery covers—they shatter

Avoid stepping on engine fan shroud—you'll hit the fan

Learn to open transmission cover doors w/ a nut to smash your fingers

Learn to open battery cover doors w/ a nut to smash your fingers

Don't let fuel flow into a tank—you don't want fuel and fire in the bilge

Adjust air cleaner doors to avoid fire and low air-pressure for you

Keep a vent open when the heater's running—you'll both breathe easier

Sound by with an extinguisher when the tank's being gased

Sound by with extinguisher when the tank's started



### TANK NUMBER

First thing to get acquainted with is the number on your tank. Most of what you'll do with this tank and to it, in operation and maintenance, will depend in some way on when it was made and what's already been done at the factory, in the field, or in the modification depot. Most directions you'll get will deal with groups of tanks in the same family, by blocks of numbers.

The early models #1 thru #217 (if not yet modified) have the number on the outside hull, behind the right handloop.

Later model numbers are stamped on a 5x11 plate mounted at the top-right of the rear hull plate. The number on the top-right is the Janssen-Bohannon's number.

# TURRET

## HOW THE T41E1 TURRET OPERATES

**T**HE T41E1 turret is very similar to the M3C. You can traverse the turret by hand or by power, but the gun can only be elevated by operating a hydraulic pump.

Here's a run-down on how your turret should be operated:

1. If the gun is in the TURRET position, before you try to move anything that connects the gun barrel lock, disengage the wing nut and raise the upper part of the base from the gun barrel. (The contents inside the turret include the gun to clear the lock, then

close the lock cover, tighten the wing nut, and swing the upper deck until it's engaged in the spring-loaded lock.)

2. Check the oil in the oil-gauge reservoir. The filler cap with attached dipstick is under the instrument's seat (Fig. 3). It should be up to the FILL mark at all times.

3. Check the turret-traverse lock. Turn the handle clockwise to unlock. (When locking the turret, you either the turret-traverse lock or the gun-travel lock—these both at the same time because it takes loads to lugging up the turret-traverse lock.)

4. Turn on the motor switch in the driver's compartment.

5. Before operating the turret by power, remember: The batteries won't last long if the turret is operated without one of the engines running. If your battery charges, use the auxiliary engine. If you're going to check the tank within a short time, start the main engine and keep it revved up to 1000-rpm. Also be sure the vehicle is located where the turret can be traversed without the gun causing any difficulty.

6. Now look at the traverse cable switch on the turret, sitting forward of the cable. It must be OFF (Fig. 2). It's on when its red light is lit. This switch is for the leader to set the turret's traversing power whenever he needs to go behind the gun to get ammunition from the hull.

7. Turn on the AUTOMATIC switch located on the





the control bar, or the indicator to the right of the gauge (Fig. 3). Against light above the control lights when the switch is on (the automatic switch and the master interposition must be on to start the training mode).

4. (After engine is shut off to left of the gauge's handle is the POWER position. Now you're ready to pump power to the tank.)

5. To turn the turret left, rotate the gauge's handle handle to the right; to go right, rotate the handle left. To adjust the handle is used regulates the speed of the turret.

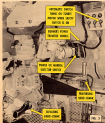
To go from power to manual operation, all you have to do is to flip the toggle switch from POWER to MANUAL and reverse the turret with the hand crank. (When in this manual position—only the gauge can reverse

the turret—the commander's handle is dead as far as operating the turret, but it still has the power to fire the gun.)

However, it controlled by the hand-chocking pump. To chock the gun, crank the handle clockwise—in lower the "N" crank is counter-clockwise. If the chocking-pump handle works spongy and doesn't control the gun effectively, you must pressure into the system by pumping the hand supercharge-pump that's located to the right of the gauge's seat. Two or three strokes is usually enough. While pumping, turn the hand-chocking pump at the same time as you can "feel" when the gun chocks OK. Never over-charge the system or you'll blow the sleeves out of the pump. You can tell

overcharging when the chocking pump handle begins to freeze up.

The commander's override handle lets the commander reverse the turret only when the power is in POWER circuit. By separating the switch on the back of the handle the commander takes control away from the gauge, and he rotates the handle to reverse the turret. The commander cannot reverse manually or chock and depress the gun—only the gauge can do this.



## A Word About

### HYDRAULIC ACCUMULATOR-PRESSURE

Hydraulic accumulator pressure must be kept up to 800 psi<sup>2</sup>. When you first get your fork, alternate and depress your gun a couple times. If it's slow to raise, stroke the hand-supercharge pump (it's located to the right of the gunner's seat). If the pump doesn't help much, chances are the accumulator pressure is down.

Have Ordnance regulate the accumulator pressure, and then keep your eye on the pressure for a few weeks until the system is broken in—need to make sure no leaks develop.

Then take Ordnance check the pressure every month thereafter.

<sup>2</sup>ounds per square inch.

## Bleeding Gun-Elevating Hydraulic System

**A**ll in the line of the hydraulic gun-elevating system causes jerky action in raising and lowering the gun and contrary gun position. Correct this by bleeding the lines in the system.

**Don't forget this:**

1. Use the hand-elevating pump, stroke the gun to maximum elevation before tight against the stop, and lock it in the position.

2. Open the valves on each side of the dual-valve and the bleed valve on top of the elevating control (Fig. 4).

3. Pump the hand supercharge pump until a good stream of oil without air spurts comes through all three valves. (Don't force spurts too fast if you can get them, so that oil can be caught in a chamber instead of spouting all over the fighting compartment.)

**Note:** Don't stroke gun during bleeding.

4. Close all three valves when pumping hand pump.

5. Depress and elevate the gun several times with

the hand elevating pump, making certain supercharge pressure is about the gun's maximum elevation and maximum direction.

6. If the gun continues to move erratically, there's still air in the system. Repeat the bleeding process and test again.

**Note:** During the bleeding operation, oil level in the reservoir must be kept at proper level.



# T41E1 turret trouble-shooting

## TROUBLE

TROUBLE	REASONS TO CHECK				
	1	2	3	4	5
1. Motor will not start.	1	2			
2. Turret will rotate only one direction.	2	3	4	5	1
3. Rotations in one direction.	3	4	5	1	2
4. Sluggish in loading.	4	5	1	2	3
5. Sluggish or jams in one direction.	5				
6. Large back-lag during rotation.	6				
7. Low rotation in high elevation loading rate.	7				
8. Stop-and-go rotation with gear on.	8	9	10	11	12
9. Gears which do rotate don't move.	9				
10. Turret rotates under spin.	10				

## REASON

TROUBLE	REASONS TO CHECK				
	1	2	3	4	5
1. Gun stops.	1	2	3	4	5
2. Turret rotating very slowly.	2	3	4	5	6
3. Rapid loss of lubrication.	3	4	5	6	
4. Gun vibrates and does rattle.	4	5	6		
5. Gun stops (rotates) after rough terrain operation.	5	6	7	8	
6. (After on land) shooting jams in high after rough terrain operation.	6	7			

## TROUBLE (CONT)

1. Low rotation in signal mode.  
(Check connections.)
2. Bad loading pump.  
(Check connections.)
3. Low gear-tooth contact.  
(Check wear and adjust.)
4. Worn or faulty bearings.  
(Replace bearings.)
5. Dirty gear-tooth contact.  
(Replace teeth - check after wear for alignment and add lube within 2 minutes.)
6. Faulty rotation.  
(Check all loader's safety switches, beam being rotated in 90° position, check to see if electrical system is positive.)
7. Excessive vibration between motor and balance of system by spreading load with bearings shall only if OK, make it acceptable in test-bed, shall.

1. Check electrical start for battery.
1. Check differential pressure 5 to 10 mmw index.
2. Check valve longer 1/4 pressure valve.
3. Adjust venting.
3. Check for air.  
(1. Not valve shut or leak.  
2. Following per start-up form.)
4. Relief valve is too high, water or too low. (Check in higher pressure.)
4. Check seal in handle all in handle.
4. Worn or out of alignment.
4. Insufficient clearance.
4. Faulty gunner's handle.
4. Faulty commander's handle.
4. Possible signal motor trouble. Check by turning off loader's safety switch and turning on commander's. When gunner's handle is right and left. Loader for signal mode or you do this. If OK, signal motor can be fixed in operation in test direction.

## TROUBLE CHECK

4. Insure shooting operation for check of valve-tooth contact.
4. Insure shooting operation without vibration... Check vibration.
4. Re-check for lube after check of M and BE. (Repeat.)
4. Check valve is stuck - clean out or replace.
4. Recheck (see lube) (Repeat.)
4. Check system.
4. Supercharge pressure is low - Pump hand supercharge pump.
4. Bad venting/pump has lube.
4. Accumulator pressure (M) is low - complete M and B, change.
4. Accumulator bag has lube.
4. Hand supercharge pump has lube (Repeat.)
4. Gunner pistol points in shooting operation (Right up or repeat.)
4. Adjust seal vibration.
4. Check sighting equipment for movement.
4. Check for vibration issue in site correction.

Note: Naturally, have reference to the others that are out of your section.

## how the T4IE2 turret operates

The only difference between the T4IE1 and the E1 is the turret-control system. It's known as the Cadillac turret control, covering and elevating system—designed for simple operation and maintenance, and to give you more ammunition space in the turret.

Here's how it should be operated. As with the E1, the turret must be released before the turret can be moved. The turret lock is the same as the E1's, but the turret lock has been changed. It's in front of the gunner, ahead of the traverse gear box (Fig. 1). To unlock the turret, pull the handle out, disengage the splines, turn the handle to the left about 45-deg, and re-engage the handle into the splines. To lock the turret, turn the handle to the right and do the same. If the lock doesn't engage, traverse slightly with the hand crank until they do. As with the E1—the turret lock and the gun travel lock should not be used at the same time.

Before traversing, make sure the engine grill-door is closed, and that any loose goggles around the basket are out-of-the-way. And it's a good idea to hand crank the turret before power traversing—just to make sure the turret isn't locked. The turret limit is the same direction as the crank.

To power-traverse, follow these steps:

Turn ON the master switch and start one of the engines. The traverse motor is only 1½ horse, but it still draws enough amps from the batteries to war-

ren't steady unloading.

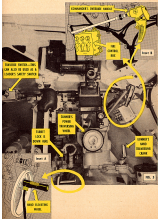
Turn on the traverse switch (located on the turret ceiling above the gun hood) to start the traverse motor. This switch also acts as the loader's safety switch so he can cut the power when he needs to.

Now, turn the gunner's power-traverse wheel, which is mounted on the turret box in front of the gunner. Turn the wheel to the left to traverse the turret to the left. Turn right to traverse right. When you turn the wheel slightly, the turret will barely creep. The more you turn the wheel from its neutral point, the faster the turret will traverse.

To elevate or depress the gun, there's a handwheel mounted on the side of the gun hood (Fig. 1—Item A). Turn it clockwise to lower the gun and counter-clockwise to raise it. (Traction fingers on the wheel let you get the lines you need to operate the gun up or down.)

The gunner's firing trigger is located on the elevating handle. Before pulling the trigger to fire, first set the 70mm. or cal. 30 switch on the fire control box to the ON position.

Since the commander has a better view of the country-side than the gunner, he's provided with a set of controls that let him override the gunner's controls either to elevate or traverse if he spots a target that the gunner can't see. The commander's controls are all incorporated in a single photo-type



hand is moved on the ceiling forward of his back (Fig. 1—last E).

Here's how it works:

To override the gunner in elevation, the traverse switch must be set in override in elevation, the ELEVATION switch on the fire control box must be on. The turret will traverse in the direction the hand is moved—traverse speed depends on the distance you move the handle. The mechanical linkage from this handle to the gunner's wheel is designed so the gunner will know he's being overridden—he will feel the force of the override in the action of his traverse wheel. On the E,

the override makes the gunner's controls precession, but with this mechanical override on the E, the gunner is instantly aware of the commander's action and can more readily follow the new situation. No more "dead-end" feeling and momentary confusion about "what happens!" Even when the gunner is traversing or elevating with the hand crank, the commander can override its power without losing the manual controls.

To override the gunner in elevation, or to elevate the gun, move the same handle forward to elevate and backward to depress. Commander's elevation control has one constant speed.

## AUTOMATIC BLEED ON REPLENISHER CYLINDER

On tanks with Manufacturer's No. around 1300 and under, you'll need to keep an eye on your gun-replenisher-cylinder bleed-hole. It's located on the cylinder between the top mounting-strap and the oil-service instructions, or where the oil-service instructions should be (Fig. 8).

This hole must be open at all times

to let air out when too much oil pressure develops. When it's plugged, air plus oil stays in the cylinder, causing excessive pressure and interfering with the gun read action. To watch it if you're using a paint brush in this vicinity and it gets clogged, also has pointed over the hole, open it with a piece of wire.



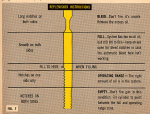
## REFPLENISHER-CYLINDER INDICATOR-TAPE

The tape chart located at the rear of the replenisher is your guide as to how much oil is in your scroll system. Markers have been put on at markings so it can keep you posted even in the dark—just feel it and it'll tell you where you stand. That is, if you know what the markers mean. If your tank doesn't have an instruction plate on its replenisher cylinder, paste this strip on (Fig. 7) so you can be kept posted.

If you don't have enough oil, first remove the filler plug from the replenisher, and the needle from your filler gun. Fill the filler gun with OIL-A, screw the hose on the filler gun into the filler-plug hole loosely, push the plunger

slightly to force the air out, screw the hose tight and force the fluid into the replenisher.

If you have too much fluid in the system, remove the filler plug on the replenisher. Hold a rag under the filler-plug hole and let the rag absorb the oil being drained. Push in on the ball valve in the filler-plug hole with the needle of the filler gun so the fluid will flow out of the replenisher, and use gradual pressure on the ball valve to control the amount of oil flow. On tanks with Manufacturer's Serial Nos. 1988 and up, a valve was added to the top of the replenisher cylinder. To bleed, just open the valve and catch the oil.



## Compression Fittings

It's a natural urge to take a wrench and tighten a fitting when you notice it's leaking—but keep your muscles off the tube fittings in the correct hydraulic system. These are not like gas-line fittings. These are compression-type fittings that you should pull up only to two psi snug when you put 'em on. If you see any leaking, tighten it finger-tight and then no more than 1/4 turn. If it still leaks, all the tightening in the world won't stop it—you'll need to make a new connection (if the tube's long enough) or replace the tube.

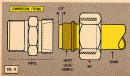
You can use the compression-type fitting over and over again without losing its sealing qualities if you'll only use it properly. Only its seal (shoulder) should be replaced. If you've got to replace a piece of tube to stop a leak, first remove the old tubing and remove the fitting carefully. Then cut off the embedded ferrule (if you're going to use the same piece of tubing).

Next, get a nipple part of a compression fitting and grip it in a smooth-jaw vice. This is a device to prevent all your compression ferrules in the right plane on the tubing. Keep in mind—the same nipple can be used as a fixture for putting up six sleeves, but then it should be used for a final assembly in the correct because more than six "settings" may distort the seat in the nipple.

Now place the nut and the ferrule on the tubing so that the shoulder end of the sleeve is facing the threaded end of the nut (Fig. 8). Cut the tubing off square and remove all burrs.

Lubricate tubing and ferrule with light-weight oil. Next, slide the tube into the nipple (shoulder to the flange) and turn the nut finger-tight. Then press the tubing into the fitting firmly so that the ferrule and the shoulder bite into each other.

Tighten the nut with a wrench, but no more than 1/4 to 1/2 turn. That'll





press the handle on the racking. Then loosen the nut, remove the spring from the firing, and check the handle's clearance from end of tube. The distance should be approximately  $1/4"$ , but not less than  $1/16"$  (Fig. 9). If it's on OK, it's ready to be put into the gun.

When working in case the nipple is too tight, tighten the nut on the firing only hand tight. Then, using an open-end wrench, tighten the nut no more than an additional  $1/4$  turn.



## HAND-FIRING HANDLE ON THE 76mm

One of the quirks on some of these tanks is that the hand-firing-control handle on the 76mm gun slide in the FWC position, it should always return to the OPEN position.

To stay on the safe side, before firing your piece check up on the handle and make sure it returns to OPEN as it should. If it has a hard way to stick, or if the cam doesn't clear the follower when it releases position, you'll need to move the cam on the handle as shown in Fig. 10. Here's how to do it:

1. Remove the cap-screws that hold the control handle to the gun cradle and take off the handle.
2. Now remove the stop ring from the handle.
3. Next remove the cam from the handle structure and move the cam two serrations ( $15^\circ$ ) clockwise (looking from the cam end) from its original position.

4. Put back the stop ring.
5. Reinstall the handle on the gun cradle, put back the screws and tighten them to about 24 ft. lbs. torque.

When you've done all this, try the gun again and see if the handle works.



# SUSPENSION

## OIL, NOT GREASE

The late order to TM 9-730 (Just 10 says to lube the suspension with grease.... but a revision to improve the tank's suspension changed this. Re-glazing with Manufacturer's No. 101, all the suspension-bearing surfaces and the suspension-bearing mountings hold oil instead of grease. Plug the track-wheel hubs and support rollers are decreased with two plugs so that one plug is usually on top. Now, instead of poking around the suspension with your grease gun like the late order says, you'll have to use a 1/4" Allen wrench to remove the filler plugs and fill the cavities with oil.

On tanks with Manufacturer's No. 1113 and up, the Allen plugs were changed to hex-head plugs, so you'll need a wrench.

When pouring oil into the hubs, particularly the track-support roller hubs, give the oil enough time to fill all the cavities because the diameters are close enough to cause some oil restriction. Each road wheel takes about 13 ounces. Compensating-wheel hub, compensating-lever and suspension-bearing-mountings each hold 10 ounces. The track-support-roller hubs take 4 ounces each.

The oil in these pockets should be checked every 100 miles to be sure it's kept at plug-hole level. In the double-plug hubs, always remove the plug that's on top for your check. If no oil comes out, rotate the wheel to get the plug on a line horizontal with the ground. If oil still doesn't come out, rotate the wheel till the open plug is on top again and add OIL. oil to run out.

### Know & Keep From A Drip

Can your eye around the external areas of the bearings every 50 miles and note the amount of oil seepage. If you see a little oil, it doesn't mean the seals need to be replaced. Here's a guide as to how much oil you can lose and still be on the safe side.

Run the tank a while, then stop and put a piece of paper under the leaky seal. Let it sit for three minutes. The puddle on the paper must not be bigger than 6" across (no diameter 6 1/2") when you have it under the road wheel, suspension bearings or compensating axle. And a puddle 3" across (no diameter 3 1/2") under the track-support rollers. If your puddles are larger than that, the seals should be replaced.

If it's your tough luck to inherit one of these leaky old seals, replace your replacement seals and spacers by the numbers in ORD 7 SNL G251 and also by stating the tank's Manufacturer's Serial Number on your requisition. You get the best seal out of the assemblies with a drift and hammer after removing the assemblies.

To install these new face-type seals, the seals you'll need are listed on pages 662 and 663.

## TRACK ADJUSTMENT

The track for the T41 is the 34-link T5E3 track—used for proper adjustment, the sag between the first and second track-support rollers should be  $\frac{1}{2}$ " to 1".

It's checked this way: Drive forward, and coast to a stop without using the brakes. Then place a straight edge on the track and measure the sag midway between the rollers (Fig. 11).



If the sag is more than 1", the track needs adjusting. Loosen the adjusting-nut stop at this point. It's a good idea to clean the mud and dirt from the nut threads and give 'em a smear of grease), then turn the adjusting-nut either clockwise to tighten the track, or counter-clockwise to loosen the track. When you think it's about right, drive the tank forward, coast to a stop, and retighten the sag. Keep this up until you've got that  $\frac{1}{2}$ " to 1" adjustment. After you've got it, place the nut stop back in its original position—make sure the locking plane is well seated against the adjusting arrow—and tighten the bolt.

Now take a look at the clearance between the adjusting nuts and the sprockets (Fig. 12). It should be .005" or

more. If it isn't, the adjusting nut will work loose, get caught in the track, and all hell will break loose. This .005" minimum clearance is a must—to keep tightening the nut until you get it.

On new tracks, the sag may be less than the  $\frac{1}{2}$ " minimum a long-time eyeball from watching the adjusting nut. But running new tracks tight isn't harmful—they usually stretch to proper sag after a few miles of operation.

And in case you're wondering: Having more shoes in one track than the other will not affect the operation of the tank in any way as long as each track is adjusted right.

Another tip that'll keep the adjusting nut and sprocket from being a could-be sore spot: Out in the classroom (and you know Nasser, boy) the nut and bolt get an urge to run and rock, making track adjustments a bit difficult. So every time the track is broken, loosen the adjusting-nut stop, back off the nut and pack nut and threads with grease (Fig. 12). Take care not to fill the nut so full that the expansion plug gets pushed out when it's turned back in the sprocket.



## TRACK PIN INSTALLATION

**W**HEN connecting track shoes, has remaining hours the right-sided wonder pin been trying your soul? Maybe you're using the wrong method, or the wrong track-jacks.

It's possible to install track shoes at several different angles because of their octagonal-shaped bushings. Only one angle is correct... the one shown in Fig. 13. And this angle is necessary to keep stresses and wear to a minimum—it also cuts down hard work when you connect and disconnect the track.



This is the best way to disconnect the track.

1. Remove track tension.

2. Install two track-jacks (Fisher #12-2895-02) to the inside of the track, between the compensating and front end-links.

3. Now use a straight edge on the shoes along-side the jack.

4. Draw track together until the center of the "Y" is 1/4" from the straight edge (Fig. 13).

5. Remove safety pins and washers at each end of the pin between jacks.

6. Remove slusher of pulley #12-2873-01 or pin track and pull pin from beam.

To connect track the right way:

1. Install two track-jacks to tracks.

2. Draw the track together until you get the 1/4" measurement.

3. You're now ready to drive the two connecting-rod in place. Turn the two bushings the proper way

though for a 27° connect amount to rotate and slide the pin at one point to each bushing... the oil "see a bigger hammer" idea will run one or two times as well as a job. As the pin is driven in and breaks the next bushing, rotate the pin with the wrench, get it lined up with bushing, then tap it lightly with the pulley or hammer.

4. Tighten pin nuts to 200-250 ft lbs torque (Always tighten pin nuts before removing jacks.)

5. Remove track-jacks and adjust track to 1/4" to 1" sag between front and center track-support rollers. (Originally track jacks #12-2895-02 is a new design, it's different than the one shown in Fig. 13). If jacks carrying around any other type than what's mentioned here, regardless a new set, (and you get your new set, use track-jack #12-2895-02... it's the one used on the RC).

**Note:** After the first few miles of operation, tighten pin nuts to at least 100 ft lbs torque. They'll loosen from pin.

## COMPENSATING WHEEL WEAR

**A**fter the preventive check done while the track's off is switching the compensating-wheel align. The track's center guides check the outer-disk guide-flange and make it wear more rapidly than the inner-disk flange (Fig. 14). And any distortion of the compensating wheel or linkage will rock the wheel, increasing the wear on the outer disk.

To get the most use out of the compensating wheel, it's smart to equalize this wear. Put "inner" disk on "outer" side, and vice versa, every 1000 miles.



## TERSON BARI and ANJOLIE

**W**hen replacing a broken tension bar, the mating anchor should always be replaced because the bar and anchor often take each other's shape while they're mated. For this reason, the serrations on a new tension bar won't always mate properly with those of the used anchor. Also, the anchor is usually damaged some, even though you may not see it.

Tension bars are marked with an arrow and a part number for identification. Plus, to cut down backlashes, the bars are now also being marked with a dot of color on the outer ends (Fig. 11).

To quote a gentleman in the Red Country: "You don't have to beat a gun to install a tension bar. Some guys don't change the anchor and don't index the blank space on the bar with the square tool in the anchor, don't they wonder why it takes anyone who's with a 10 lb. sledge to run her home."

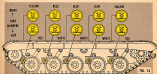
He goes on to inform us, "Here's the easiest and also the correct way. First,

replace the anchor and keep its plain base. This'll allow for any misalignment of the support mountings.

"Next, make sure you've got the right bar, then groove the serrations at each end and shove the bar thru the support arms opening and into the tank. Turn the bar so the lower serration's black tooth is on top (it's black) and lines up with the anchor's black tooth. Push the bar lightly until these serrations just meet.

"Now raise the support arm until its black tooth lines up with the bar's upper serration's black tooth. When they're aligned, the bar should slip home and seat itself with a push of the hand. If you're a little weak on the push, tap the bar lightly with a piece of wood. When the bar's in place, keep the suspension arm supported until the cap and retaining bolts are installed.

"When handling bars avoid wearing them—scratches and burrs cause 'more oscillations' which in turn cause premature failures, which in turn means more work."



# Wheel Bearing Adjustment

There's been a change in the bearing adjustment as it was originally given in TM 9-750 (para 11). Here are the new specifications, by the numbers.

## With a torque wrench:

1. Raise wheel off ground.
2. Remove hub cap, grease, static spring and center pin.
3. Tighten the nut to 200 ft-lbs torque.
4. Back off nut to zero.
5. Tighten the nut to 75 ft-lbs torque, if parts are old—90 ft-lbs, if new.
6. If you stop at the pin hole—pin it; if not, back off to nearest center-pin hole.
7. Insert center pin, static spring, grease and hub cap.

## Without a torque wrench:

1. Tighten nut good and tight.
2. Back off nut till wheel spins freely.
3. Spin wheel and tighten nut till wheel drags slightly.
4. Loosen cone-pin hole, then back off nut till hole is clear.
5. Insert center pin, static spring, grease and hub cap.

Speaking of a torque wrench . . . you'll get accurate torque readings only from free-running, lubricated threads. If threads are jammed, bogged, or rusted, your reading can be as much as 100% wrong—and usually is. Clean and oil the threads.

## pairing-up bearing cones and cups

You can get a failure in road wheels, final drives, track support rollers, wheel-roller support, and suspension wheels when bearing cones and cups are not checked to be sure they pair up (Fig. 14).

For best service, bearing-cone-and-cup combinations should be put together from bearing cones and cups made by the same manufacturer. For example, use Inyatt bearing-cones with Inyatt cups, New Direction bearing-cones with New Direction cups, and Timken bearing-cones with Timken cups. You'll see their name stamped on the parts.

This should be standard practice when installing all bearings because of the possibility that there might be a slight difference between parts.



FIG. 14

## REPLACING ROAD WHEELS

When using wheel lites H12-1390-300:

1. Loosen, but don't remove, the wheel nuts.
2. Install the lites with lower bolt-end facing the front of the tank and upper end snug against the main-wheel support arm.
3. Drive the tank forward slowly. Both ends must engage properly. Stop tank when lites is vertical. **Caution:** Make sure you and everyone else are clear of the lites—if both ends aren't engaged properly, the thing will come flying out from under like a hot seat of Halo.
4. Now take all the tank nuts and remove the wheel.
5. Put on the replacement wheel, in-

stall the nuts but **don't** tighten.

6. Drive tank backwards until it's free of the lites. Now tighten the nuts from 250-300 lb-ft torque. (If a torque wrench isn't available, tighten the nuts till they're good and tight, back off about two turns, then retighten.)

When wheel lites aren't available:

1. Get yourself a piece of 2x4 about a foot long.
2. Place it next to the lower edge of the tank, under the support arm of the wheel to be removed.
3. Place a completely lowered hydraulic jack on the 2x4 so it'll be in the center of the arm when wheels are up.
4. From here on, do like you'd do if you'd had a lites to begin with.

## sensitive track-static-wires

**T**HE M1's track has a 14-gauge static-grounding wire to snare track leakage to ground the track pins. This prevents radio interference caused by track static electricity (Fig. 17).

If you do any electric welding on the tank, avoid using the track for the ground connection—electric welding often involves current as high as 150 amperes which will burn out 14-gauge,

0.080" diameter wire. And when doing any welding on the turret, never connect your ground to the hull—this would cause arcing of current thru the turret race and supporting ball-bearings.

Find yourself some expedient surface as close as possible to the area being welded, and make your ground connection there. But **please** don't use the track.

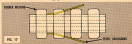


FIG. 17

# ENGINE



## Continental 405-896-3 engine data

### ADJUSTED DATA

1. Revolutions of crank speed (3000 rpm)..... 420 (300)
2. Engine normal speed—full load..... 3000-3200 rpm
3. Engine normal speed—no load..... 2700 rpm
4. Engine idle speed (see page 425)..... 450 rpm
5. Number of cylinders..... 4
6. Cylinder coding..... 40
7. Intake air system—standard type  
auxiliary and..... DeLaval
8. Intake valves—closed  
from auxiliary and..... DeLaval-DeLaval
9. Numbering of cylinders from auxiliary and  
Right Side (R/S) left side..... 1-2-4  
Left Side (L/S) right side..... 3-4-6
10. Ring side..... 1, 2, 3, 4
11. Valve clearance—full height  
Intake..... .021" .021" .021" .021"  
Exhaust..... .021" .021" .021" .021" (under valve roller)
12. Spark plug gap..... .017" .017"
13. Oil capacity..... 7.1 gallon
14. Oil pressure at 3000 rpm (full load)  
50 (3) at 180° F..... 40 to 70 psi  
50 (3) at 160° F..... 70 psi minimum
15. Oil pressure at idle  
50 (3) at 180° F..... 10 to 20 psi  
50 (3) at 160° F..... 15-20 minimum
16. Maximum oil temperature into engine  
(working oil)..... 175° F
17. Normal oil temperature..... 130 to 150° F
18. Oil specifications (looked at temperature)  
+ 30° F to + 120° F..... 150 (3)  
0° F to 40° F..... 150 (3)  
- 10° F to 0° F..... 150 (3)
19. Oil consumption—maximum at 3000 rpm  
full load..... 7.2 gals. per hour  
150 (3) oil free engine..... 3.2 gals. per hour
20. Fuel specifications—engine  
(SAE 4-80-C)..... 80 (3) Diesel
21. Normal cylinder compression at  
working speed..... 70 to 80 psi
22. Warm-up speed..... 1000-1500 rpm

### OPERATING LIMITS

DESCRIPTION	REMARKS
1. Oil pressure normal value	Controls oil flow to maintain pressure of 70 to 80 psi using 150 (3) oil at 180° F.
2. Oil flow to piston valve	Valve opens and allows oil to bypass oil filter at a differential pressure of 10 psi.
3. Spring balance of oil valve by piston valve	Valve opens and allows oil to bypass oil filter at a differential pressure of 10 psi.
4. Thermocouple oil valve by piston valve	Valve closes at 175° F and allows oil to pass thru oil cooler. Valve opens and allows oil to bypass oil filter at a differential pressure of 10 psi.
5. Pressure limit control valve oil	Controls flow of exhaust gases passing through hot gas transfer to protect catalytic converter. Reducing valve at 147° are built on compressors.
6. Fuel pump	Fuel Pump Pressure, 7.0 to 8.0 psi at 1400 to 3000 rpm on 150 (3) fuel pump capacity 10" of mercury at 3000 rpm.



## Check Cylinder Compression

If the engine operates in not normal, check the compression pressure this way:

1. Try to start the engine. If it starts, run it for 15 minutes, at 1000-rpm, with transmission in NEUTRAL, to distribute oil throughout the engine. Then stop the engine. If it won't start, try step 2.

2. Remove one spark plug from each cylinder. If the engine has **not** run as in (1) above, squirt a small amount of engine oil into the spark plug holes to wet the rings.

3. Start the auxiliary engine—to keep the batteries up, crank engine with

main motor (normal cranking speed is about 50-rpm with a fully charged battery) with compression gage on each cylinder in turn until you get a reading. Then repeat on the first cylinder tested to see how the chance of a **leak**. **Notes:** Let motor cool for 5 minutes after each 30 seconds of continuous operation.

Normal compression pressure should be from 75 to 85 psi. If any cylinder is more than 4 lbs lower than the average, it means worn piston rings, worn cylinders, damaged pistons, poorly seated or poorly fitted valves.

## ENGINE-COOLING-FAN HOUSING

People are inclined to use the main-engine-cooling-fan housing and air-coillet vanes as a step or platform during service operations. That'll damage the fan, fan shaft, or clutch and restrict air circulation. The housing and vanes are to protect the fan from foreign matter (grime, leaves, rocks, etc.) and to increase fan efficiency. They won't do either if they get bent up.

To pass the word along, and maybe even paint NO STEP on the center of the housing as a reminder (Fig. 18).



FIG. 18

## FUEL-FILTER CARE

**A** plugged fuel-filter element will restrict gas flow to the carburetor, thus lowering the gas level in the carburetor's float bowls. This starves the engine and leaves an explosive mixture in the bowls; should the engine backfire or the gas mixture leaks out, it would ignite into the fuelbow and squish the floor.

This is why it's a good idea to drain the fuel filter before taking the tank out for a spin. Skip this little chore and one day you'll be late to your weekend party.

Drain the filter by working thru the engine-compartment door from the lighting compartment. Drain about one pint of gas to wash out all the gunk in the

filter bowl. As for the gas, drain it into a can or some sort of container. It's best business to let gas flood into the engine-compartment bilge. And who's interested in a flat?

If gas is accidentally spilled into the bilge when draining the fuel filter or filling the gas tank or whatever, don't operate the bilge pump unless your right-shoulder muffer is cool. The pump's outlet is right next to this muffer, and if the muffer's near operating temperature, you'll ignite the spilled gasoline.

When and how to drain the fuel filter is one thing—clearing it is another. The filter should be disassembled and cleaned weekly, like it says in your '68.

## TROUBLE SHOOTING

with the engine oil filter

Besides keeping the engine oil clean, the filter can be used as an aid in engine trouble-shooting. If you suspect your main engine trouble is due to some part breaking down inside the engine (like a leaking oil pump, piston rings, etc.), the first place to look is at the oil-filter plug. Any metal particles in the oil stream will get caught in the filter, but the heavier ones will settle to the bottom and attach themselves to the filter's magnetic drain-plug (Fig. 14).

If the plug is clean, replace it and troubleshoot elsewhere—but if you find metal bits, from the looks of the pieces you should have an idea what's causing the trouble.



## filter-disc cleaner

Here's a gizmo that takes all the elbow-out-of-cleaning-the-air-cleaner filter discs in your engine and transmission oil cleaners. (Courtesy of another ball inventor at APG, Maryland.) A lot of time and elbow-grease go down the drain cleaning the discs the old way because sometimes they don't come clean.

Have Ordover or somebody make you the cleaning gadget shown below... just follow these instructions:

First, get a 4" piece of 1 1/4" OD steel tubing, a 1 1/4" brass flange sleeve (3000-2154250), a 3/16" I&L hole and a 1 1/4" ID bushing about 1 1/2" long. Take the brass sleeve and slip it on the 4" piece of tubing, with the flange upward, weld it 1/4" from the tube's top.

Next, shove the brass sleeve flange dull a series of 3/16" holes about 1/4" apart all the way around the tubing. Then 1" under the brass sleeve drill

a 1/4" hole. Now you seal both ends of the 4" pipe by welding a 1/4" circular piece of metal on them. Take the 1/16" hole, insert it in a vise and drill a hole through its center, lengthwise. This hole will be your air-siphle, it fits the Devel-Mac-type DGA air nozzle. If your vise doesn't have this nozzle, then you'll have to improvise a siphle that will fit the air hose you have. Weld the siphle to the 1/4" hole in the tube. The last step: Chamfer one end of the 1 1/4" ID bushing (Fig. 20).

To use this cleaning fixture, remove a dirty disc from the dirty filter and place it on the tube as it'll rest on the brass sleeve, slip the bushing on after it (example-end down), then attach your air-hose. With a light air-pressure blowing thru the disc, wash it with a stiff-bristle brush saturated with cleaning solvent. Clean one disc at a time in this manner (Fig. 21).

Don't soak the dirty discs in solvent before putting on the fixture, this lets the outside dirt get loose and makes the job tougher and sometimes impossible.



## main-engine-carburetor idling-speed adjustment

**T**IGHT idling, smooth main-engine idling speed, fresh-air mixture, and carburetor and governor linkage setting, it's important to make accurate speed adjustments on the five main-engine carburetors. Here's how, in order:

1. The throttle-plate pins of both carburetors must be in exact registration with each other at idle (full open and low throttle) position.

2. The carburetor throttle-plate shaft lower, governor carburetor and throttle lower must contact their respective stops simultaneously at wide open throttle.

If you can't get rid of all irregularities in throttle-plate position, adjust it in case of wide open throttle position and set at idle position.

Keeping these two basic requirements in mind, here is the proper clockwise link-age adjustment:

### HOW TO ADJUST THROTTLE LINKAGE

1. Disconnect throttle control-cable-to-carburetor (C) and carburetor control shaft to governor rod.
2. Lock out idle-speed adjusting screw.
3. Close butterfly valve, and view in idle-speed adjusting screw with it position idle stop.
4. Contact throttle control end assemblies, and adjust so that both carburetors close fully. Also check wide open position of throttle lower for correct to wide position of carburetor control lever.
5. Contact carburetor control shaft to governor rod then adjust for—
  - A. Closed position of throttle lower.
  - B. Wide open position of throttle lower.
  - C. Exposed governor pinion fully, and wide position of throttle lower. (Throttle lower must be in nearly closed position.)
6. Tighten all pin nuts.
7. Test engine and adjust idle-mixture screws, but idle adjusting screws for desired idle speed.

THROTTLE  
CONTROL  
CABLE

THROTTLE CONTROL  
ROD ASSEMBLY  
(GOVERNOR)

SOLE STOP



WIDE OPEN

IDLE STOP  
(SOLE STOP)



2000 lbs



2000 lbs  
full load



2000 lbs  
full load



2000 lbs



2000 lbs  
full load



2000 lbs  
full load

WHEEL-TO-CONTROL-ARM

WHEEL-TO-CONTROL-ARM

WHEEL-TO-CONTROL-ARM

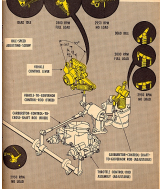
CONTROL-ARM-TO-STEERING-KNUCKLE

WHEEL-TO-CONTROL-ARM

WHEEL-TO-CONTROL-ARM



2000 lbs  
full load



before you:

## OIL WEIGHTS and TEMPERATURES

Interchange given in the TM and LO data column; the oil used in T4EE1 engine should be OE 50 for temperatures above  $+32^{\circ}\text{F}$ . The temperature below  $+32^{\circ}\text{F}$  or in the range from  $+32^{\circ}$  to  $-32^{\circ}\text{F}$ , OE 10 should be used.

Pay close attention to the  $3^{\circ}$  overlap between the two temperature ranges. Oil changes should be figured according to the **expected temperature**, and changes from OE 10 to OE 18 should be made as soon as the outdoor air reaches  $+32^{\circ}\text{F}$ . This is to assure having a

lighter weight oil in the engine when over the winter drops below  $+32^{\circ}\text{F}$ . It's not necessary to switch back to OE 10 unless the **expected temperature** will be in the  $+32^{\circ}\text{F}$  to  $+40^{\circ}\text{F}$  range for extended periods.

Above all, never start an engine with OE 50 in it when its temperature is below  $+32^{\circ}\text{F}$ . If you do, it'll be ready to go no place but to the medical shop. The fifty-weight oil can't possibly flow through the works in time to prevent scuffing of many friction surfaces.

### air-cleaner-hose leaks

Engine'll last longer and run better if clean air is clean first.

Look for:

1. Best air-cleaner sockets—Don't use a screwdriver or other such as a prybar when working on the hoses. Once the outlet's bent out of round, it's almost impossible to make it air tight. Best cure is to replace the socket.

2. Hoses incorrectly installed. To seal right—equally space the rubberizer inlet and outlet socket and set the clamps behind their beaded edge.

3. Hoses clamps not tight.

4. Pin holes in the hoses, believed caused by wear or inserting objects. The trick is to keep from being crushed into the air-ward—keep a watchful gun handy where air hoses are concerned.

### air-cleaner oil

The preliminary Lube Order 9-740 tells you to inspect air-cleaner pans daily and replace or lead treat with OE, manufacturer grade. But it's been found that the heavier oils get too heavy too quick when there's a lot of dust flying around.

Now it's SOP to inspect and fill the pans daily with OE 18 in temperatures down to  $-32^{\circ}\text{F}$ . Below  $-32^{\circ}\text{F}$ , use OE8 (Arctic). Make a note on your LO.

When re-installing the cleaner's oil pan after an oil change, make sure the pan is seated all the way home and the clamping ring has a snug hold on the pan. And after tightening the locking screw for the clamping ring, it's a good idea to secure the screw with safety wire to keep it from working loose.

Operating the boiler...  
the right way!

## HOW TO START



**1**

Be sure main switch is off... and all other accessories are off at their source.



MAIN  
SWITCH



PRESSURE  
RELIEF VALVE



GAS  
VALVE



GAS  
VALVE



ALL OTHER  
CONTROLS



BURNER  
CONTROL VALVE

**2**



First start-up when  
boiler is at 0 PSI.

**3**



Get good  
check tight fuel gaps.

**4**



Put on MAIN, GAS,

**5**

Steering bar must  
be in **RETRD**.

**6**

Set parking brake ... by  
pulling bar brake down.

**7**

Turn on master switch.

**8**

If tank has been empty for more  
than 48 hours or at temperatures  
below freezing, shut **OFF** fuel first ...

**9**

Open throttle completely. Turn starter only to  
**OH** position. Magnets will **OFF**. Turn engine  
over at least 2 revolutions to clear cylinder of  
excess gas vapor.

Even if there's reason to believe raw gas or water  
is in any cylinder, before turning engine over to  
clear cylinders, hold the starter and hold out the  
engine for hydrate lock. If you feel lock, re-  
move one spark plug from each cylinder (see plug  
wrench described on Page 441), and turn over the  
engine till all liquid is removed.

**10**

Slow open head throttle  
about six inch beyond bar  
stop ... for good starting  
**OH**.

**11**

Next, switch magnets to  
**RETRD OH** position ... de-  
press throttle and starter  
together to **OH** position.

**12**

While engine's turning over,  
pump primer until engine  
starts, if this way pumping.



**13**

**NOPE.** Pumping primer without the engine having run doesn't do any good. . . the primer needles are located under the intake ports . . . which means the gas can't get into the cylinders until the valves are open. . . furthermore, it just wastes the oil off the cylinder walls.

When engine starts . . . release master switch and locate switch at the same time. Master switch is only needed to start the engine . . . in the emergency it is source of electrical power . . . it goes away as it!

**14**

Pring hand primer to help engine starting . . . avoid flooding by conducting strokes until engine back out.

If the batteries are run down and too weak to make a normal start, turn off the master-relay switch and start the main engine by means of a slave cable from another bank. Plug in the cable first, and be sure you have a positive to positive and negative hook-up. [When you get a minute, look up P.E. '77, page 273.] Start the other bank, run it at a high RPM then start your bank. Disconnect the slave cable when your engine gets up to about 1100-rpm and then turn on the master-relay switch.



To start with "Little Joe", leave the master switch off and turn off all light switches, because when you start "Little Joe" you may burn out the lights that are on. Then hand crank the auxiliary engine, let it run a while. When it's warmed up and ready to get out a good flow, flick on the master-relay switch, and let your batteries charge for about 45 minutes. Then start your main engine.

In an extreme emergency and when the weather isn't below freezing you can start direct from "LF Joe" without first charging batteries. When you do this, leave master switch off until main engine gets up to 1100-rpm.



**new your engine is running...**



Adjust hand screws of engine carb between 1000 and 1100 rpm.



Check all pressure gauges for proper pressure.



All other lights on dash are should go off 30 seconds after starting.



If this light comes on at low idle (600 rpm) for gas set at 2.0. If "1.5 psi" on, everything's isn't working, turn it off.



Adjust hand screws to 1500-rpm and set for bleed.



When you stop, always switch to 1 position and compare RPM reading with original 1000.



Now, look to 1000 RPM with engine in regular running at 1800 rpm. This is normal.



Now move switch to 3 position and again watch for a drop in RPM from original 1000.



Again, switch back to 1000 RPM position and watch for the tach to come back to 1800 rpm.

If it drops more than 100 rpm with engine switch set to 4 or 1, you get trouble with the ignition system.



RPM on engine more than 20 seconds with switch in either 4 or 1 position.

RECOMMENDATION: ALWAYS USE 2ND GEAR TO START

20

What your engine is doing, usually...



After load starts, engine should drop to 1500 rpm.

## in case you need a push or pull to start...

Just read what says . . . pull with tow bar using winches while in motion. Or, if you only have 4T's around, push with tow bar . . . but don't pull with tow bar—you'll break the tow parts.



Push or pull with 4T's.



Push or support with 4T's.



Before parking trailer, . . . move to neutral first. Don't be towed back.



When vehicle is moving at 1 mph, shift to 1st.

But if a tow bar isn't around, tow bar is pulling with your tow cables. Break the cables to the towing legs first to the point and leave them long enough so you won't climb your back on the towing truck.

Keep it mind while in motion . . . keep your feet off the brake . . . if you step on it—you'll get the parking brake and the "T" bar will lock in neutral, killing your gear.

## SHIFTING



**TIPS**—Here's a tip on shifting from low to high gears . . . Pull lever straight back . . . it will slide over the small bump almost without effort. This way there's no chance at all of accidentally moving into reverse.

**TIPS**—To shift into any given range from a stop: Apply brakes, reduce engine speed to low idle (800-rpm), then shift.

## BRAKING



**A REMINDER**—Moving the selector lever into neutral gear doesn't automatically set the brakes—the brake pedal must be jammed down after the lever is put into neutral gear.

**NEUTRAL PARK**—Control lever off the way forward and to right. When range selector moved lower to its neutral park and that brake is applied, brakes are locked and "N" bar will lock in neutral position. To release parking brakes, move lever to neutral down and they will automatically release.

**NEUTRAL FREE**—Control lever locks to the left, is used only for first start or to release parking brake.

**LOW**—Control lever is first notch back from neutral. Spring on lever will pull lever to right, holding it in 1<sup>st</sup> gear down.

**2ND**—Control lever back one notch from low. Pull lever straight back, it will slide over the bump on range control bar.

**3RD-5TH**—Just keep sliding to next step. Shift to low, pass, then rear lever left and back. The dead stop may vary per the transmission—and 1000.



# STEERING

When steering, don't jerk it around. Steady pressure is all you need . . . light and even don't look!

**TO GO FORWARD**—keep both handle straight . . . *and so do I!*



**RIGHT TURN**—Pull back on right handle grip.



**LEFT TURN**—Pull back on left handle grip.



The amount of lean depends on how far back you pull the "T" bar.

**STOP . . .** before going into a pivot . . . and don't pivot more than 180° or you'll make yourself track trouble. To pivot . . . push or pull handle as far as you'll go.



For a left pivot, hold shift lever in neutral gear and pull back on left handle grip.



For a right pivot, hold shift lever in neutral gear and push forward on left handle grip.

To get in **REVERSE STOP** before shifting... or after.  
Before looking... get in gear!

### BACKING TO LEFT

1. Shift to reverse...
2. Pull back on right hand grip.



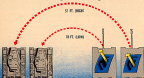
### BACKING TO RIGHT

1. Shift to reverse...
2. Pull back on left hand grip.



SPEED LIMIT  
& MPH  
MAXIMUM

## the bulldog's turning radius



Down shift into low when anticipating a sharp turn... as you'll be sure to have the most control.

## DRIVING the BULLDOG



## REVERSE BRAKING

To see reverse as a brake or not to use reverse as a brake is one of those questions with two or more answers. Some say the practice is OK—others say it's not. Here are the facts ... you be your own judge because it's your back and your neck.

### It's dangerous because:

1. Steering is reversed, which can confuse even the best of drivers.
2. Transmission overheat, causing increased transmission damage.
3. Reverse torque might stall the engine.

But, in places where hills are steep and a long way to the bottom, holding the back with low gear and brakes may not do the trick because your brakes may be shot before you reach the bottom. In cases like this, the only thing you can do is use reverse as a brake.

### To use reverse as a brake you must:

1. Stop before shifting into reverse.
2. Keep perfect control of the truck. Remember, the steering is opposite from normal.
3. Use enough engine power to control the descent and keep from stalling the engine.
4. Keep an eye on the transmission temperature warning light. If it comes on, stop the truck, hold it with your brakes, shift into neutral, and run the engine at 1750 rpm until the warning light goes out.

# COASTING



**DON'T** gun your engine with foot traffic... always increase engine speed gradually!

**OR ELSE** you might sweep the road off the chart!



**DON'T** toss your engine and jam into gear to jerk onto road holes... get her in low... give her the gun-slow n' way!

**OR ELSE** you'll bust the guts out of your transmission!



## NEVER

- try to pivot-steer by coasting engine... this is asking for trouble.
- apply intermittent left or right steer to slow tank... one looks, one brakes during a turn... it reduces steering effectiveness. Slow down *before* you turn.
- leave tank unattended with transmission in gear... set parking brakes.
- fail to make a complete stop before shifting into neutral.
- start without disengaging the guards at rear of tank.
- downshift while going above 11 mph... it's deadly.
- back up without a guide (unless someone's shooting at you).



# STOPPING and IDLING

When coming to a stop, be sure both drivers in a dual-trip before shifting into neutral. Because when you're in neutral the TCU will automatically lock in neutral, killing your steering.

If ever you start park with engine running, cut fuel flow to the engine. It can go 100 to 1000-psi. That'll keep the engine in good shape.



If you take delivery about one of 100, look...



# OPERATING TIPS

## STALL SPEEDS

**A** good way to know if your T41's engine is in good shape is to have maintenance pull a stall-speed check. Under normal operating conditions the stall speed should be between 2300-rpm and 2400-rpm in high range. (High altitude and dense areas may drop it to between 2200 and 2400-rpm). Here's a run-down on how a stall speed check is made.

First check transmission and engine oil levels, then warm the engine and run it (it) both engine and transmission are at normal operating temperature. Next, place range-selector-control lever in HIGH and jam shoes hard on the foot brake. Hold the brake down and gradually increase engine speed with foot accelerator until throttle is wide open. The tachometer needle should level off in the RPM range mentioned. Don't keep the throttle open longer than 30 seconds and don't run a stall check in LOW.

If the tachometer needle drops below 2300-rpm (2200-rpm in high altitude areas) with the throttle wide open, the engine is not operating properly. If it goes up to 2500-rpm or against the pointer, the transmission is slipping.

2200-rpm indicates carburetion or ignition trouble. At 2500 to 2550-rpm, check for restricted air-flow through air cleaner, or blocked air lines. If the

cleaner and air lines check out OK, trouble could be a broken pull that's in the top-changes.

Constant stalling and backfiring at maximum RPM is still indicates ignition trouble or a sticking top-springs and valve.

2800-rpm could spell valve- linkage- up trouble. Check to see if the point of the shift indicator is centered on HI dot. If it isn't, the linkage needs adjusting. If it's centered, the transmission is in need of repair.

After the run, let the engine run for a few minutes at 1800-rpm, then push in degasser, close throttle and stop engine.

Incidentally, when in HI STALL, the tank should not creep forward—if it does, the brakes need working on.

## TOWING

When towing a crippled T41, and you believe the trouble is in the transmission, use a wrecker or a recovery vehicle with a new bar and disconnect the universal joint on the lame tank to avoid further damage to the power pack. The tow bar gives you control of the mired tank when the joints are disconnected.

If the transmission's OK—you can use wire cables, leave the universal joint be, and station a driver in the sick tank to steer and stop.

For steering, have him shift into

LEFT (meaning it has to *lean*), and when he's back on the straightaway, have him hold the lever in NEUTRAL STEER. If you have it in NEUTRAL PARK, the parking brake will lock if you apply the foot pedal—automatically, the “T” bar will lock in neutral and you’ll have no steer. Have him keep the two tanks in line as much as possible, especially when it is wet and muddy.

Always try to use a weaker or recovery vehicle with a tow bar, but if you must use a tow cable, use two 20-footers, cross them and connect their

eyes to the tow towing-shoulder on the rear of the tank. Be sure to avoid short leads in the cable because they’ll break some of the cable’s strands every time and have to break and dangerous. On the towing tank, position the gas to the front to keep it from summing the towed tank to one it lurches forward.

**Caution** Never use a T4E1 with a tow bar to tow another tank because the plastic hook on the rear of the T4E1 isn’t designed to pull another tank—it may snap off during the jolt. It’s there primarily to pull light stuff like trailers, jeeps and small trucks.

## GAGING YOUR FUEL SUPPLY

Some additions to know about the fuel gage and tanks.

**W**hen gaging up, park in the fuel shut-off valve located “up-down” in the lighting compartment and make sure it’s set at the BOTH ON or OFF position. This valve controls the gas flow to the engine and **what** **between** **both** tanks in these two positions. If you’re not careful, you could go off fuel hooked.

These two positions also apply when reading the fuel gage because the gage’s only flow is to the right tank. The LEFT ON and RIGHT ON are used only if one gas tank is damaged.

This fuel-gage reading, one (in the right tank) indicates on the fuel gage the fuel level in both tanks, but only if the fuel-increase valve is turned to the BOTH ON position.

However, due to the slant shape of the fuel tanks, the reading on the fuel gage doesn’t indicate the actual amount

of usable gas in both tanks. So, if you want to keep pointed in terms of actual gallons of gas you can use, mark your fuel gage like this:



Although the tanks hold 140 gallons, 20 gallons of this gas won’t be used because the gas-line outlet is about 2” up off the gas tank’s bottom. It’s made this way so the dirt and water that usually settles on the bottom isn’t drawn into the engine’s fuel system. This means when the gage is on “F”, you actually have 40 gallons of gas in the tanks, but only 14 gallons are usable.

## AIR-CLEANER DUCTS versus PERSONNEL HEATER

**N**ormally, the air-cleaner ducts are adjusted to draw air from the fighting compartment. This is fine for mild or warm weather, but it's not so good in cold weather. The main engine draws so large a volume of air with fans that closed tightly that the air pressure in the fighting compartment may drop to a point where the heater will not burn efficiently.

At this point the crew may also begin to lose efficiency.

Correct the condition by adjusting the air-cleaner ducts so that air is drawn from the engine compartment rather than the fighting compartment. This means moving the duct damper from the rear position to the front position. You do it by turning the lever until the air-duct openings in the bulkhead are accessible from the fighting compartment, then rotate the handle in the center of each duct, clockwise, until the damper is all the way to the front of the duct.

This'll take approximately 100 turns, but don't get tired turning and leave the damper just way between the two extreme positions—this'll leave an opening in the bulkhead and give you a definite fire hazard.

When warm weather comes, return the damper to the rear position, and be sure to take care of both right and left ducts.

## AUXILIARY-ENGINE HAND-STARTER

**T**he auxiliary engine has its hand starter mounted horizontally on the lower inboard side of the engine, behind the right engine compartment access door, and is reached from the fighting compartment (Fig. 21).

To start the auxiliary engine by hand, first make sure the master relay and radio switches are off. Next go to your auxiliary-generator control switch or KLM. If the temperature is low and the engine is cold, pull out the choke to full choke. With the handle, crank the engine up to compression stroke with a burst of strain, then pull it. Then release the handle and let the cable completely rewind. Now pull the handle with a steady, slow, even, long

pull. Let cable rewind before attempting another start.

If the engine doesn't start after three tries, slightly decrease full choke position. And try it again. When pulling, it isn't necessary to spin the engine.



## How to use the **AUXILIARY-GENERATOR HEAT-EXCHANGER**

There's a tube-type heat-exchanger incorporated in the exhaust of the auxiliary-generator engine. A Williams electric-heat-element is also built into the heat-exchanger, thus allowing to impose a load on the auxiliary engine for quicker warm-up. All of this provides warm air for the main-engine compartment, and quick engine-warm-up for faster starting in extreme cold.

The thing to keep in mind is, with the electric heater ON, only approximately 115 KW of electrical energy is available from the generator to operate other equipment in the vehicle. Therefore, it's important to know how to use the heat exchanger correctly.

A dimper lever, mounted on the back side of the duct, directs the flow of heated air. For normal weather operation, set the duct-dimper lever to OFF

position (lever to extreme left). This setting draws heated air out of the duct—if the temperatures get above 150° F around the auxiliary-generator engine, it'd cause a vapor lock.

In extreme cold weather, set dimper lever to ON position (lever to extreme right). This'll direct heated air into the main-engine compartment.

After the auxiliary-generator engine is started, turn ON electric-heater switch located on the auxiliary-generator control box in the driver's compartment. When the engine compartment is warm enough, turn OFF electric-heater switch.

And remember—use the heater element only when you need to load down the auxiliary engine for a quick warm-up of the heat exchanger and heater air in the engine compartment.

## driver's **BACK-REST ADJUSTER**

In take below Manufacturer's No. 1260, the driver's seat—when it's down out of the way back and the driver's leaning against the back-rest—will bump into the travel guard and stop the travel from traveling. If you're a big, heavy driver and must use the extreme position, you'd better lock the degree of adjustment before you get more than a back scratch.

Protect yourself by having Ordnance make a positive stop for the seat adjuster. The stop (Fig. 10) is 3/4" spacer bar stock, tack-welded to each side of the adjuster assembly, directly over the rear teeth. It limits the seat adjustment to

allow enough clearance between the back-rest and the travel guard when you're relaxing in the seat.



# WHO does WHAT and WHEN

Here's a suggested recipe for how the four of you can get organized in the morning, noon, and night, to keep your bulldozer groomed and fed.



BY	HOW	WHEN	COMMENTS/REQUIREMENTS
X	X	X	Fill out check sheet during inspection.
X	X	X	Logbook inspection made by other crew members.
X	X	X	Inspect tracks, steel wheels, rollers, hangers, sprockets, and compensating wheels for damage.
X	X		Check track adjustment.
X	X	X	Inspect tracks for wear or bent guides, loose track-shoe-pin nuts, track pins, and sprockets.
X	X	X	Check under the vehicle for oil or fuel leaks.
X		X	Determine if lamps and reflectors, horns, fire extinguishers, gauges, tools, etc., are in the proper place and in good operating order.
X	X	X	Make sure all lamp covers work tight & easy.
X	X	X	Keep on the lookout for loose bolts or pins.
	X	X	Check all accessible wiring to be sure it's connected tight and supported, that insulation is not cracked or chafed, and that grounds and shielding are in good condition and secure. Report any unacceptable wiring.
X		X	Make sure camera covers are secure and serviceable.
		X	Try off the lights. Inspect all lenses.
		X	Help gather and leader lubricate suspension and all contact points like it says in EO P-730 . . . <b>Just</b> see page 672 for suspension-lube change.
		X	When there's need to change lubricants and special oils, to agree with the IC—see help box, to make sure.
X	X	X	Check for sweating, have moisture removed from all parts and then get 'em lubricated.
X		X	Be alert for unusual noises or conditions.

X	X	X	Check exhaust for excessive black smoke to see if your engine is on the beam.
X	X	X	Check belts and belt-drive system security of belts, pulleys, and of cyclone equipment.
X	X	X	Investigate and correct or report any faults noted during operation. Complete trip to terminal and forward the platoon leader, together with request for any second-aidable maintenance you need.
		X	Help other crew members clean glass, mirror surfaces, inside of roof and wipe or wash off exterior.
		X	Help check gear areas for collection of sludge or water and clean out if need be and refill.
X	X	X	See that wheel-lift equipment is snug in place and ready for action.
	X	X	Take care of the oil. (DINA gas—keep it in top shape.)
X		X	Check fluid levels—oil, coolant, and controls.
X		X	Check vehicle landing links before landing.
	X		Check rate of fuel. Watch out that the tube doesn't get overtopped by prolonged high rate of fuel. . . . get an oilfield report out of an overtopped chamber as it won't "load off" when vehicle's expecting it.

### **DRIVER RESPONSIBILITIES:**

X	X		Check fuel in tanks and be alert for leaks. Caution: Refuel to 2/3" from top of fuel-tank, with hose inside venting or tank to discharge static electricity. Check the spare-fuel containers. Check all levels of engine and transmission and auxiliary equipment, and all if necessary.
X			Check fuel-line filter.
X	X	X	Check in the engine and driver's compartment for any indication of fuel or oil leaks.
X	X	X	Check refrigerant air-locks for holes and loose fit.
X	X	X	With the engine running, check all instruments for normal readings, and the operation for proper oil level.
	X		Operating Observations: While you're in operation, be alert for unusual noises that may be a sign of trouble. Instrumental or a tale, watch for abnormal readings. There's time the brakes are used, gears shifted, or the vehicle turned, consider critical and note any unusual or unsatisfactory performance. Stop the engine and investigate immediately if any warning lights come on.
	X		Be alert for unusual noises detected when putting vehicle in motion. It indicates stiffness of lubricant in the final drives and suspension components. Take care of any malfunctions immediately.
X		X	See that you've got a good postage space and track.
X		X	Check escape hatch, driver's compartment for oil leaks.
X	X	X	Inspect engine compartment for oil leaks, oil-cooler leak, fuel-drive bearings, operation, etc.
			Lubricate engine and transmission per I/O 9-736, and get the items in driver's and engine compartments like it done.
			Clear engine and transmission oil-filters as required.
X	X	X	Check engine cooling fan for proper operation.
	X	X	Check battery for water levels, bridge charge, corroded terminals, tightness, clean, and see that there's a coating of grease. If you're parking for a couple of weeks, remove batteries and store in cool place.
			Clear driver's compartment.

- Check the alternator in driver's compartment, adjust needles. Reap engine and engine compartment door.
- See that oil wiring in the engine and driver's compartment is secure and supported, that insulation isn't cracked or chafed, and that switches and strapping are in good condition and secure.
- Adjust other hose members in standing water, ice, and mud from all parts of vehicle.
- Check auxiliary generator operation and heater operation.
- Check all water hoses, engine and air-water line, engine baffles, and top deck grills.
- Make sure assemblies such as carburetor, generator, magnets, starter, fuel and blip pumps are tightly mounted and connected.
- Check synchronization of selector-control and steering linkage with valve body or transmission.
- Take a quick look at conduits and shiftings as you arrive.

**OWNER RESPONSIBILITIES**

Used to hand when they're waiting the vehicle.

- Check all accessible wiring in turret and make sure it's secure and supported, that insulation isn't cracked or chafed, and that switches and shiftings are in good condition and secure. Reap any inaccessible wiring.
- Lubrication. Lubricate belts, turret in accordance with instructions contained in lubrication order.
- Ammunition. Dry the base and chamber of 7.62mm gun. Dry the barrel and chamber of .501 .30 Browning machine gun, A07.
- Clean and coat 7.62mm gun tube as prescribed in the lubrication order.
- Check all in small mechanism and be alert for excessive linkages.
- Check adjustment of firing and safety mechanism. Firing or traverse link-assembly should operate without force.
- When 7.62mm gun tube is cool enough to be touched with the bare hand, or that they and for the next two days (or longer if necessary conditions), thoroughly clean the base and chamber with the base cleaner using the base brush. Make sure all surfaces are coated with vasoline. Do not wipe dry. After the third day, wipe dry and oil. Clean and oil oil .30 machine gun.
- Clean protrudes in turret.
- Clean all weapons, check for rust.
- Be alert for any unusual noises or improper conditions.
- Help loader gather on side of turret.
- Clean all optical glass.
- See that covers covers are snug on barrels, mounts, instruments, etc.
- Inspect gun and see if they're in operating condition.
- Keep paint on gun mount in good condition.
- Look for loose bolts or nuts.
- Check operation of all lights in turret.
- Check contents of right outside storage boxes and keep 'em clean.
- Check and clean altitude indicator.
- Check and clean ventral gun and turret.
- Check sight adjustment.



X	X	X	Check hydraulic oil in reservoir.
X	X	X	Check steering mechanism and firing controls.
X	X	X	Check gun lock—make it up to date.
X	X	X	Check headspace on machine guns.
X	X	X	See if all gun bolts and spare parts are cleaned and in their places, also pistons, spare heads and bodies, and spare wire blocks, electric quadrant, magazine and mount.
X	X	X	Clear chamber and breech mechanism, dry the barrel. Dry the gun here after firing.
X	X	X	Make sure the turret lock and gun-jacking lock really lock . . . and remember, you don't use 'em both at the same time.
X	X	X	See that equipment in turret is stored correctly, in extreme cold/make sure lubricants and special oils agree with AC quadrant valves.
X	X	X	Make sure you're in starting gear—make the dodge and water, clean and roll if necessary.
X	X	X	Be alert for unusual noise or operation—get at the trouble before it happens something.
X	X	X	Keep sight air cleaner filled with oil and clean as often as necessary. Steamships filter automatically dirty conditions so blowing good, it's necessary to service the air cleaner several times daily during operation to prevent getting dirt or sand into the engine and wearing out engine parts in short order.
X	X	X	If steering and reversing hand wheels are too stiff, go get Orlonox.
X	X	X	Be careful not to overheat gun tube during prolonged high rate of fire, or allow unburned powder to remain in unheated chamber—a "cook-off" is an unhappy surprise.

### LOADING RESPONSIBILITIES

X	X	X	Clean and coat those gun tubes as told on the lubrication order.
X	X	X	See that the breech and magazine mechanisms work OK.
X	X	X	Make sure the recoil mechanism has enough oil and oil locks.
X	X	X	Check adjustment of firing and safety mechanisms.
X	X	X	Check OAD of the breech and pre-venter mechanism.
X	X	X	Check contents of left outside storage boxes and spare engine oil. Reap/boxer OAD.
X	X	X	Check all other outside equipment.
X	X	X	Examine the ends of the fire extinguisher (stored head), remote-control handle, and safety valves. If the seal wires are broken or safety seal is missing, replace with fresh cylinders.
X	X	X	Check all fire extinguishers, collect discharge records.
X	X	X	Look for loose bolts or parts.
X	X	X	Check spare hydraulic-resist oil.
X	X	X	Check loader's bench, signal lamp and oil cap theft.
X	X	X	Unusual noise or unusual operating conditions can fair warning of trouble to come—stop them before they stop you.
X	X	X	Check essential gun and mount and help keep them sharp. Help keep inside of turret clean.
X	X	X	Check and re-adjustable oil reservoir in recoil mechanism.

DO	DI	DI/DO	
		X X	Polish metal slides.
		X	Secure or release breeching bolts and latches.
	X	X	During operation, in dusty and sandy terrain, keep metal slides and exposed joints dry to prevent rust and lubricant from flaking on sensitive parts. When it's possible to wash the tank, you help, too.
		X X	Help gunner check off accessible wiring in the turret and be sure it's snugly connected and supported, that the insulation is not cracked or chafed, and that contacts and sliding are in good condition and secure. Report any unacceptable wiring.
		X X	Check to see that all tools and equipment are in good shape and in the right place. Keep 'em clean, too.
		X	Inspect towing hooks and pins for looseness, damage, and wear. Test to be sure that latching mechanism closes and latches securely. (See that lat P-750, lat P-300A, and (M) G191 are in hand.)
			Help lubricate the suspension and all other joints.
X			Help gunner stay the line and status of T-100 gun. Try the turret and chamber at will. DO breeching machine gun.
			Help gunner clean weapons.
			Examine for corrosion, or other damage.
			Check orientation for proper storage.
X			Look for excessive oil leaks in turret mechanism.
			Test for smooth operation, length of round, and return to battery without shock.
			Check rate of fire. (Keep your shooting—don't allow tube to get over-hot due to prolonged high rate of fire or allow cooled round to remain in unchambered chamber because of danger of "cook-off".)
			Visually or after 30 rounds, whichever comes first, remove and clean bore extractor, clean out oil-carbon deposits and oil foreign matter from bores or get work.
			<b>Notes:</b> Easy care in assembly, disassembly and handling of the extractor chamber, to avoid damage to the bore and inner lip of the front and rear extractor hook.
			Keep rate the ventilating blower's in good shape.
X			Check air cleaner, fill daily with OE TC and clean as often as necessary to keep it at top performance.
			<b>Warnings:</b> Under extremely dusty conditions or blowing sand, you'll need to service the air cleaner several times daily during operation to prevent dust or sand blowing into the engine. Observe engine parts kept wet in a short time.
X			When parking in places or areas where dust or sand is present, check engine parts and other exposed parts, and keep them covered with cloth to prevent entry of dust, sand, or drilling water.
X	X	X	Clean water, oil, and mud from all parts of weapons and mounts.
X	X	X	Watch driver in checking for oil-cooler line leaks, transmission-oil level and engine oil level.
			Check fuel-cut-off valve. Should be at (OFF) ON position.



## ELECTRICAL



### SPARK-PLUG WRENCH

**M**OST PEOPLE will tell you it's impossible to remove the imbedded spark-plugs while the engine's still wrapped in the tank. But it can be done. Although the consensus isn't unanimous in the lawn-TM, it's been common practice among some users that have armed themselves with the proper linkage.

The gimmick is a tubular wrench (Fig. 24) that you can wiggle into the cylinder and slide over harness, nut and all, to get the job done. As you, this wrench isn't a rock hewn, but it's really made with a 13/16" socket, a piece of 3/4" ID thin wall tubing 2' long, a piece of 3/4" ID tubing 11/2' long and a 3/4" hex nut.

You cut off the socket's drive end, flare the 3/4" ID tube and weld it to the socket. Weld the 3/4" tubing on the other end of the 3/4" tube, then weld the 3/4" nut on the naked end of the 3/4" tubing.

Use it thusly:

Disconnect the harness nut.

Slip the wrench over the harness nut and then down on the riddle.

Then wiggle it down into the engine and work it over the plug. (Push the harness nut down until it rests on the plug.)

The wrench's hex nut will stick out far enough to get an open-end wrench on it.

The plug and cable come out as one unit, even plugs in 22-cylinder can be easily removed and installed.



FIG. 24

NOTE: THE WALL THICKNESS IS CRITICAL TO PROPER FIT AND USE.

## Starter and Master Relay

**SCRAMBLED** along the line the 4-1's got a new-type starter relay. This new relay (E204-798410) has heavier contacts which will stand up under repeated starts. It also has better water proofing.

It's interchangeable with the old type (E204-754779) (slightly) which is still used in the master relay. If ever your master relay burns out, it's a good idea to replace it with the older type—use the new type (Carter Warranty) for the motor.

The old-type relay needs some flogging else to keep it in shape. Oil, dirt, rust, and corrosion can be the death of it. So keep our three killers by hand tightening the packing-gland coupling nut (Fig. 15) and then packing water-

proofing compound around the gland.

When tightening the coupling nut, first make sure the pressure washer is positioned in the right direction to make snug contact with the packing-gland gasket. The shaft of the pressure washer **must** be positioned so it's down against the packing-gland gasket. If the pressure washer is found to be in the reversed position, remove the relay and disconnect the cable from the relay box. Then remove the connector end of the cable and put the pressure washer in its proper position.

## battery-cables

**T**wo metal covers were put over the lead cables to keep the batteries from getting damaged by tools or other heavy objects thrown up by accidentally dropped crew members or mechanics working in the engine compartment.

The covers were never intended to be a standing or stepping platform. Bending or flexing the battery covers causes the edges of the cables to cut into the cable insulation. This, you don't want to happen —so point "NO STEP" on both ends of covers.

For extra protection against shorts, you can tape the cables at points where they pass thru the cover cut-outs and at their terminals too. Use plastic electrical tape for this job. To keep the master battery-cable from rubbing against other terminals, bend its cable leg approximately 90° (Fig. 16).

The bolts that hold the cover in place should be kept tight, if they come loose,



## Neutral Safety-Switch

**T**HERE'S a safety switch mounted on the right side of the range-advance bearing—as part of the starting circuit. This switch stays open and prevents starting the motor when the selector lever is in any other range except NEUTRAL PARK. When the lever is in NEUTRAL PARK, it depresses the switch and completes the starting circuit.

Should the motor fail, or if it's just able to start the engine when the range

selector is not in NEUTRAL PARK, chances are the switch is out of position. Here's how you can position the switch correctly:

First, disconnect the switch's electrical connector (Fig. 27). Remove the clamp that holds the cable to the front of the range-advance bearing. Remove the jam nut from the threaded end of the switch inside the selector housing, and remove the switch. Then reconnect the two switch cables.

At this point, turn on the master battery flange magnets switch fully and hold down the master switch. Put the range selector in NEUTRAL PARK, and have someone slowly move the safety switch into the housing until the motor begins to crank the engine. Release the master switch and turn off the master switch; then move on the safety switch an additional one-half turn and tighten it in that position with the jam nut.

Disconnect the two connecting cables and re-tighten them now and again there as they should be—then put back the clamp and reconnect the cables.

## shorting to cover

the cover can slip to one side and short the battery terminal.

One more safety: There's a rubber pad glued on the underside of the covers to help prevent the cable terminal lugs from chafing and eventually shorting to the cover. If you notice the pad coming loose, replace it.



## Voltage Regulator Adjustments

**O**N THE early model units (Maurice's No. 875 and under) you'll find an Elfinco main-engine generator-regulator box. Late model units (876 and up) have a Delco box. These boxes are interchangeable and are located in the main spot, down on the hull under the main floor.

The voltage adjustment can be made with a low-voltage circuit-resistor (C-1-2115-50) that's been cranked with hand. Hook it up to the three receptacle. Then start the main engine and turn on the turbo-cooling blower. Run them for 15 minutes. This 15-minute run is extremely important, never cut it short; it's the only way you'll get the regulator to its operating temperature and ready for setting.

On the Delco box, turn the screw that's located on the side that has two screw

nuts (Fig. 20). Turn the screw one way or the other until the meter reads 11.7 volts on the coast and lower it three.

On the Elfinco box, remove the cover and with an insulated screwdriver turn the voltage-regulator-coated set screw that's located on top of the polarized relay-assembly (Fig. 20) till you get 11.5 volts on your meter. Leave the cover off the box until after you've adjusted the auxiliary-engine regulator because after you set L71 Joe's regulator you must turn the paralleling-circuit adjustment screw clockwise as far as it will go.

To set L71 Joe's regulator, run it and the transferring motor for 15 minutes, then remove the cover, place on the relay box that's located on top of L71 Joe. Now you'll need a long insulated screwdriver to reach down into the box and turn the regulator's adjusting screw (Fig.



FIG. 20



FIG. 21

50) until you again get 11.5 volts on your meter at the three receptacles.

To save time, you can run the main engine and auxiliary engine at the same time by normalizing the temperature of the regulator. But when you're actually making the adjustments, only the engine whose regulator you're adjusting should be running.



## REGULATORS

**R**EGULATORS on the 11's are two-transistor-type regulators. Both voltage and current regulators are in the regulator for the main engine. **Warning:** Never short either the control relay or the actuating relay by hand when connected to generator and battery. The contacts will stick and the very high current will damage the generator and regulator before the circuit can be broken.

The regulator for Link Jet does not have a current regulator, but the same caution applies to relay handling.

The voltage setting for regulators should be 27.5 volts. (Only in cold climates, 2° F or below, should the setting be 28.7.)

The setting is to be made on open circuit, battery and all loads disconnected. But only the engine that drives the generator to be checked.

## Engine Generator

It doesn't take much current, passing through the field in the wrong direction, to reverse the polarity. This means that when checking the generator with an ohmmeter or a test light, chances are 50-50 you'll reverse the polarity. So before the checked generator gets back in the rack, flash the field to insure correct polarity.

You do this with a low-voltage dry-cell battery (6 minutes setting). Make a connection between the negative terminal of the battery and the "E" terminal on the generator—then make a momentary connection between the positive terminal of the battery and the "A" terminal on the generator.

## LINKAGE

Footstep linkages are a pain in the spinal column, but they're in your department so you get two choices: APC's or well-adjusted linkages. The experts you can swallow quickly, the linkages take more time.



## all about brake adjustments

The brake mechanism itself is a part of the transmission and there's no one working on the transmission-brake run-rings unless your linkage is well-linked. The first step is to check the brake adjustment at the transmission.

Put a man in the driver's seat to apply and release the foot pedal (pedal should cover his feet). Remove the brake adjustment covers at the rear of the transmission. There you'll notice two lines on the cam ring: One is marked "R" (Apply), the other is marked "N" (Release) (Fig. 31).

When the brake is released, the metal indicator plate should line up with the "N" line or nearly so, and when the brakes are applied, the indicator should have the same relative position to the "R" line. If this isn't so, then your linkage or adjustment at the transmission is out, but first check the linkage.

### Brake Control Linkage

Before you can get a good linkage adjustment, say how linkage work must be straightened—get 'em straight and then adjust the brake linkage like this:







1. Position the brake pedal all the way up.

2. Disconnect the linkage at the base of the foot pedal and behind the parking-brake assembly (Fig. 21).

3. Insert a pin in the indexing holes that are located at the base of the foot pedal and at the base of the parking-brake assembly.

4. Now, adjust the linkage rods to fit snug between the foot pedal and the transmission—avoid pulling forward on the center end. This'll tighten the brake discs in the transmission.

5. Now, tighten the linking nuts and remove the indexing pins.

### Brake Cam

To adjust cam in the transmission, use a screwdriver (Fig. 22). Apply the brake pedal, glance at the "A" line—if it isn't opposite the indicator, release the brake pedal and turn the adjusting screw (clockwise to take up the brakes, and counter-clockwise to release) and keep doing this until the "A" line is dead opposite the indicator (Fig. 22). When the pedal is released it should be dead on the "B" line. Always complete the adjustment in a clockwise direction—this'll remove free play from the adjusting mechanism.

When making your final check for adjustment, be sure that your brake pedal is fully released—if it isn't, your brake lines will drag during the operation—then you'll be back where you started.

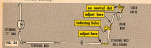
When the brakes are set, put the covers back on, but make sure the slot of the adjusting screw is set to take the angle cover's angle-plate. This angle-plate is what keeps the screw from vibrating out of adjustment.

### Parking Brake

The brakes should release when you move the range selector out of NEUTRAL PARK, if they don't, then check the trigger pin in the parking-brake assembly. The trigger pin should have a minimum travel of 7/16" and should operate freely. (The parking brake is locked when the trigger pin's at the rear, free when the trigger is at the front.) If the pin doesn't operate freely, remove the hatch cover and check the roller, the quadrant, and the wedge block for wear, corrosion, and dirt. Free them up, if they're not too gone, replace them. An after-thought . . . before working on the brakes, place the truck on level ground—once it starts to roll, it's hard to stop.

## How to adjust the **STEERING CONTROL LINKAGE**

1. Straighten all four balljoints.
2. Set the range selector in **WHEEL FWD**.
3. Put the steering "Y" bar in neutral—straight it to be sure it's locked in neutral.
4. Back in the engine compartment, disconnect the linkage at the balljoints and at the steering-control ends on the transmission (Fig. 24).
5. Insert a pin or nail thru the indexing hole located in the balljoint assembly.
6. At this point, the steering-control indicator should automatically point to the neutral dot. If it doesn't, bend it by hand until it does.
7. Now adjust the linkage to fit snug (but not tight) at two points between the balljoints and the steering ends.
8. When it fits snug, tighten the lock nuts on the steering end and remove the indexing pin.



## How to adjust the **RANGE-SELECTOR-CONTROL LINKAGE**

1. Lock the front axle—by overloading, straighten them.
2. Set the range selector in **WHEEL FWD**.
3. Disconnect the linkage at three places: at the front balljoints just behind the driver's seat, at the rear balljoints that's in the transmission compartment and at the shift-control ends on the transmission (Fig. 25).
4. Insert a pin or a nail thru the indexing hole in both balljoints.
5. Make the shift-control indicator point to the high dot by hand turning it.
6. Now adjust the control linkage to fit snug between the two balljoints and the steering-control ends. Make linkage snug (not tight) at two points will show you out of adjustment again.
7. Tighten the locknuts on the steering when you've made the adjustment, then remove the indexing pin.



## SPASMODIC PERSONNEL-HEATERS

If the heat exchanger in your 14-cub-foot Smith-Wind personnel-heater overflows and causes the overheat switch to periodically cutswell, or if the heater isn't functioning like it should, it's because the burner-pocket baffle has warped and changed the flow of combustion air and formed hot-spots. (Illustration above: Heater Serial No. 140441 was modified in production.)

Polka-roy up to the Arctic-modified duct heaters for maximum efficiency (Fig. 10), and here's how Calsonair can modify yours:

1. Remove the air-flow valve assembly and the igniter.
2. Take a round gauge, remove all the inside parts, and bore a 1/2" hole through the center line of the igniter seat.

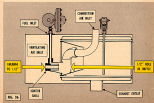
3. Place the drilled-gauge shell in the igniter seat. (Insert in just drilled-feeding and pipe.)

4. Drill a 1/2" hole through the baffle plate (it's about 7" inside the exchanger burner-pocket).

5. Remove the unneeded feeding guide. Insert a solid rod (about 1 1/2" in diameter) thru the hole until it touches the baffle plate, and then tap the rod with a hammer until the baffle is spring inward from about 1/2" to 3/4" toward the center of the exchanger. (A 3/8" extension from a 1/2" diameter rod will do as a substitute for the rod.) The baffle is back without—do go any on the tapping. And before reassembling, check the walls.

6. To determine the correct distance to move the baffle, trial insert the rod in the hole and mark it with a colored pencil mark with the edge of the igniter seat. Make another mark about 1/2" out from the first, then tap the rod until the second mark is in line with the edge of the igniter seat.

7. Reassemble the heater and it'll be a cinch to keep.



# RADIO

The radio in most T&E's consists of a P1 unit for manual communication with an auxiliary receiver and storage up to 100 hours, a P2 unit, and a track with the antenna. Its range is about 300 miles.

The procedure here on how to turn it on and operate it is similar to the way the display instrument that's easier to remember. First, if the radio is to be on for the flight's period, make sure one of the switches is having preferably the auxiliary. Check the antenna connections, and see that the power input and control cables are plugged in snug—not too tight, just pull back the pins. Then:

1. Plug MAIN SWITCH or P1 (POWER) into the power radio unit.
2. Put amplifier's OFF, ON, RTN switch on OFF. Also ON for interference-protection only.
3. Turn TUNING clockwise as far as it'll go.
4. On the P2 unit, turn the FREQUENCY halfway up.
5. Turn SQUEECH knob all the way clockwise.
6. If you need the dial lights, turn ON the MAIN SWITCH. Then turn on the DIAL LIGHT switch if you don't need the lights, leave 'em OFF.
7. Turn TUNING knob until your channel frequency is aligned in the window. (Full frequencies are marked in the window, bands on the knob.)
8. Next, on the P1 unit's power panel, put the OFF—RECEIVE—TRANSMIT switch on TRANSMIT (RECEIVE).
9. Then turn the SPEAKER switch to OFF.
10. On P1 unit, turn VOLUME halfway up.
11. Turn on PAIR, STBY if you need it.
12. Turn SQUEECH all the way up.
13. Turn the radio-tuning knob back to RTN.
14. Now set your frequency. Turn the left TUNING knob until frequency lines are between numbers.
15. Turn the right TUNING knob to window



with frequency you need. RTN is also handy off dial window, turn volume counter-clockwise, to get back on dial, turn clockwise.

16. Now on the speaker knob, turn SQUEECH all the way up (clockwise).
17. If you want DIAL LIGHTS, go and you need the dial light, turn PAIR, STBY knob to ON.
18. Turn VOLUME knob about halfway up. Dial should now light.
19. Turn TUNING knob till your frequency's aligned with the white line in the dial window.
20. Now on the CONTROL knob, look for frequency window in MAIN FREQUENCY position.
21. Plug your check set into the control box.
22. Turn FREQUENCY controller of the wiring. Check that set has its own volume control, located on control box directly below Control's plug-in socket.
23. Put the SQUEECH CONTROL SWITCH in the center RTN control position.
24. If you haven't already turned on the PAIR SWITCH, see in the line 11.

# know your angry-3



## CONTROL BOX

20. Set all three **IGNITION** levers (7, 11, 20). Turn each one clockwise until you hear a clicking noise that lasts all vibrations. This noise indicates your jet's functioning. If you back off more than necessary to operate the valve, we'll come back again to be sure.

21. Now point at the jet. Set the valve levers 8, 10, 12 as all calls to great response.

22. To talk or operate on 41 jet and open valves, turn counter-clockwise. Again counter-clockwise, then press and hold the **IGN** and **START** buttons as you check out—because you want jet's through. With counter-clockwise in this position you can also talk and receive over the telephone system by holding in the start and the **IGN** buttons.

23. To follow clockwise (CW), turn counter-clockwise until clockwise and hold in the **IGN** and **START** buttons as you check out. With counter-clockwise in this position you can also talk over the telephone. When **IGN** button is held, release it first.

24. When you're not using any special jet, keep

the control box selector switch in the center position. This sets you talked at all the jets, and will let you talk over the telephone.

25. After you're on the jet, the only adjustments on the jets that you'll need to feel with are the fueling valve level and spark plug adjust either of them as the situation demands.

26. If you need to use the telephone system only, turn the **IGN** switch to **OFF** (see step 5).

27. After you're using the telephone system and—keep it honest!

28. To turn the jet off, simply turn off the **IGN** (START, CW-START) when you're ready to go on the jet again from that, and you're all set!

29. If you're curious about all the other points on the jets, dig out your copy of **THE BURN** and look up a little on the subject. . . . page 12 covers the complete operating procedure.

The reason you're up to your **IGNITION**, the bottom: it's a nice thing to have around. . . . the **IGN** and the world's best are on the jet.


# TROUBLE SHOOTERS



Let that pistol down, Jerry  
Don't shoot the blue man  
That's no simple man, Jerry  
Let that pistol down



Times have changed — today's mechanized means need more than a shot or two. These trouble-shooters listed below will help you get a home mount to roar up and go.

TROUBLE	CAUSE	REMEDY
<b>1. Pistol is cocked when starter's held on.</b>	Release switch not turned on, or turned on, or replaced.	Turned on, or replace.
	Range selector lever not in neutral.	Set to low (R2/R3) (R4).
	Range selector safety switch activated or turned on.	Deactivate or replace. See page 447.
	Master or starter relay turned on.	Check and replace. See page 448.
	Ready starting system.	Check starting system (check circuit).
	Ready battery system.	Test batteries and starting circuit.
	Mechanical failure of engine parts.	Go per instructions.
<b>2. Cracks, hot spots to start.</b>	Thrust pins of oil.	Grease and hold in per 20 7-128.
	Release switch not on R2/R3.	Set it on.
	Master switch not on.	Set it on.
	Red switch (start/stop) not open.	Set it open.
	Red switch closed.	Set open.
	Engine flooded due to over-priming primer.	Turn off engine switch, push accelerator down to floor and turn over engine about five times to exhaust surplus gas. See page 436.
Engine extremely cold.	Additional use of pump required (using only white engine coolant with pump on). Primer should have about 10 psi resistance; if not, indicates broken pump/line— if more, pump is defective or fuel line stopped.	



## FIGURE



1. Look for next long stride



4. Use all power—no don't during full power



1. Accelerating



## CROSS

Weak ankles

Engage all toe hairs

Feel not reaching backward

Control and maintain good pluck

Keep different feet on same line at power

Engage timing

Reduce dragging

Improve leg/hip timing

Control air clearance

Use relaxed joints

Excessive fatigue out of adjustment

Wing or air/lap for long periods

Low air level

Strong push-off

Early landing toe

Maximize take stopped or reduce distance

Relative of jump

Early landing landing onto hind pull and not stepping to mid engine

Engage through air control evenly

Intermediate digging

## RECOVERY

Expire or change with auxiliary generator or clean coils

Change oil according to oil F-100

Examine carburetor inlet fuel line, check engine (inspect oil). If low flow of oil, check oil. Fuel pump is OK. If not, check fuel system.

Remove spark plug coils, test spark jump. If no spark, what can do? Is oil level.

Examine quarterly 80 miles, or whatever for 80.

Remove spark-plug coils and test spark jump (see Water section). If spark won't jump 1/2" gap, or it sputters, or won't at all, coils or magnets is at fault. Inspect all plugs, but compressor. Check spark timing. Check for low fuel level coils.

Reduce too tight. Budget

Check leg/hip timing

Control-clearance filter

Method for study subject, failed play, excessive air consumption, to get 10000.

Check and adjust throttle linkage

Use an 800-1000 rpm

Check level and oil oil

Days and still per 10-1-70

Check fan, engine check if necessary

Remove caps, oil, hoses, etc. from the. Check condition through water by removing water line and reading engine

Check of pressure. Check to show 70 psi with 10-1-70

Check drive. Replace if defective. Replace per instructions. 10-1-70. Cool engine by putting in normal and reading at 1-100 rpm for low air-etc. Before using the check oil level for 10-1-70.

Check condition. Check and inspect globe. Check drive line of air control engine

Check oil pressure (check to 100-1000 rpm or 10-1)

**TROUBLE****CAUSE****REMEDY****1. Excessive oil consumption.****2. Loss of pressure.****3. High oil pressure.****4. No oil pressure.**

Wrong grade of oil.

Oil leaking.

Worn internal parts.

Wrong grade of oil.

Blebled engine oil.

Fouly oil pump.

Bad connecting-rod bearings.

Fouly pressure caps.

Fouly mounting-light switch.

Dirty pressure-control valve set.

Clogged oil filter.

Improperly adjusted or fouly oil-pressure valve.

Fouly oil-pressure caps.

No oil in crankcase.

Clogged oil-inlet tubes.

Fouly oil pump.

Check oil for correct viscosity by consulting manufacturer's temperature, drive-and-idle.

Check for leaks—repair 'em.

Method by usually reduced, use of gears, forced pumps to get lubrication.

Check oil. Drain and refill if necessary.

Do not overprime. Change oil every 1500 miles or so, often as conditions require.

Inspect it.

Identified by excessive cutting or knocking of noise for lubrication.

Check caps. Replace if necessary.

Check, replace valve or ball if needed.

Remove and clean valve set.

Same as per page 471.

Adjust or replace control valve.

Inspect caps.

Play back a head.

Go get lubrication.

Go get good one.

**NOTE: EXHAUST****1. Bad and smacking combustion.****2. Catastrophic knock.**

Fuel leaks shut off valve closed.

Fuel intake empty.

Exhaust-valve deterioration.

Clogged fuel lines or filter.

Fuel leaks.

Too much pumping of molecules.

Fouly fuel pump.

Malicious combustion.

Set it at 2000 RPM.

Wife and son.

Check for shut, replace complete valve if necessary.

Bake pump to carburetor line, replace if necessary. Remove and clean fuel filter.

Examine for broken lines, repair or replace.

New pump installation. Repair new pump installation.

Check pump pressure. At 700 psi, minimum 2 1/2 psi, maximum 11 psi. Replace pump if needed.

Fuel adjusted wrong or results after fouly—replace carburetor.



## TROUBLE

1. Fuel meter too low.



2. Fuel meter still works (approx.) with no signal.



## TRANSMISSION

1. Overheating warning light on.



2. Low oil-pressure light comes on.



3. Fuel fails to draw in some or all ranges.

## CAUSE

Carburetor work adjusting.

Fuelly fuel-pump pressure.

No fuel.

Fuelly valve.

Fuelly bypass.

Fuelly check valves.

Low, or too oil.

Wrong oil in transmission.

Excess or dirty oil filter.

Excess water some or low.

Oil drains installed wrong.

Fuelly wrong-size pump.

Transmission slipping.

Broken fan belt.

Fuelly driving, including under load pull and not engaging in and retransmitted.

Fuelly oil flow.

Fuelly lubrication oil pressure.

Low oil level.

Fuelly light valve.

Valve control linkage out of adjustment.

Transmission slipping.

## REMEDY

Adjust idle system for maximum performance at 1000-1100. See page 102.

Check pump for 20% psi at 2000 rpm. Replace if necessary.

Check carburetor and fuel-pump manifold/lines/pipes for leaks. Replace or replace.

Replace valve.

Check bypass valve at 2000 rpm. For correct. If defective, go get detuning.

Check. Replace if necessary.

Check level. Replace or 1000-psi and transmission oil normal operating temperature. level should be between MIN (2000 RPM) and 20 400 (10 4000 RPM) 200 marks at 40-50.

Always use 20 10.

Check filter always clean it 10 miles after oil change.

Remove and clean.

Check. Check should flow air through valves.

Check. Replace if necessary.

Check oil pump (see page 102).

Check and recheck belts.

Shift into neutral and run engine at 1700 rpm for five minutes. Look for oil leaks before setting engine.

Check for oil leaks.

Remove fan belt, give pump belt best water, in bit of high range oil pressure plug or control valve body. Check 200 to pressure page. 1000 rpm engine running at 1000 rpm, oil pressure should register about 20-30 psi. go performance.

Check. Oil oil 200 10.

Check. Replace if necessary.

Check it. See it says on page 102.

See oil pump in high range. If beltworks less 1000-psi, go get beltwork.

**TROUBLE****CAUSE****REMEDY**

Shaft too pressure not in allowable range.

Inefficient all pressure is used.

Check. Pressure should be 175 psi (transmission in line or manual) with engine running at 1800 rpm.

Check. Pressure should be no less than 40 psi with engine running at 1800 rpm. If below, go per following.

**STEERING CONTROLS & LINKAGE**

1. Link won't steer.



Range adjuster control and transmission valve body out of adjustment.

Transmission all pressures not in operating range.

Selective steering linkage.

Transmission manual control (over shift trans. selector valve body).

Check transmission all pressures, but if not in operating range, go per following.

Adjust steering linkage.

2. Link steers in only one direction.



Steering linkage or valve body improperly adjusted.

Inefficient all pressure in right or left steer valve.

Brake dragging.

Check and adjust linkage. (See page 461.)

Check. If not in allowable range, go per following.

Check valve body adjustment on both sides of transmission. Check and adjust valve linkage.

3. Range adjuster control lever sticks in manual or neutral.

Control lever not out of adjustment.

Adjust rod and linkage.

4. Range adjuster control lever sticks or has excessive play.



Steering and shifting linkage out of adjustment.

Loose ball joints on shift linkage.

Not steering and shift control of transmission.

Adjust to eliminate looseness.

Replace connecting parts.

Strengthen or replace linkage.

5. Brake won't stop fast.



Linkage out of adjustment.

Brake out of adjustment of transmission.

Check, adjust, eliminate all play.

Adjust service brake of transmission.

6. Brake dragging.



Brake out of adjustment of transmission.

Linkage bent or too tight.

Check and adjust on both sides of transmission.

Check for selective linkage. Straighten or replace when you get it.

7. Brake handle pumps too soft.



Brake pump low.

Selective pump.

Clogged filter or bad flow to pump.

Check, repair as necessary.

Check, repair, or replace.

Check, repair, or replace.

**TROUBLE****CAUSE****REMEDY**

2. Hinges aren't required to maintain or level tracks.

Loose or broken track fittings.

Check, straighten, repair or replace.

Bad fittings.

Check, repair or replace as necessary.

**TRACKS AND SUSPENSION**

1. Tracks look to one side.



Unequal track tension.

Adjust both tracks so they'll be equal.

Worn or distorted drive sprockets or tracks.

Check for worn parts, replace if necessary.

Overcast track.

Blow in the middle, or use S-curves instead of tracks, or use pin chains.

2. Excess track.



Improper riding.

Are riding the drums?

Worn or excessively loose track.

Adjust or replace track.

Broken compensating idler wheel.

Check how idler's guide flange fits across wear. Interchange idler or replace. (See page 41.)

3. Track sag to one side.

Broken tension bar.

Replace if bent when not in contact with guide bar.

4. Excessively loose riding.



Loosely slack adjuster.

Set by hand. It should feel warm after running track. Replace if needed.

Broken tension bar.

Replace on page 41.

**ADJUSTMENT TIPS**

1. Tracks to start.



Defective sprockets, cables or tension wiring.

Start manually. If it starts, check tension wiring and cables. If it won't, check sprockets, cables and wiring.

Worn or faded slips.

Remove and slip. Replace if necessary.

Excessive bracket points and adjustment.

Adjust to 0.010" gap when tracks are in line.

2. Tracks, but won't keep running.



Bad start-off roller stand.

Set it manually.

Slipped drive or fuel lines.

Remove gas, fuel and lines. Check lines for leaks, kinks, and chipping.

Overcast fuel pump.

If fuel from pump is inadequate, replace pump.

3. Won't run efficiently at full speed.

Excessor improperly adjusted.

Check for fuel speed adjustment.

Excess mixing.

Check slips, guide flange rollers, and sprocket pulleys. If still mixing, verify ID.



# SPECIAL TOOLS

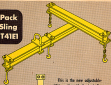
*you'll need for organizational maintenance*

Tool Set, Organizational Maintenance Special Set A, Basic		FR 81, 7140	117-256-000			
Tool Set, Organizational Maintenance Special Set B, Basic		FR 81, 7140	117-256-000			
		TOOL NUMBER	QUANTITY SUBMIT	LT 1	ST 1	
<b>Engine</b>	<b>Components</b>					
	Kit, universal, electrical cables and fuel line	41-6485-000			1	
	Block, adjust, 18 1/2" engine valve and valve and oil pressure control valve	41-64573-00			1	
	Cap, valve tappet adjusting	41-6495-000			1	
	Light, magnetic timing, four lamps	41-1-028			1	
	Shag, lifting, engine and transmission	41-5-203-00			1	
	Block, universal, ignition harness set	41-64674-00			2	
	Block, universal, engine timing, four lamp	41-64675-00			1	
	Block, valve engine timing, four lamp		41-64676-00		1	
	Block, spark coil oil cooler four-lamp	41-64583-00			1	
	Block, spark plug, intake	41-64587-00			1	
	Stand, transport, engine and transmission	41-5-493-00			1	
	Adapter Set, Electrical Testing Load with Adapter Set 11-A-2000			107500	1	2
	<b>Contents of:</b>					
	1 Adapter Cap					
	1 Adapter Cap					
	1 Adapter Cap					
	1 Adapter (2 pin)					
	1 Adapter Cap					
	1 Adapter Cap					
	1 Adapter (2 pin)					
	1 Leads, test					
	1 Key, adapter set					
<b>Transmission</b>	Cap, transmission oil pressure	41-6-137-000			1	
	Shag, lifting, transmission	41-5-203-00			1	
<b>Auxiliary Equipment</b>	Cap, fuel and carburetor	41-6-138-000			1	
<b>Suspension</b>	Adapter, puller, road wheel assembly	41-4-364			1	
	Adapter, puller, compensating link pin		41-7530	1	1	
	Adapter, puller, tension bar		750-000		1	

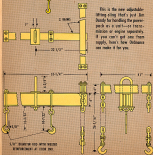


Component	Part Number	Quantity		
		Qty	Per	Per
Pulley, coverplate, shaft diameter incl.	41-F2851-01	1	1	
Pulley, drive frame (incl wheel, arm etc's) Includes belt and compensating link pin—used with 41-4121A	41-F2851-03	1	1	
Remover and Replacer Bearing cap, front support roller hub—used with 41-B1295-017 flange.	41-B-25740-01	1	1	
Remover and Replacer Bearing cap, compensating hub and rear wheel hub, inner—used with 41-B-1295-017 flange.	41-B-25740-02	1	1	
Remover and Replacer Bearing cap, compensating wheel hub and rear wheel hub, outer—used with 41-B-1295-017 flange.	41-B-25740-03	1	1	
Replaces, all steel, compensating wheel and rear wheel hub.	41-B-2582-01	1	1	
Replaces, all steel, rear wheel arm support bracing—used with 41-B-1295-016 flange.	41-B-2582-02		1	
Replaces, front support roller hub, of steel.	41-B-2582-03	1	1	
Replaces, bearing, shaft diameter.	41-B-2582-04	1	1	
Pin, drive, front pin.	41-F411-006	1	1	
Flange, back connecting FEET flange.	41-B-2585-005	1	1	
Flange, remove and replace.	41-B-2585-001	1	1	
Flange, remove and replace.	41-B-2585-002	1	1	
Remover and Replacer, bearing, front wheel arm and compensating link—used with 41-B-1295-016 flange.	41-B-2573-01		1	
Wrench, adjust, rear wheel arm spindle nut.	41-W2024-001			1
Wrench, plug, tension bar retainer.	41-W2024-02			1
Wrench, rear wheel.	41-W2024-03	1	1	
Wrench, overhaul, track tension adjusting.	41-W211-05	1	1	
<b>11 NEW See 11 11 11</b> Wrench, adjusting, drive spring bearing.	001-701700			
Wrench, blade, ground angle used 11, 12 1/2, see group 1 FOR TRACK ROLLER ROLLERS.	41-W2170-001			
Tool, breadblock removing.	001-701700			
System, breadblock removing.	001-701700			
Kit, splice track removing (incl also for "T" flange with breadblock removing system).	001-702001			
Ring, holey "E" track and rolling.	41-B-1291-00			100%
Gas, drilling, oil.	41-B-1291-00			

## Power Pack Lifting Sling for the T41E1



This is the new adjustable lifting sling that's just the thing for handling the power pack as a unit—or its transmission or engine separately. If you can't get one from supply, here's how Ordnance can make it for you.



1/4" diameter eye bolts spaced 18" apart at each end.

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\*Articles in this issue apply to other vehicles in the Light Truck family, as indicated above. Code letters shown identify the following vehicles:

A, T11    B, T101    C, N62    D, T601    E, T60    F, T104

For a listing of all products in the INTERNATIONAL MANITOWOC GROUP, as well as the names of the dealers nearest you, call 1-800-4-A-TRUCK or write to International Harvester Company, P.O. Box 100, Rockford, IL 61105. For more information on the products and services of International Harvester Company, call 1-800-4-A-TRUCK or write to International Harvester Company, P.O. Box 100, Rockford, IL 61105.

# *how to get what you need by the numbers*



**O**RD 7 and 8 (with changes 1, 2 and 11, and ORD 9, SNE. G. 271), have been distributed. If you don't have your ORD 7 and its three changes, let your publications section. But take it easy after you get them. They aren't quite up to date because so many parts were changed or superseded after the catalogs were compiled.

To speed up supply and get the right part, order in the regular way, but be sure to write the Manufacturer's Serial Number or the Ordnance Serial Number (of the mark that needs the part) on the requisition. That's about the only thing that'll tell the people at the depot which part is right for your tank. It will also tell a straight story to the Cashier man who'll be at some point in the supply line to help edit each questionable requisition.

Brief yourself again, it's important: The Manufacturer's (or Ordnance) Serial Number must be used for each part requisitioned—and this does **not** mean the USA Number.