I highly recommend you download and read the R-390A Y2K manual and use it as a reference.

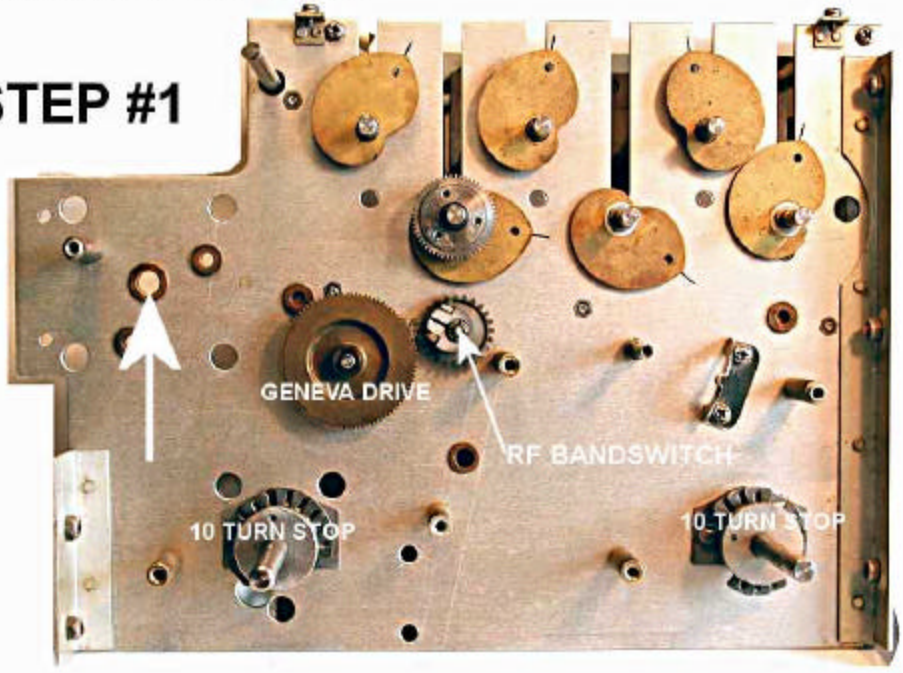
Follow these steps to rebuild gear train:

1) Set frequency to 07 +000. That is 1 khz past 07 999.
2) Remove slug racks and label each one to return it to the same place.
3) Remove front panel.
4) Disassemble gear train until you reach the point as shown in picture "Assembly 1". Do not disassemble the split gears and other "assemblies" at this point.
5) It is SUPER important to work on a large flat hard surface so you can carefully lay out the gears as you disassemble them. The floor below you should be hard and flat also because it is easy to loose a small spring or other part. Believe me, this is good advise.
6) Clean gears down one by one with a solvent. It is not necessary to disassemble the clutch/differential assembly. Just soak the whole thing. I recommend cleaning the Geneva drive in place. Disassemble the split gears and clean.
7) Assemble according to the picture sequence starting with photo called "Assembly 1" Carefully tighten each clamp where indicated. I strongly recommend having a few spares of each different size clamp as the clamps crack real easy. Split gears should be loaded. You may need someone to help you hold a gear in the loaded postion while assembling, or you can use very small clamps.
8) Perform mechanical alignment as follows:
a) Align cams at 07 +000 marks
b) Set RF bandswitch (see bandswitch pictures)
c) Set counter to display 07 +000
d) Set 10 turn stops (see Y2K manual)
e) Set crystal oscillator bandswitch. (see Y2K manual)
9) Re-assemble front panel and install slug racks.
10) Adjust PTO. You can set this by using a frequency counter or adjusting it for best signal on a local AM station.
11) Enjoy your radio.

If you have and questions, corrections or comments please e-mail me at:
Polaraligned@earthlink.net

Scott Seickel
9/2/02

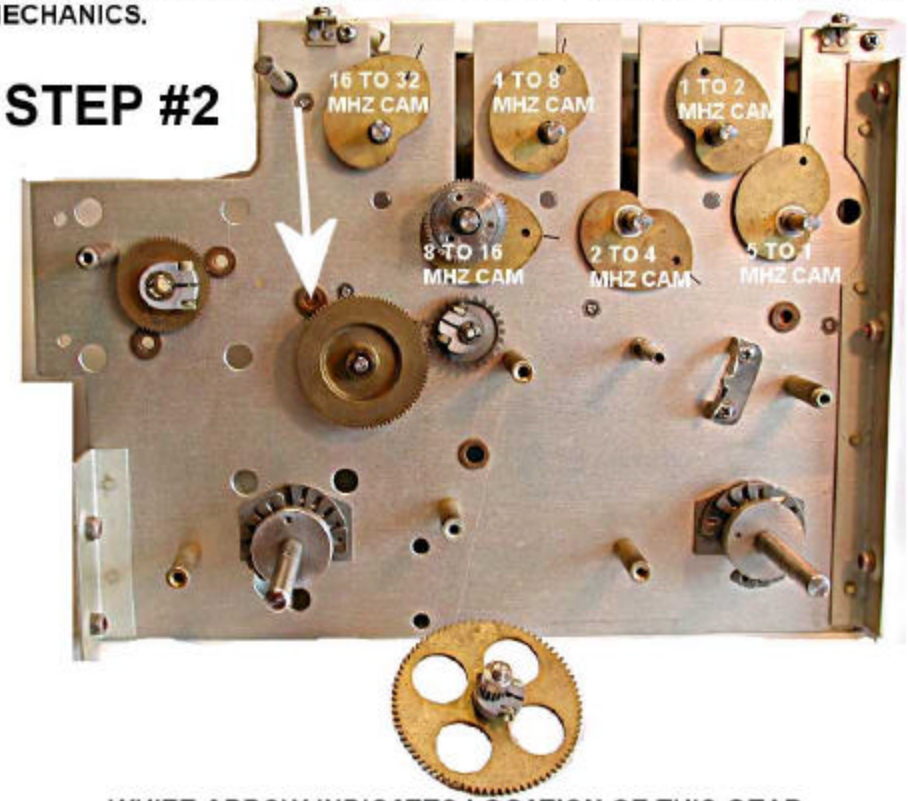
HERE IS YOUR STARTING POINT. YOU CAN TAKE APART THE GENEVA MECHANISM IF YOU LIKE, BUT I FOUND IT EASY ENOUGH TO CLEAN WHILE STILL IN PLACE. IF YOU CHOOSE TO DISASSEMBLE THE GENEVA DRIVE, WATCH OUT YOU DON'T LOSE THE BALL BEARING INSIDE.



CLEAN DOWN THE CAMS, GENEVA DRIVE, ATTACHED GEARS AND THE WHOLE PANEL WITH A MILD SOLVENT.
THE GEAR GOES WHERE THE LARGE WHITE ARROW POINTS.
THE BUSHING GOES IN THROUGH THE REAR OF THE PANEL AND THEN THE WASHER GOES ON IT, AND THEN THE GEAR

NOTICE THE 6 CAMS ARE SET FOR 07 +000. THAT IS THEY ARE IN THE POSITION THEY WOULD BE IN WHEN THE MHZ DIAL IS SET TO 07 AND THE KHZ CONTOL IS TURNED UP SO IT IS JUST PAST 999. THE DIAL WILL THEN READ +000. THE HOLES IN THE CAMS ALIGN WITH THE LINES ON THE PANEL. THIS IS WHERE YOU WANT THEM TO BE WHEN YOU ALIGN THE MECHANICS.

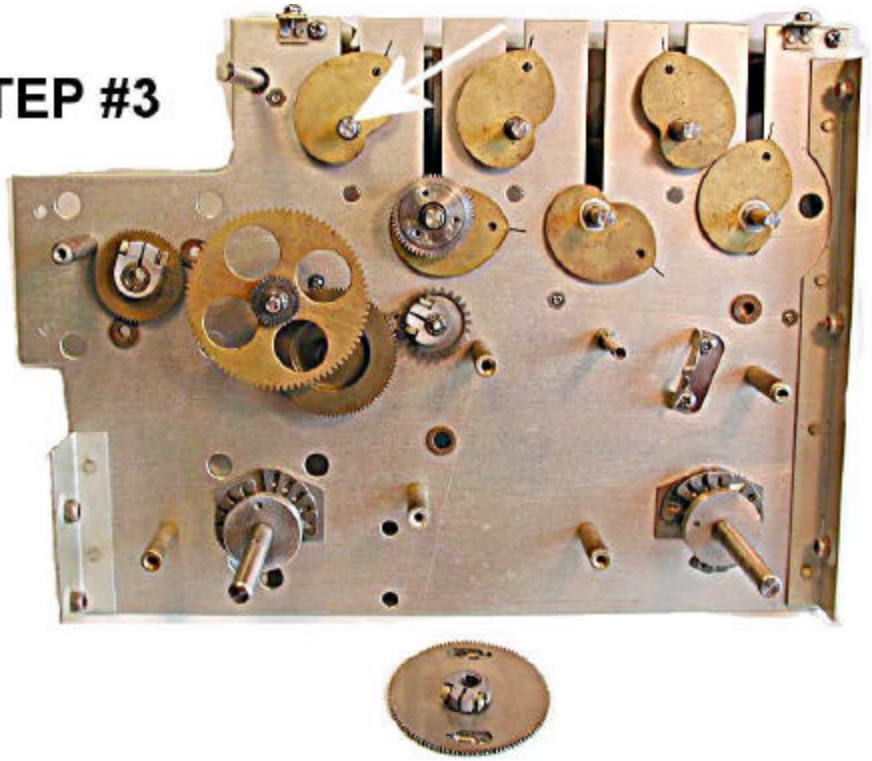
STEP #2



WHITE ARROW INDICATES LOCATION OF THIS GEAR
INSERT IT WITH PINION MESHING WITH THE GENEVA DRIVE GEAR

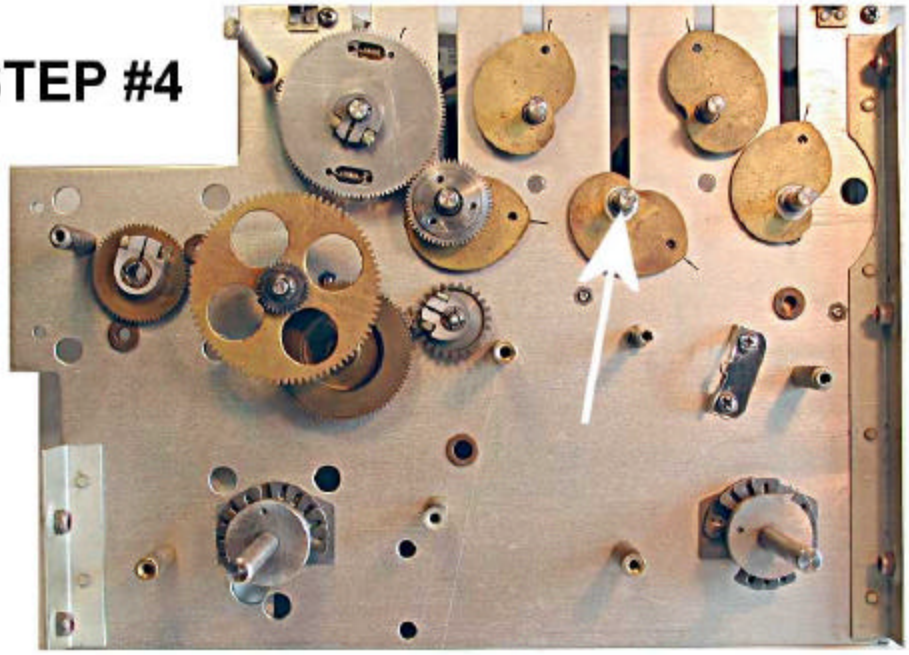
DON'T WORRY IF THE CAMS DON'T STAY IN THIS POSTION AT THIS TIME.
LATER WE WILL REALIGN THEM AND CLAMP THEM TO THE GEARTRAIN

STEP #3



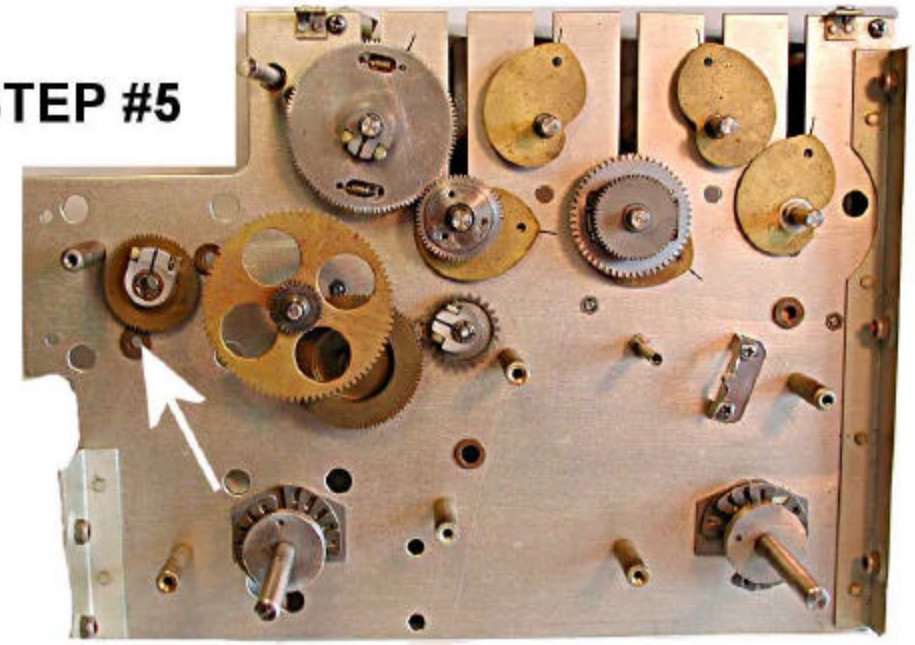
THESE SPLIT GEARS SHOULD BE SEPERATED BY REMOVING THE RETAINING RING AND PULLING APART. ALL THE SPLIT ANTI-BACKLASH GEARS SUCH AS THIS ONE, SHOULD HAVE THE SIDES OF THE TEETH LIGHTLY SANDED WITH 220 TO 320 GRIT PAPER. DO NOT SAND THE MATING SURFACES OF THE TEETH BUT RATHER THE SIDES OF THE TEETH WHERE BURRS FORM. THE GEARS SHOULD SPIN SMOOTHLY AGAINST ONE ANOTHER WHEN DRY ASSEMBLED. USE A VERY LIGHT COAT OF SYNTHETIC MOTOR OIL BETWEEN THE GEARS UPON FINAL ASSEMBLY.
PUT THIS GEAR ON CLAMP FACING OUT AND TIGHTEN IT LIGHTLY AS THE CAM IS GOING TO NEED TO BE SET BEFORE FINAL TIGHTENING.

STEP #4



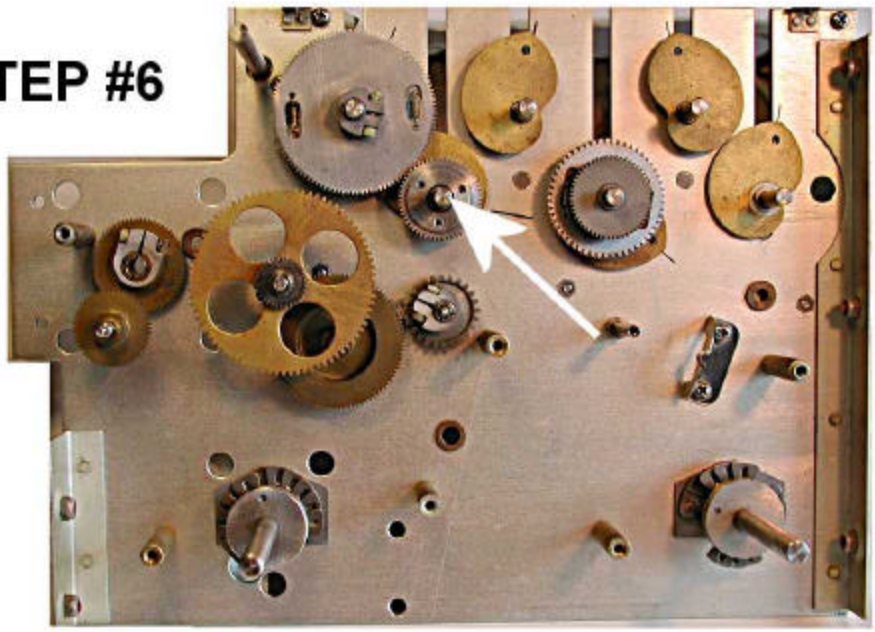
THIS GEAR GOES ON WITH THE SMALLER GEAR FACING OUT (TOWARDS YOU).
AGAIN, ONLY LIGHTLY TIGHTEN AS THE CAMP WILL NEED TO BE ADJUSTEED LATER

STEP #5



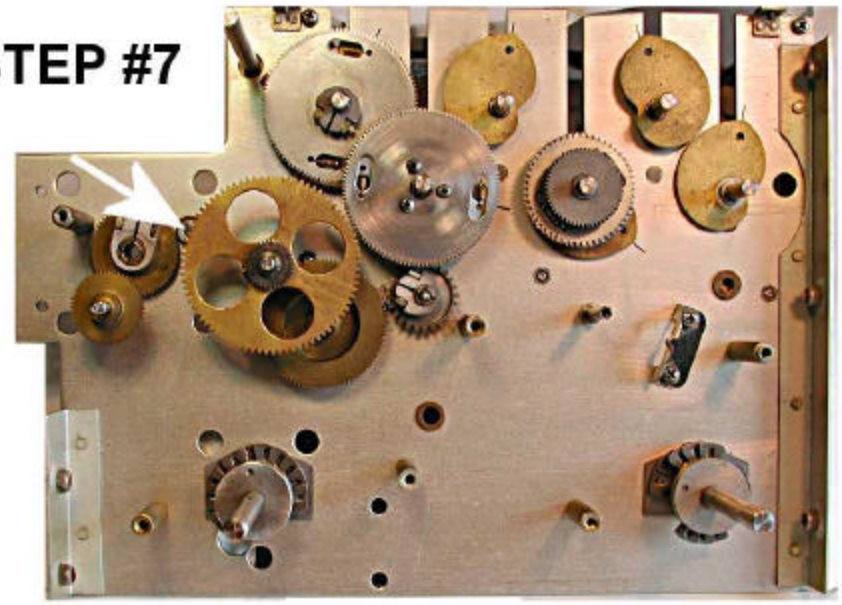
THIS GEAR DRIVES THE BEVEL GEAR OF THE MHZ DISPLAY. LIGHTLY LUBRICATE THE SHAFT AND INSERT THE LONG SIDE OF THE SHAFT INTO THE BRONZE BUSHING.

STEP #6



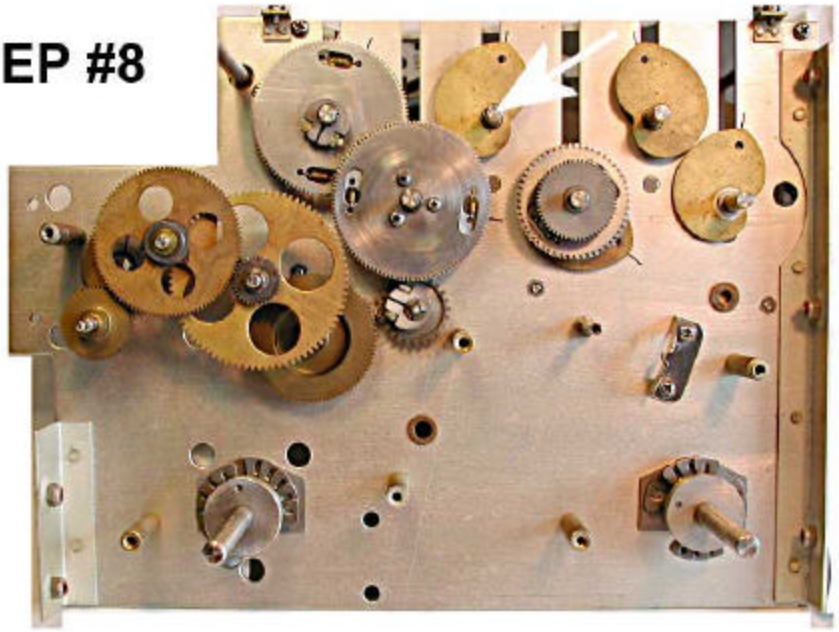
TREAT THESE SPLIT ANTIBACKLASH GEARS AS DESCRIBED EARLIER AND THEN FASTEN USING 3 SCREWS. SIDE WITH LARGE CENTER HOLE GOES IN TORWARD CAM.

STEP #7



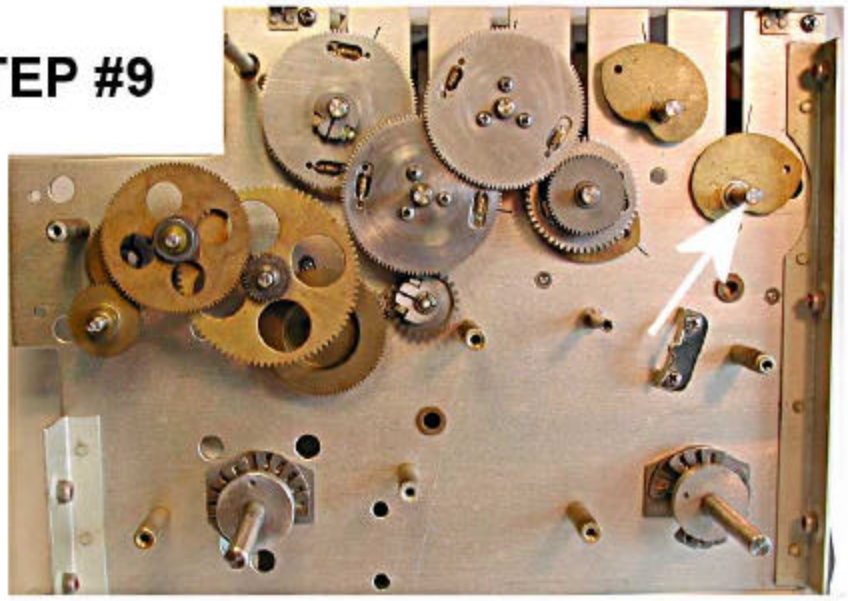
LUBE SHAFT END AND INSERT WITH SMALL GEAR FACING IN AND MESHING WITH ADJACENT GEAR

STEP #8



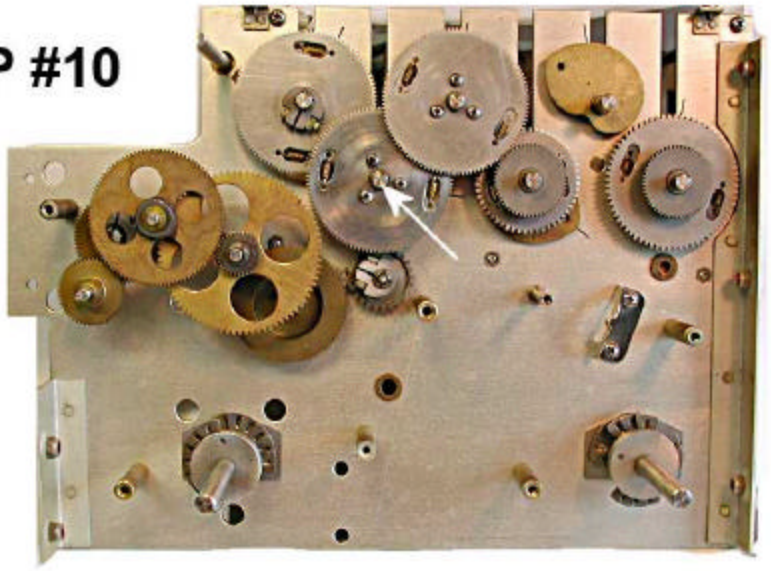
AGAIN, TREAT SPLIT GEARS AND INSERT WITH SMALL GEAR FACING IN TORWARD CAM. ONLY TIGHTEN LIGHTLY FOR NOW.

STEP #9



AGAIN, TREAT SPLIT GEARS AND INSERT THIS TIME WITH SMALL GEAR FACING OUT. ONLY TIGHTEN LIGHTLY FOR NOW.

STEP #10



SMALL GEAR OF THIS ASSEMBLY FACES IN.

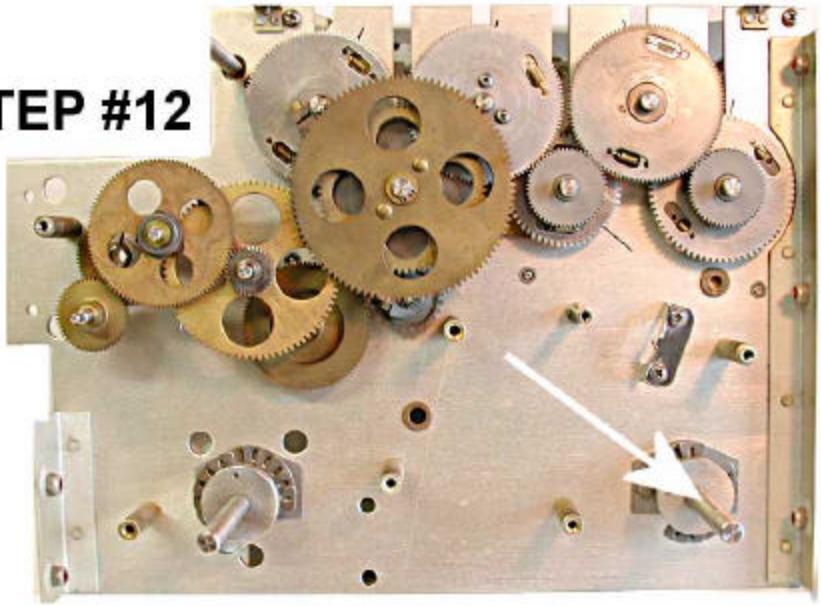
CLAMP FACES IN. WHAT IS IMPORTANT WITH THIS GEAR IS TO ONLY SLIDE IT IN FAR ENOUGH SO IT DOES NOT MESH WITH THE SMALL GEAR ON THE THIRD CAM FROM THE RIGHT. YOU MAY HAVE TO SLIDE THE GEAR ASSEMBLY THAT IS ON THE VERY RIGHT CAM OUT A BIT SO IT MESHES WITH THIS GEAR

STEP #11

SEE PICTURES SHOWING TOP VIEW.

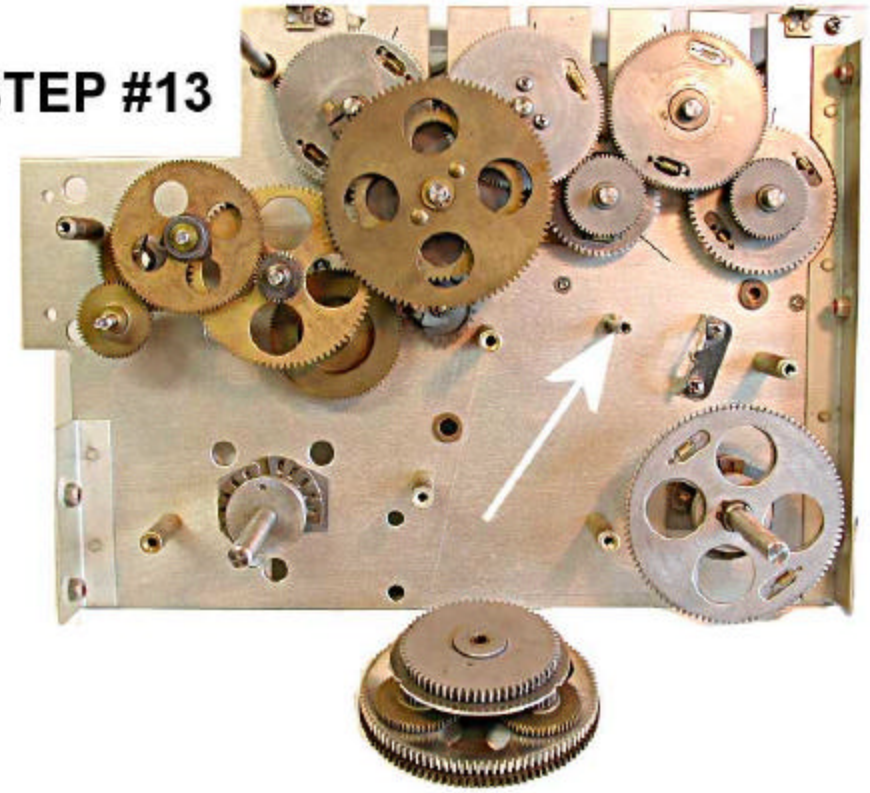
SLIDE THIS GEAR ONTO MHZ SHAFT WITH CLAMP SIDE FACING IN. ONLY TIGHTEN CLAMP LIGHTLY AS THE 10 TURN STOPS STILL NEED TO BE ADJUSTED.

STEP #12



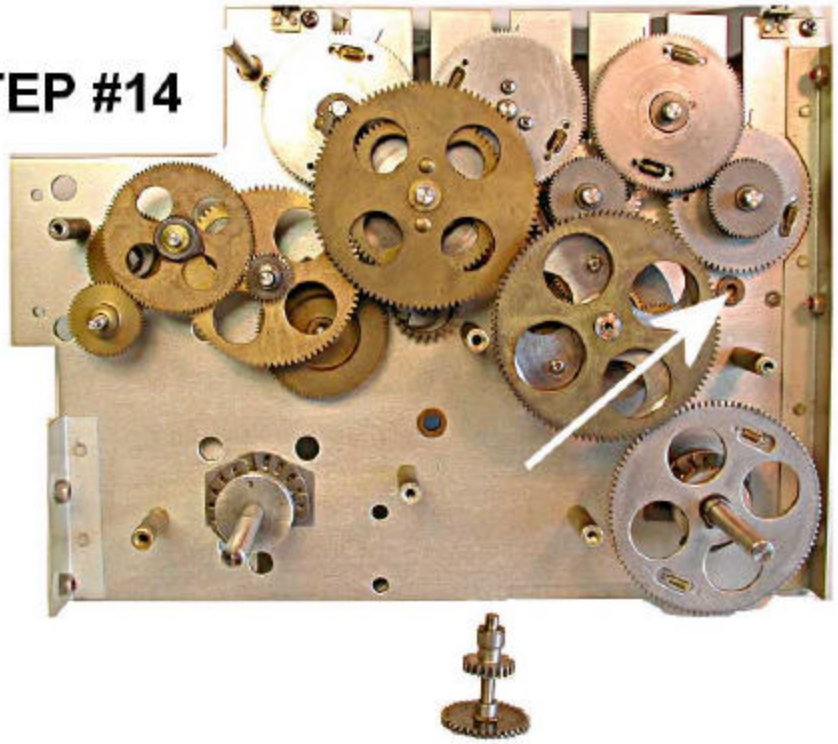
SOAK THIS DIFFERENTIAL ASSEMBLY IN GASOLINE OR OTHER SOLVENT FOR A DAY OR UNTIL ALL GREASE AND DIRT IS REMOVED. RINSE THOROUGHLY. DISASSEMBLY SHOULD NOT BE NECESSARY IF THOROUGHLY CLEANED. RELUBRICATE ALL GEAR MATING SURFACES WITH SYNTHETIC MOTOR OIL

STEP #13



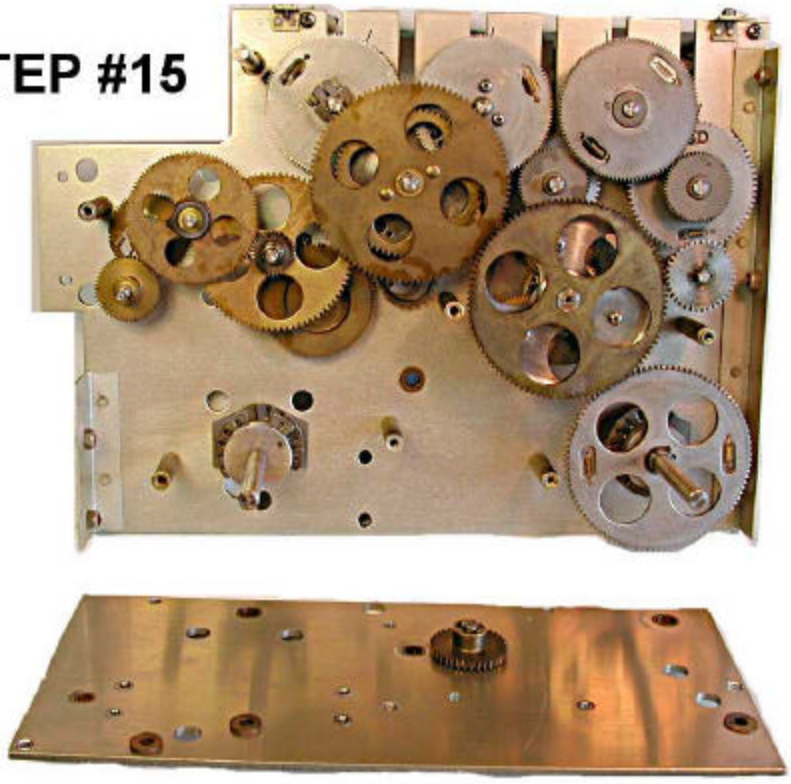
SLIDE GEAR ASSEMBLY ONTO SHAFT SMALL GEAR FACING INWARD.
IF THEIR IS ENOUGH DEMAND, I WILL SEPERATLY DO A REBUILD OF THIS DIFFERENTIAL ASSEMBLY.

STEP #14



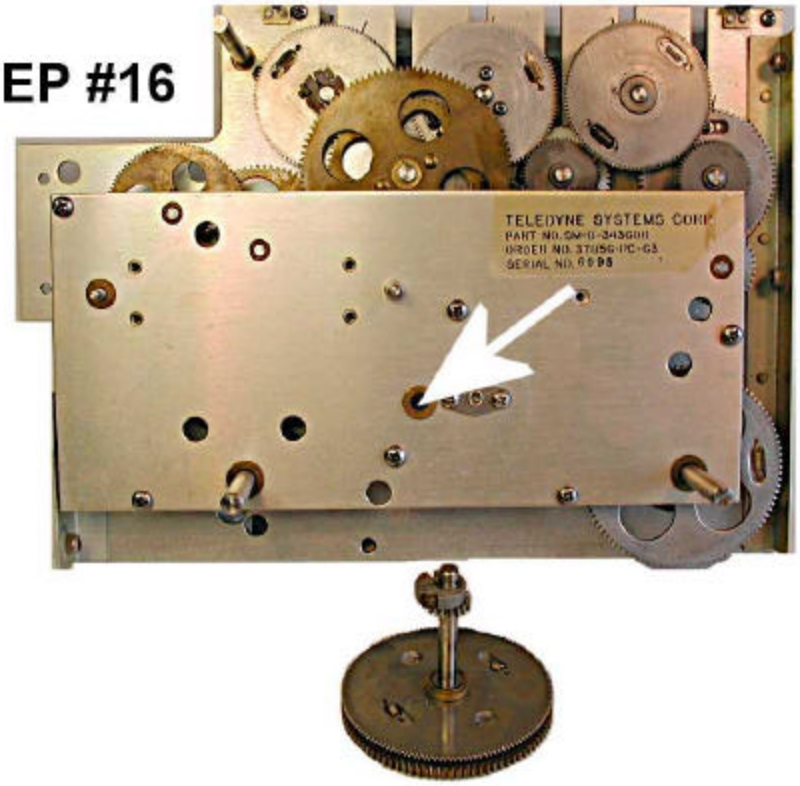
LUBRICATE END OF SHAFT AND SLIDE INTO BRONZE BUSHING.

STEP #15



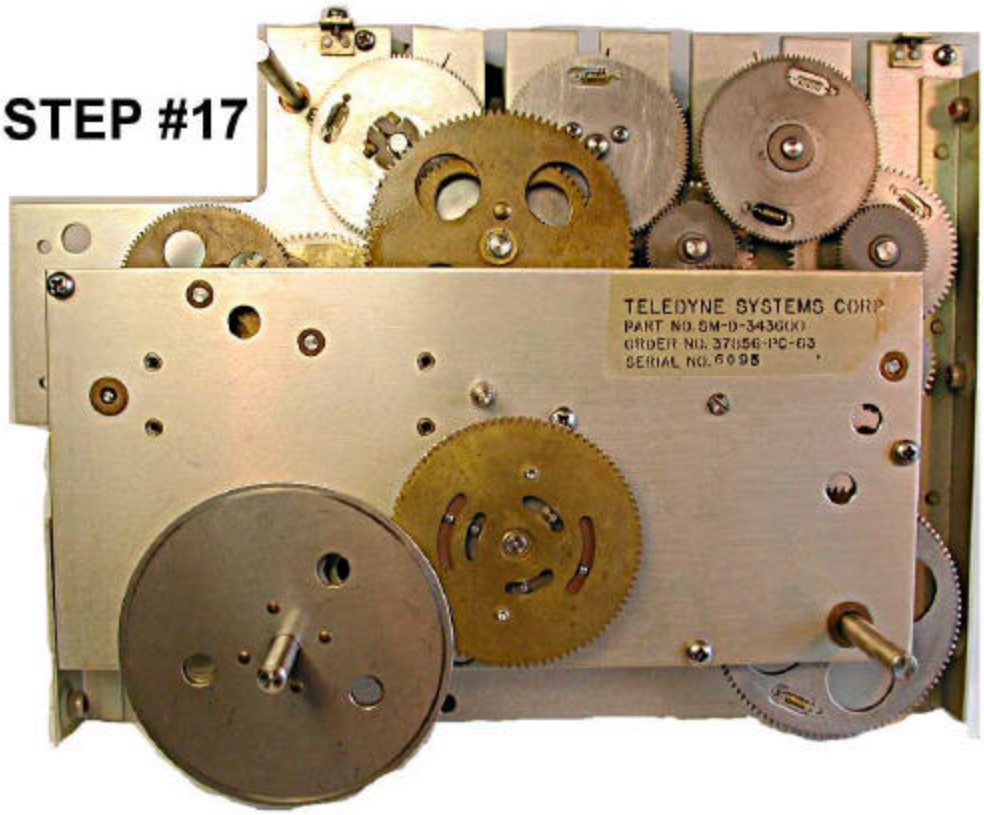
PANEL GOES ON NEXT. CAREFULLY ALIGN SHAFTS INTO BRONZE BUSHINGS ON PANEL. TIGHTEN ALL SCREWS GRADUALLY AND EVENLY.

STEP #16

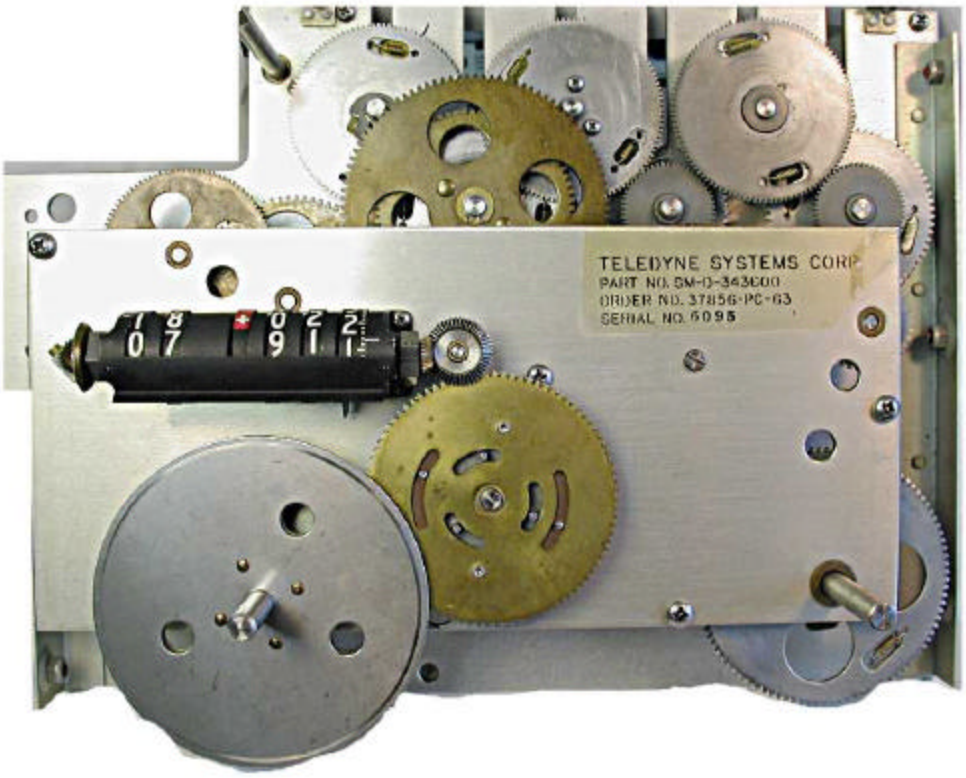


SHAFT WITH CLUTCH ASSEMBLY GOES THROUGH BUSHING AND SMALL GEAR AND CLAMP INSTALL ON SHAFT BEHIND PANEL

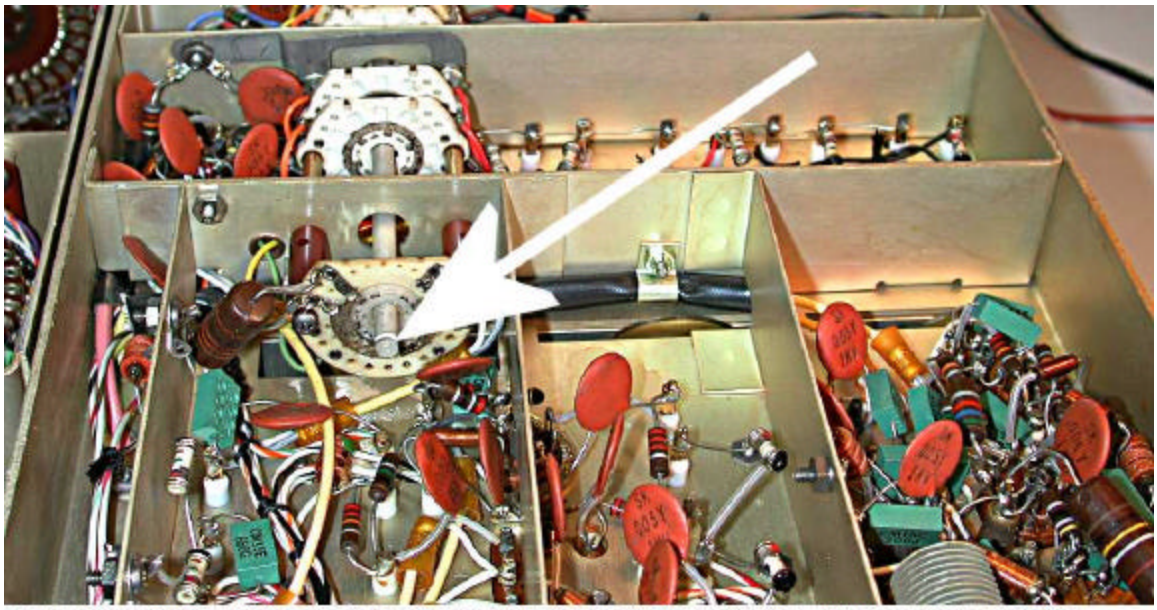
STEP #17



CLUTCH DISK IS CLAMPED ONTO KHZ SHAFT.

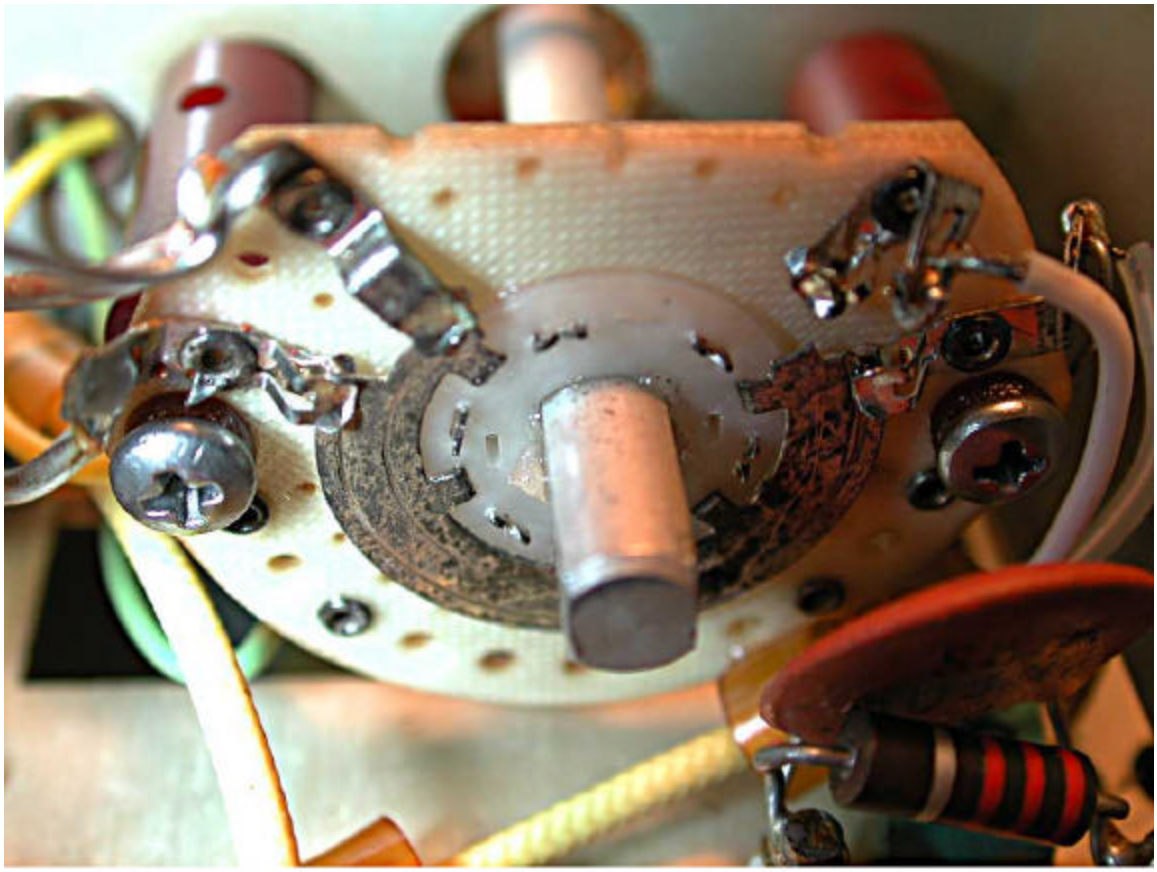


ASSEMBLY FINISHED!
TIME FOR MECHANICAL ALIGNMENT WHICH CONSISTS OF:
1) ALIGN THE CAMS AT 07 +000 MARKS.
2) ALIGN THE COUNTER TO THIS READING.
3) ALIGN THE BANDSWITCH.
4) SET THE 10 TURN STOPS.

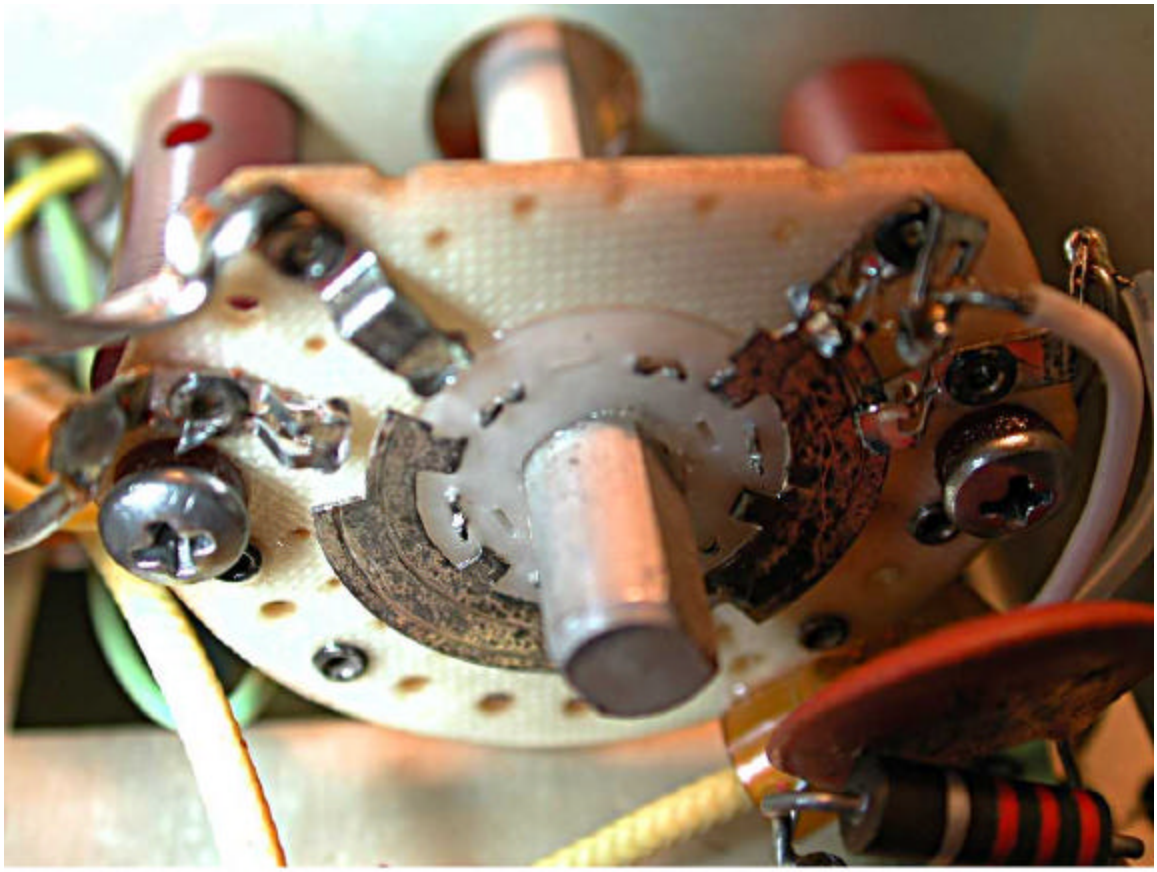


THIS IS THE WAFER OF THE RF BANDSWITCH THAT WE WILL BE LOOKING AT TO MECHANICALY ALIGN THIS SWITCH. IT HAS 6 POSITIONS. THE SWITCH CHANGES POSITIONS WHEN THE MHZ DIAL IS CHANGED FROM: 0 TO 1 MHZ, 1 TO 2 MHZ, 3 TO 4 MHZ, 7 TO 8 MHZ AND 15 TO 16 MHZ. NOTE THAT I SAID THAT THESE ARE THE TRANSITIONS AT WHICH THE SWITCH CHANGES. THE 6 SWITCH SETTINGS REPRESENT THE FOLLOWING BANDS: .5 TO 1 MHZ, 1 TO 2 MHZ, 2 TO 4 MHZ, 4 TO 8 MHZ, 8 TO 16 MHZ AND 16 TO 32 MHZ.

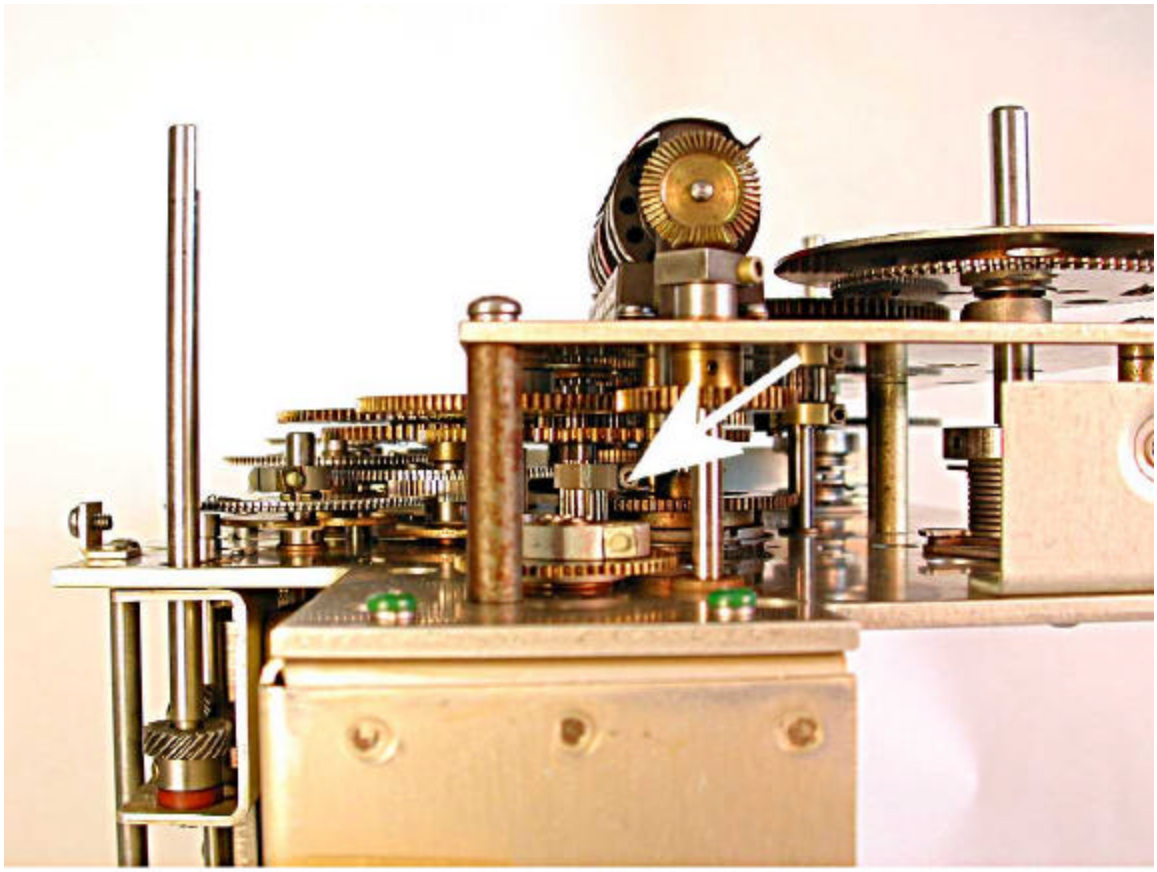
WHEN LOOKING AT THE RF DECK AND GENEVA DRIVE AS SHOWN IN THE STEP #1 PICTURE, TURN THE GENEVA DRIVE FULLY COUNTER-CLOCKWISE TO SET THE SWITCH ON THE LOWEST BAND, WHICH IS .5 KHZ TO 1 MHZ. NOW TURN THE GENEVA DRIVE SLOWLY CLOCKWISE AND THE SWITCH WILL TRANSITION TO THE 1 TO 2 MHZ BAND, THEN THE 2 TO 4 MHZ BAND, THEN THE 4 TO 8 MHZ BAND. THEN THE 8 TO 16 MHZ BAND. STOP AFTER THIS TRANSITION. NOW VERY SLOWLY TURN THE DRIVE BACK TILL IT JUST, AND I MEAN JUST, SWITCHES BACK TO THE 4 TO 8 MHZ BAND. THIS IS THE PROPER SWITCH POSITION FOR MECHANICAL ALIGNMENT AT 07 +000. SEE CLOSE UP PHOTOS TO CONFIRM SWITCH ALIGNMENT.



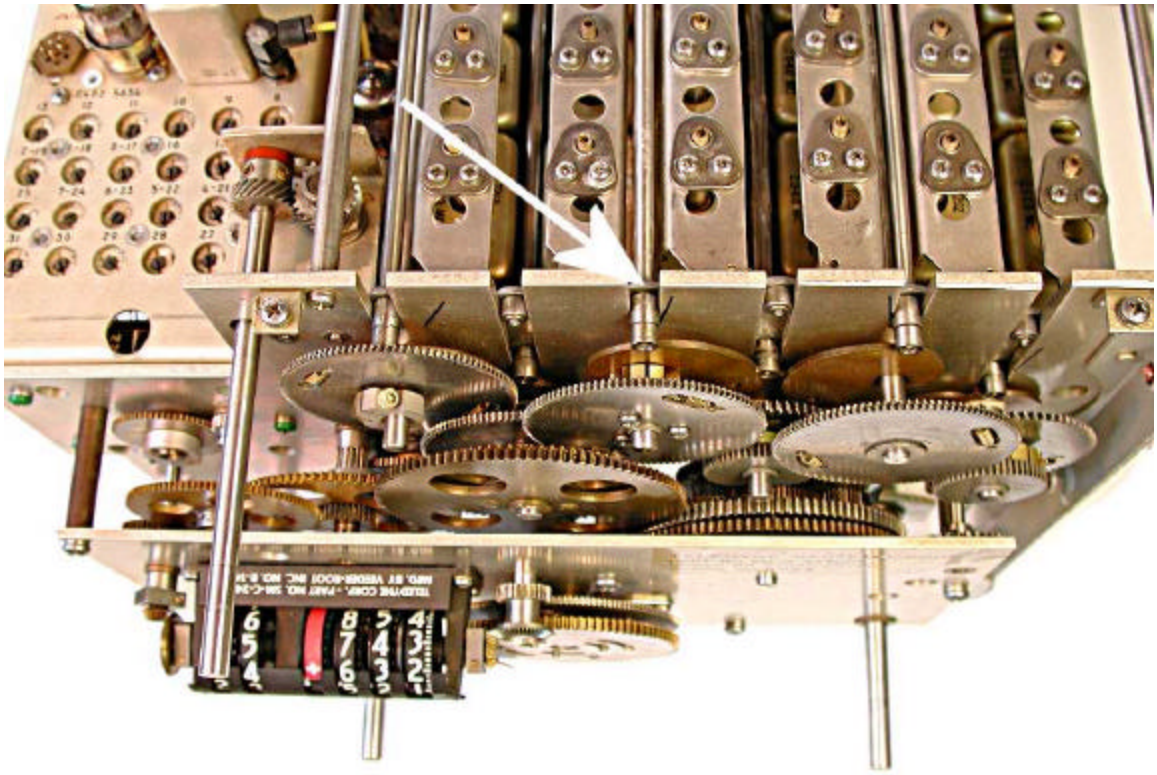
THIS IS THE POSITION OF THE RF BANDSWITCH REARMOST CONTACTS WHEN THE DIAL IS SET IN THE 07 MHZ POSTION. THE KHZ DIAL HAS NO EFFECT ON THIS SWITCH SETTING.



THIS IS THE POSITION OF THE RF BANDSWITCH REARMOST CONTACTS WHEN THE DIAL IS SET IN THE 08 MHZ POSTION. THE UPPER LEFT CONTACTS SHOULD OPEN UP AS THE SWITCH IS TURNED FROM 7 MHZ TO 8 MHZ. THERE IS ONLY ONE POSITION OF THE GENEVA DRIVE THAT WILL PRODUCE THIS RESULT.



THIS IS THE CLAMP THAT YOU NEED TO LOOSEN IN ORDER TO ADJUST THE RF BANDSWITCH. THE CLAMP HOLDS THE PINION GEAR AS SHOWN IN ASSEMBLY PICTURE #2. YOU NEED TO HOLD THE LARGE GEAR ATTACHED TO THIS SMALL PINION GEAR AND ONLY TURN THE GENEVA DRIVE TO SET THE RF BANDSWITCH.



LUBRICATE SLIDES WITH MOBIL 90 WEIGHT SYNTHETIC OIL. LUBRICATE ALL GEARS WITH MOBIL 1 SYNTHETIC 30 WEIGHT OIL. IT IS IMPORTANT TO USE SYNTHETIC OIL BECAUSE IT WILL NOT DRY OUT AND HARDEN WITH AGE. THE GEARTRAIN WILL NEED TO BE LUBRICATED EVERY 6 MONTHS TO 1 YEAR. NEVER USE GREASE. IT WILL JUST MAKE A BIG MESS.