

Tempo 2020 Preselector Sprocket and Chain Replacement

Here is a question that undoubtedly is on the mind of Tempo 2020 owners: “Can I replace those cracked ladder chain sprockets in my rig?” Based on my experience, the answer is a qualified “Yes.” Previously, I have repaired original sprockets that weren’t too badly cracked by gluing on a nylon sleeve to the sprocket hub and rotating the crack away from chain engagement. Following up on a suggestion of a member of the Tempo_2020 Yahoo group, I have located a source for new replacement sprockets and chain.

An online source for metric sockets and chains is *sdp-si.com*. SDP/SI sells all sorts of mechanical replacement components. They are the only source I have found for the required metric sprockets and ladder chains with a 6mm shaft. What is needed for replacing the 2020’s ladder chain components? The replacements must obviously be similar in size to the originals to avoid interference between the *Preselector train* (3 sprockets) and the *Bandswitch train* (5 sprockets). They should be able to handle the load of their respective train. The original sprockets are nylon, which is a very tough and durable thermoplastic, but the material has been subject to age-related degradation in many Tempo 2020 rigs. The result is shrinkage and splitting/cracking along the hub, primarily over the Torx-drive setscrew hole, and propagation to a crack between sprocket teeth. The replacement matching sprocket/chain I found that most closely could fit the requirements is acetal plastic sprockets with a brass hub and chrome-plated brass chain.

A 6Z 8M211606

A 6Y 8M21

The SDP/SI part numbers are ~~AGY8M211606~~ for the sprocket and ~~AGY8M21~~ for the chain. The sprockets are priced individually, and the chain is priced by the meter. The sprockets not exact replacements for the 2020’s sprockets, as the 2020 has 13-tooth sprockets, and the replacements are 16-tooth. Also, the replacement sprocket hubs are smaller in diameter and length, and the brass insert is not as thick. Replacement chain and sprocket must be matched; i.e., have the same pitch. The thickness of the teeth is fairly close, but thinner than the 2020 teeth. These factors are important; acetal is not as tough as nylon in the service they are employed.



See Photos 02 through 07b for close-ups of the replacement sprockets and their differences from the originals. The difference in manufacturing is evident. The original sprockets were molded onto machine-crosshatched brass hubs. The replacements appear

to have been glued onto considerably thinner brass hubs. The setscrews in the replacements are not as substantial, also they use Allen drive as opposed to Torx drive. Combined with the thinner brass walls of the hubs, this implies that the setscrews can’t take as much tightening torque.

I have completed a replacement of the Preselector sprocket and chain on a Tempo 2020. Why the Preselector only? Part of the answer is that the Preselector ladder chain has a spring in it, and it is easier to replace than the Bandswitch ladder chain. But, in order to replace the Preselector sprockets and chain, it would be difficult to do that without removing the Bandswitch chain...so why not replace those sprockets as well? The second part of the answer is that getting the new sprockets to fit on the 6mm shafts is not easy...they are a significantly tighter fit. The Preselector fitting requires that the two capacitor assemblies (transmitter and receiver) be identically meshed and unmeshed, and the main

Preselector shaft is at its stop for full CW and CCW simultaneously. The Bandswitch has five shafts that have to be exactly coordinated, one (the main shaft to the knob) which rotates opposite to the other four. “Fiddling” the location of the sprockets on the shafts would be a very difficult challenge for the Bandswitch due to the tight fit of the brass hubs. A third factor is the rotating torque that is applied to the sprockets in use. In my opinion, the Preselector drive puts less stress on the components than the Bandswitch drive, and it is less critical in its function. Mis-positioned bandswitch segments could be catastrophic in the transmit stages.

In the accompanying set of photos, the front panel of the 2020 has been dropped, and the triangular shaft feed-through panel has been removed (two small screws). In Photo 01 you are staring at the shafts, sprockets and chain. The Preselector is shown rotated in the full-CW position. Note the position of the spring on the Preselector ladder chain.

Removal and replacement steps:

1. Rotate the Bandswitch to the 27.0 MHz or 15.0 MHz position, whichever provides easier access to the setscrews. Make a note or simple drawing of the Bandswitch sprockets’ setscrews positions. Also note the way chain loops around the sprockets as well as the “open” side of the chain and which direction the “tab” ends of the chain face. See Photo 01 for reference. It’s a good idea to browse the set of photos and read through the entire procedure before beginning the work.
2. Referring to Photo 01, look at the small Phillips screw in the vertical slot at the upper right. This screw locks the adjustable idler sprocket position and provides tension on the chain. Loosen this screw and push the idler down to remove tension on the chain.
3. Remove the setscrews (Torx T8) from the Bandswitch sprockets. [I bought a set of Torx L-shaped drives from Fry’s Electronics, about \$13. They are made by Wiha.] The setscrews for the replacement sprockets are 1.5mm Allen drive.
4. Slide the sprockets and chain off the various Bandswitch drive shafts and idler shaft.
5. Rotate the Preselector fully CW. Note the spring in the ladder chain for the Preselector drive train. Rotate the Preselector fully CCW, again noting the position of the spring. With the new chain and sprockets installed, these relative positions will be approximately the same.
6. Note the “stretch” of the chain spring. On my rig, it was approximately 12.45 mm. Gage its tension by pushing the long leg of the chain with your finger.
7. Remove the setscrews (Torx T8) from the Preselector sprockets.
8. Starting with the upper left-most sprocket, remove the 3 Preselector drive sprockets along with the chain. You will probably want to use the best 5 of the combined 8 sprockets for reinstallation of the Bandswitch drive train.
9. Measure the untensioned spring separation. On my rig it was 8.3 mm. Note how the “tabs” on the chain and tabs on the spring engage each other (best to make a drawing, with the center of the V

of the spring facing “outward. “Using a small-jaw needle nose pliers, bend the loop ends of the (a) chain and (b) spring and remove the spring.

10. The length to be cut for the replacement chain will not be the same as the original, due to the difference in sprocket overall diameter.
11. Count the number of links in the original chain. My rig had 53 links.
12. I experimentally determined the length of the replacement chain by sliding the new sprockets in place and winding the chain over them, marking where the ends should meet (without using the spring). I then unwound the chain, and I determined that the chain should be 3 links short of the end mark to account for the 12.45 mm of the spring when stretched.
13. After these measurements, I ended up with a new chain of 62 lengths. The original chain was 53 lengths.
14. Ensuring that the chain is properly positioned as it was when you removed it, position the spring on the new chain. The difference in the width of the new chain will not matter once the chain is reinstalled. Crimp the tab ends of the spring and chain in place.
15. Spread the chain out with your hands and make sure it looks like Photos 01 and 10. I installed the spring the wrong way the first time and had to redo it.
16. Position the two Preselector shafts by hand to the fully CW position, and do the same with the Idler/stop shaft.
17. Refer to Photos 11 through 14 for the next steps. Slide two replacement sprockets onto the two preselector shafts.
18. Loop the chain over the two sprockets on the shafts, and hold the third sprocket by hand with the spring as in Photo 11. Slide the third sprocket onto the idler/stop shaft, expanding the spring. The spring should be in a position where it does not interfere with the idler sprocket.
19. Making sure that the driver preselector and receive preselector capacitor assemblies do not move, position the first two sprockets such that a) there is a slight clearance from the hubs to the shaft bearings along the shaft, and b) there is little or no slack in the chain between the two sprockets.
20. Again referring to Photos 11 through 14, tighten the setscrews in the three replacement sprockets. Do not over-tighten. The smaller Allen setscrews can not handle as much torque as the larger, original Torx setscrews, and the brass hubs are not as thick as the originals.
21. Rotate the Preselector drive shaft from full CW to full CCW several times and note the following: a) the idler/stop screw hits the stop at the end of the capacitors’ rotation; b) the chain spring does not interfere with the sprockets at either end of the rotation (see Photos 15 and 16); and c) there is tension on the long run of the chain. The distance between the spring legs should be approximately

12.45 mm, similar to the original. This is not a critical measurement. Push the long leg of the chain to gage its tension as in step 5.

- 22. This completes replacement of the new sprockets and chain. Next will be reinstallation of the Bandswitch sprockets and chain.**
- 23. The bandswitch shafts must be in the same position as when they were removed, i.e, the main bandswitch shaft will be rotated fully CCW and the other 4 fully shafts CW or vice-versa.**
- 24. With the setscrews slightly loose, slide the sprockets and chain onto the 5 shafts. Refer to Photo 17.**
- 25. Position the sprockets on the four short shafts so that there is a slight clearance away from the shaft feed through bearings and there is no interference with the Preselector chain sections.**
- 26. It is difficult to gage the tension on the Bandswitch drive chain. I set the sprocket screws on the bottom left, upper left and main shaft sprockets first. Ensure that there is no slack in the chain, and tighten those three setscrews with the T8 Torx tool.**
- 27. Push or pull up the idler sprocket from behind the bulkhead and temporarily tighten it. Finger-check the five chain spans and determine if the slack has been taken up on all. For the top three sprockets, adjust the idler/tensioner as necessary. Then, tighten the 3 remaining setscrews in the sprockets.**
- 28. Using a regular screwdriver, rotate the main bandswitch shaft and ensure that it rotates through all 10 positions. If it does not, one of the shafts is in the wrong position.**

If all has gone well, you should now have functioning Preselector and Bandswitch drive assemblies. Time will tell if the replacement sprockets will hold up in service.