Intermountain Cab Forward AC-12 Issue RECAP

1ST VS 2ND RUN -- Kenneth R Clark, P.O. Box 127054, San Diego, CA 92112

For those who have the second run, maybe you could tell those who us who have first run models what are the exact changes from the first run in the drive train (motor to drivers).

Key elements in the drive train are: the motor - appears to be the same which could be a problem the gear reduction tower - 1st run was about 8:1, but needed to be only 4:1 the axle gear ratio - 1st run was 10:1 because the 30 tooth axle gear was driven by an unusual triple lead worm (first I have seen in an HO steam model)

DC VERSION TEST -- Jim Elliot

The comments all seem to be about the DCC and sound equiped AC12's.

1. Has anyone made test runs with the DC versions?
2. Do the tests result in similar problems?
3. Does the motor still overheat?
4. What about speed and pulling power?

TEST RUN – Leo Pesce

Tonight I finally got to the club and finished my testing, and indeed I was disappointed.4275 started rebooting going up the grade (and this after flipping the decoder in the tender). Eventually the motor stopped working at all, though the sounds kept on going. Someone said recently the decoder heatsink was a red herring, and he was right. After reading your report, I am convinced that the short you have seen, is also causing (possibly) the rebooting of the decoder. I used three different tenders with the same result, so I know it is in the engine. As to why it is happening only going upgrade, beats me. 4280 kept working, but eventually got down to a snail pace to the point it could not go up the grade even by itself. One thing I noticed though was that if the engine was on a flat part, it worked fine, or going down the grade. Again, after reading your report, the wipers issue and gears restrictions seems to be the correct issue.

DISASSEMBLY WITHOUT CUTTING PARTS – R. David Carr

David sent out an e-mail to the Espee group with an Adobe attachment. It is from Intermountain and is titled "HO Scale AC-12 Gear Box Replacement Instructions". **Refer to attachment**.

PROBLEM RECAP -- Jim Bright

As a lot of others in this group,I have been struggling with an AC that didn't want to perform well. With some good input from some others and a bunch of trial and error it turns out that there are three fairly simple procedures that when done turned my AC into what appears to be a good runner. In the process of all this I replaced the "weak" motor with a Mashima 1833 which is stronger but didn't solve the problems. The AC was running like it had it's brakes on which it did and the Mashima was drawing about .6 amps with higher spikes and some herky jerky running. After the fixes were implemented the AC ran smoothly and the Mashima used only .25 amps.

The **first problem** was the **gear tower**. When I removed it from it's mount on the fixed engine drive I found the gears were tight and hard to turn. The cover was screwed on so tight I had to place it in a vice and use a large channel lock on the screwdriver shaft to loosen the screws -- one screw even sheared off. Once the screws were backed off about half a turn the gears became free turning. I opened the gearbox and cleaned out a lot of the excess grease and used a small amount of light oil on the gear teeth and gear posts. The cover was screwed back on but not nearly so tight and the gears turned freely.

The **second problem** was with the **worm gearboxes** on the two engine drives. When you remove the cover you will probably notice some small washers that are used to shim the cover. This indicates to me that something was binding and the shims were used to relieve that. The gears seemed to turn fairly easily by hand so I thought all was ok there and that the binding I was seeing with every driver revolution was caused by a problem with the side rods, which it wasn't. On a recheck of the gearbox I noticed that the bearings wouldn't set down in their seats but the worm was firmly on the axle gear. The axle gear evidently has a diameter that is about a millimeter to big. So, at least in my case, even with the shims in when the lid was screwed down, it was still causing the two gears to bind. I backed off the screws until just before they became loose and tested the running quality that way. No more hesitation -- just smooth even running. I used a dab of thick CA on the side of the screw heads so they wouldn't loosen any more.

The **third problem** is the **pickup wipers**. There are sixteen of them and, as pointed out by Pete Cesaro, they press against the drivers much harder than they need to for good pickup. When the wiper pressure is reduced you remove a whole bunch of drag from the system.

After the adjustments in these three areas I reassembled the loco to the point where all the weight was reinstalled and it was runnable on my clubs layout. A high speed test run using an electronic speed trap gave a readout of 83.4 smph and I'm not sure I had the throttle all the way full. I'd never run the loco at any where near that speed -- I'll probably set the top of the speed curve somewhere near 50 smph and do most of the running in the 40 and below range. What I like about this is that at the speeds I will be running I won't have

to have the motor going wide open. The other thing that is good is that both starting and slow speed control are excellent and it pulled 32 heavy ore cars -- probably equivalent of 20 - 25 forty foot cars up a long 2% grade with no trouble. Even did a startup on the grade with no trouble. I ran the engine for about an hour and there was no sign of heat or slow down or anything like that.

I'd suggest that before replacing the motor you verify good operation in the areas disused above. It's quite possible you may find the original motor is quite serviceable. If not, you can always do a motor swap.

There was one other thing I think I should mention. While doing all this I started getting a **short** in the engine, not the tender. I turned that the flanges on the first set of drivers by the cab were contacting the piping connections for the blow down devices. When the engine is apart it's easy to remove the part the **blow downs** are connected to and trim away a little material -- it looks like they already had trimmed some in this area, but on mine not enough.

I do have one continuing problem and that is the **tracking of the pilot truck**. Even with the longest spring I still got an occasional derailment. I'm going to try adding a little weight to the truck itself and see if that doesn't help

So there -- you have what seems to have worked well for me. I'm just hoping there isn't some gremlin lurking in that background that jumps out with a new problem

DISASSEMBLY PHOTOS -- Jim Bright

Last night I posted photos to the Yahoo group's photo section. The disassembly photos were taken by my friend Mike Cartabiano and are fairly small files. I'm waiting for him to return from a business trip to get larger replacement files. I also included some photos of the replacement I did of the motor with a Mashima. The Mashima fits the motor chamber like a hand in a glove but the clearance for the wire connections is quite close and some type of barrier should be placed to avoid a possible short. I like some cushioning around the motor so I trimmed a bit of material away from the sides and the back where the wires connect. I used a piece of facial tissue as a liner which gave me a press fit. I also placed a small bit of tissue in front, behind and above the motor to help keep it secure and absorb any vibration. If I was going to us glue to secure the motor I'd use either E-6000 adhesive or Goop. The flywheel is the one from the original motor. If I had a milling machine I'd make room for a decent size flywheel.

The photos are posted under the title **"IRC AC-12 disassembly....."**

CHANGES MADE – IMPROVED PERFORMANCE -- Bill Rogers, Fort Collins, CO

I have been following the InterMountain AC-12 discussions with great interest as I have recently acquired two of them. The ideas and experiences of other group members regarding fixing the various problems with these locomotives have been extremely helpful in getting my locos to perform satisfactorily. Many thanks to everyone who contributed to this discussion. Since there is nothing really new or amazing in the changes I made to my locos, I won't go into the details here. However, I have posted an article about my experiences tweaking the two locos that I got and some pictures of the decoder heat sinks I installed in their tenders at:http:// www.steinborn.org/billr

DISASSEMBLY, FIXES & TEST – Leo Pesce

I opened the IM AC boiler without making any pipeline cuts.
After talking to a friend of mine, he suggested to look for other locations for making the cuts, or possibly discover if the indicated pipes would be attached to other locations and trying to detach them from there, or cut them from there.

- I discovered the turret cover behind the cab was holding down the pipes, which when taken off, would be free to slide through the hole in the walkway.
- A surprise was on the smokebox front, where a major appliance with a large pipe was not glued to the front, and pops off.
- At this point I also detached the cab handrails from the steps.
- So after removing the top three screws, and the two screws under the cab (these are not easy to get to, and may be a problem putting back on), I was able to wiggle the top boiler/cab off the main engine.
- After that I took out three screws that hold the top weight and after moving that aside (there are two wires threaded through a hole in this weight), I had access to the motor.The initial inspection was the motor. It comes off easily. It was an interesting mount, which comprises of cradles milled in the weights, two plastic plated fixed at the motor bearings and two O rings around the plate grooves. Locking the top weight locks the motor in place.

1. As a first test I turned the flywheel manually a complete driver circle. I noticed at one location there was a bind. The rest of the turns was pretty free. Later I showed the issue to a friend of mine, and he discovered that the piston rod on one engine (the articulated in this case) was fully into the cylinder, and possibly that is the cause of the bind. Further tests will be done to address this.

2. I then clipped leads from a DC throttle and applied voltage (the tender was not connected). The motor started smoothly till it got to the bind. A little more voltage and the motor was able to pass the bind. I increased the voltage finally to max, and I was

astounded by the speed of the wheels. They were flying. This confirmed to me why my other friend non sound AC had no problem reaching the advertised speed.I then checked the amperage; unfortunately I did not have my larger voltmeter handy, so I used a cheap one I have for quick voltage readings; this one only went to 250 mA. I reached the 250mA about 50% on the throttle (I was using an MRC 2400). I will report back once I get my hands on the larger voltmeter.

3. I then let the engine run for about 15 min at 50% throttle, and though the motor was luke warm at the beginning, it was hot to the touch towards the end. I stopped then to let it cool. I did not attempt to separate the two engines to understand better the bind issue, and possibly if this engine has an issue with the tower. The indication of the amps would indicate that there is friction in the drive train, and as indicated in other posts, this could be the tower. Due to how the motor is mounted ad locked,

I am curious how people that changed the motor locked it in place. I need to go back to the posts to see if that was already mentioned. Will continue to report the findings.

AC-12 ACCESS -- Jason Hill
My photo essay on opening a IM AC-12 are now uploaded to the photo section. This is a copy of my read-me file with other notes. Quick Instructional Notes for disassembling an Intermountain AC engine General note: Look at photo notes for individual locations of steps.

1. Glue and cut piping at marked locations
2. Remove screws from bottom of cab, and from under dome, steam turret, and FWH on top of smokebox.
3. Note for first time disassemblers: remove your cab first. The engine I have used to take photos of I glued the cab to the top of the boiler.
4. Carefully, slide boiler up at the front and then back towards the smokebox. Beware of small wire piping and plastic pipes under left side of smokebox. See photos for areas of concern.
5. Lift boiler top off of rest of engine. Note: wires to the factory lighting board behind the back head in the cab.
6. For further disassembly into the motor and drive train. - Mark wires running down through hole in front of boiler as A-A and the other as B-B. This will allow you to reconnect the two wires later.
7. Cut wires A-A and B-B and unscrew three screws in top of boiler weight.
8. Unthread the wires through the hole and remove boiler top weight.
9. Modify boiler top weight with Dremal for wire routing outside of previously used hole.
10. Rewire for custom lighting.
11. Reassemble in reverse order.

CAB & ENGINE ACCESS -- Steve Carter
That's a nice set of photos Jason. Thanks for posting them. Just one question? How do you access the screws under the cab, to remove the cab? I noticed that on mine, the plow and silver area is rather loose, suggesting it can come off to access the screws, but I don't see and obvious way to do so.

DISASSEMBLY -- Jason Hill
I'm not saying that you HAVE to cut and reglue all of the pipes in my photo essay. It is just that about the 10th time into the engine, the piping gets VERY annoying to keep threading and bending out of the way. With the modifications I make the engine comes apart in about 2 minutes.

TEST RUN AFTER FIXES – Steve Carter
I had all ready installed my own Tsunami decoder and took it for a short test run, 15 minutes or so.
After reassembling the locomotive, I spent a few hours installing decals, and re-installing the decoder, so the heat sink was up and free of most of the plastic. It was also lubricated per the instructions and the medium spring installed on the front truck.

Saturday I took it for an extended test run on the PSMRE Layout in the Washington State History museum. The run was with an mu'ed BLI AC5, 14 free rolling cars and a caboose. The IM was on the point and didn't get far before it derailed on a switch, both the front truck and the first motor. After that it ran well and for about 15-20 minutes. I checked the tender for heat and found nothing noticeable. I was called to take care of a problem elsewhere and left the train for about 10 minutes. When I went to start it up, the decoder made all the right sounds, the BLI tried to move but the IM just sat there. No wheel movement at all. I removed the IM from the track and left it off for about 45 minutes. It was then placed on the tracks again and refused to budge. I've not yet attempted a diagnosis but I'll post an update when I learn more. In the meantime, anyone have a suggestion or two?

Other's ACs may have additional problems, but this is all I did to mine.

HEAT SINK -- Pete Cesaro
On my unit I have added an aluminum heat sync to the decoder, replaced the original no-name motor with a Mashima flat can of the

same dimensions, and opened up the area under the four tender hatches to allow any heat to escape. I do like the option of turning the decoder heat sink up but I wanted to go one step further. There is definitely some serious heating going on when you can feel the tender body and it is warm to the touch only after about 15-20 minutes of run time. I have not had a chance to really put it through its paces yet but will over the weekend.
My 2 cents

HEAT SINK -- John Gillette
This is definitely a good idea. If the heat sink is contained in a more or less sealed plastic box, aka the tender, all it's going to do is transfer the heat to the air in the box more efficiently than no heat sink and the box will still contain that heated air. That decoder is going to generate the same amount of heat energy to be dissipated no matter how the heat sink is oriented. You still have to continue moving that heat energy out and away. It appears you are getting thermal shutdown, but is it shutting down on purpose? And if it isn't on purpose that implies that possibly sometime it won't and you get a warped or melted tender shell.
Dang I better drag mine out and see what gives on it.

HEAT SINK INSTALLATION
After carefully separating the decoder from the speaker enclosure and peeling off the foam tape, I installed the heat sink over the speaker enclosure, aligning the hole in heat sink over the screw hole in the tender floor. Next I applied heat sink compound to the decoder and fastened it flat side down on the heat sink with a piece of blue electrical tape. See the following photo. There have been no more overheating incidents, even with periods of continuous operation as long as 45 minutes. The wiring was, and still is, a bit of a mess. That may get tidied up later. But for now, it works; and out of sight, out of mind.

HEAT SINK -- Chuck Catania, www.cpcrr.org
I concur with the problem being the motor and will be very interested in your findings. If the fix is to change the motor, I'd consider doing a swap for a DIY running gear kit for the 1st run, and replace the LEDs at the same time. I attached a heat sink to the decoder with Kapton tape and left it in the open air. I secured the decoder interface board so it would not move around. The reset issue went away with this fix. So we had a red herring which slightly covered up the current 2nd run issue. I ran my 1st run loco, with the 2nd run tender. The pulling power of the 1st run is obviously better and no slow down. I did not have an issue with speed on the 1st run, only gear noise and out of gauge wheels.

HEAT SINK DECODER OVERHEAT
An Intermountain AC-12 was on my Christmas list and Santa Claus came through. After reading about the various troubles people have had with their AC-12s, I had some concerns about this locomotive. After lubing it as described in the instructions I placed it on the layout and began testing. The initial results were not too bad. The locomotive ran smoothly and quietly. The top speed was about 39 scale miles per hour. This was somewhat slower than I would have liked, but was marginally acceptable. The current draw at top speed was .45 amps. This seems high to me, but again is marginally acceptable. I did have one **decoder overheating** incident after about 25 minutes of continuous operation. The rear light blinked several times and the loco shut down. After a minute or so it restarted and continued on. Time to open the tender.

I had read on the Espee group at Yahoo about the decoder overheating and short circuit problems with the weight in the tender, so I was pleased to discover that insulating tape had already been placed between the weight and the brass pickup strips in the floor of the tender. This locomotive was shipped directly from Intermountain (in Loveland, CO) to our house. This problem must have been corrected at Intermountain.

To solve the decoder over heating problem I made a heat sink from .03 inch thick copper sheet as shown in the next picture. It is about 2 1/2 inches long by 1 1/8 inches wide. There are two ears bent down to fit over the sides of the speaker enclosure. The ears are 7/16 inches wide. The hole is for post that secures the tender floor to the tender body. I bought the copper sheet at Ace Hardware here in.

POWER PICKUPS -- Pete Cesaro
The tender is not really getting HOT, but when you consider that we are discussing electronics if the tender even gets overly warm that means the relatively small decoder is generating a lot of heat. By reducing the drag of the wipers the current draw has dropped about 20% which equates to less heat which should definately help things, it certainly has on my engines.

POWER PICKUPS -- Posted by: "pdsteam@aol. com" pdsteam@aol. com pdsteam
Sun Dec 27, 2009 5:53 pm (PST)
One of the things I determined from my troubleshooting efforts is that there is a lot of mechanical resistance in the drive train due to the excessive pressure created by the phosphor bronze pickups. By re-bending them it has reduced the current draw of the motor and the engine runs much more smoothly. Now with an adequately powered motor this would not be as big an issue but is has made a big difference with this engine.
With the current draw at or near the maximum of the decoder, maybe even peaking over the max, and the decoder being in an enclosed

area with no air circulation, this could certainly cause the heat we have been realizing.

POWER PICKUP -- Ernie Fisch,, ernfisch@cox.net
On Jan 12, 2010, at 7:07 PM, Rob Sarberenyi wrote:
Brian, my friend Dr. Leo Pesce did that with the contacts on his two IMRC AC-12s but didn't notice any improvement. In fact, his locos have gotten worse and he's become quite dissatisfied with them overall. He's run several tests with the locos on two different club layouts and has yet to find a workable solution. Hopefully he'll comment on this thread.
Today I ran an AC-12 on straight dc to see what its draw was. It is a 1st version. Creeping along it drew 125 mA. When I kicked the speed up some it drew 140 mA. This is a very reasonable current draw for a modern loco and indicates fairly free running. I never checked the wipers as this engine is being returned (long story not to follow).

POWER PICKUP -- Brian Moore, Plymouth, UK
Don't do it! I've just removed the bases of the articulated wheel sets (an easy three-screw job), pried off the contacts, and saw that they were vicious. Using a set of curved tweezers, I bent the contacts to a far less acute angle.
Result: Astonishing improvement in the running of my two AC12's. I can even live with them if they don't run better than tonight. Both happily pull a 22 car reefer train at 40 mph AND DO NOT SLOW DOWN (Shouting on purpose here).
As I've just said to Mr de Weert: It's all in the wipers, Wouter.

POWER PICKUP -- MECHANICAL RESISTANCE -- Pete Cesaro
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The tender is not really getting HOT, but when you consider that we are discussing electronics if the tender even gets overly warm that means the relatively small decoder is generating a lot of heat. By reducing the drag of the wipers the current draw has dropped about 20% which equates to less heat which should definately help things, it certainly has on my engines.

DRIVE TRAIN -- Kenneth R. Clark , P.O. Box 127054 , San Diego, CA 92112
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Key elements in the drive train are:
1. motor - appears to be the same which could be a problem
2. gear reduction tower - 1st run was about 8:1, but needed to be only 4:1
3. axle gear ratio - 1st run was 10:1 because the 30 tooth axle gear was driven by an unusual triple lead worm (first I have seen in an HO steam model)

GEAR RATIOS -- Kenneth R. Clark, P.O. Box 127054, San Diego, CA 92112
For the second run ACs the reduction from motor to wheels is 18:1. The gear tower is 1:1 so the reduction through the worm gear has to be 18:1. The motor would probably be all right if the whole drive system turned freely. For most of us the drive doesn't turn freely so the motor is inadequate.

GEAR RATIO -- Jim
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IM AC-12 ...Final Gear reduction -- Ken Clark
I believed the problem was the gear tower used to lower the drive train from the motor to the gearboxes. I removed mine from the model to investigate and found an excessive gear ratio of 7.74:1. In subsequent
discussions I found that some of the readers were confusing this gear tower with the axle gearboxes. On the IM model the axle gearboxes are non-idler, unlike the BLI and later KTM models that used Idler gearboxes. I also indicated that I intended to take a closer look at the worm in the axle gearboxes.

I have now looked at the worm and that explains the entire drive train gear reduction. The Axle gear looks to be around 25-27 teeth. I have not removed it from the axle to make an accurate count. For simplicity sake let's assume that it is a 27tooth gear, like used in KTM and Samhongsa models with 63" drivers. Coupled with the 7.74:1 gear reduction in the transfer gear tower. The total gear reduction would appear to be about 209;1. Since the motor RPM is around the same 10,000rpms as the motors I use in my KTM

models with 37:1 gearboxes , I would expect a top speed of only 1/5 that of my KTM engines. But the IM AC-12 is not that slow. The reason is the worms used in the axle gearboxes.

They are TRIPLE lead worms; making the final axle gear only 9:1, less than most diesels. The total gear ratio is actually around 70:1; which really is consistent with the observed speeds. I have never seen a triple lead worm before in a HO model. I have some double lead worms in the gear boxes of logging engines: but the triple lead is a first. Typically the worm is a single lead to provide a final high gear reduction. NWSL, gearboxes for instance use single lead worms.

For me the solutions are simplified, the gear ratio is double by more normal application, so I have to either cut the gear ratio in half or double the speed of the motor. Reducing the gear ratio to around 35:1 may overtax the motor, I don't use a single 2032 in my KTM ACs, not enough torque. This motor is likely less powerful. It quite likely may not have enough torque when the gear ratio is reduced. The NWSL Hi Speed 2032 had enough torque and a suitable Top end RPM but is no longer available. The Faulhaber motor tried was only 40% faster and may not have enough torque as well. Under powered motors will not reach their top RPM and will provide only marginal speed improvement. Round motors that fit the space of the existing flat can motor are not likely to have sufficient power. The frame would have to have been modified slightly to fit the NWSL 2032.

In the absence of suitable 20,000 rpm motors; it appears that both a change of gear ratio and a new motor will be needed. The new NWSL 2032 may have enough torque. The NWSL 2240 would be a better choice but a much harder fit. Still no obvious easy solution.

GEAR REDUCTION / MOTOR / HEAT SINK -- Pete Cesaro

Your assumption is definitely a possibility. Decreasing the gear reduction will most certainly make the motor work harder and if it was designed to match the first run gear ratio it could very well be underpowered.
Based on the first run of the HO AC-12 and the fact that the slowdown problem was never reported on the first run, I would have to say, in my opinion, that it is underpowered. Another possibility could be the gears are not lubed properly but that doesn't quite fit in with the symptoms.
The motor certainly looks physically the same as the first run and as there are no indentifying marks on it, makes it very difficult to find and specs. I have had both of 1st and 2nd runs apart and the motors look identical, and I'm sure IM is not going to spend any more money than they have to in reparing the first run.
On my unit I have added an aluminum heat sync to the decoder, replaced the original no-name motor with a Mashima flat can of the same dimensions, and opened up the area under the four tender hatches to allow any heat to escape. I do like the option of turning the decoder heat sink up but I wanted to go one step further. There is definitely some serious heating going on when you can feel the tender body and it is warm to the touch only after about 15-20 minutes of run time. I have not had a chance to really put it through its paces yet but will over the weekend.

GEARING CHANGE -- Paul Vernon

As stated before, I opted to buy a new AC12 at the reduced price AND I purchased the re-gear and new driver kit. Both arrived from Fed-Ex and I set about following the comprehensive instructions to change the gearing.
Let me say first, that I have taken apart many brass locos, rebuilt them, etc. Changing the gears on the AC12 ranks up there with any of them. The gears are easy to change ONCE YOU GET TO THEM. What you have to do is remove the top half of the boiler, then the top weight then the two engines (front and rear). This is complicated by the amazing amount of piping and parts on the model.
BUT, I have changed the gears and put the model back together. I don't have any leftover screws and am now involved in putting the parts back on the model. I did break a couple of pipes, so some glue will be in order. All in all, the change requires a good evenings work.
Suffice to say, it runs! I have not had a chance to put it on a layout yet or compare speeds, etc.
By the way, somebody made a comment about removing the cab roof to detail the interior. The cab roof is NOT a separate piece. To get to the cab interior you have to remove the top half of the boiler along with several parts and hand rails.

CURRENT DRAW -- Kenneth R. Clark , P.O. Box 127054 ‘ San Diego, CA 92112

The whole issue of current draw needs a further look. By comparison a heavy brass HO AC-12 with a can motor would draw around 200-250 milliamps at 12 volts no load. Pete what kind of current draw have you found and is that before or after the decoder? Is it possible that the decoder doesn't have enough current handling capacity and that is also contributing to the problem for DCC versions?

As far as replacement motors, something is amiss. One person indicated that the final gear ratio is now 18:1, My brass ACs have 37:1 gear ratios and 9000rpm motors and a top end around 60-65smph. With an 18:1 gear ratio the IM AC12 should do about 120-130smph at 12 volts. Seems like the 1st run models were closer to 70:1 so there is something wrong in the calculations, the top speed should be much higher.

MOTOR UNDERPOWERED – PeteC - pdsteam@aol.com wrote:

One of the things I noticed as I was going over my replacement AC-12 is that the motor seemed to be under powered and I am wondering if this could be the source of several people reporting that the engine slows down after running for a while. I was able to

replace my stock motor with a standard Mashima 1833 flat can. Had to fiddle a bit with the motor mount and the wire connections but so far I am pleased with the results. The motor being underpowered can certainly be the cause for overheating and subsequent slow down of the engine.
Can't say for sure if that is the cause but my engine runs a lot better and the slow speed is more stable and consistent.
And other than the main crank shaft being loose, (had to super glue the press fit crank into the hole in the drive and then tighten the crank screw and replacing the yellow headlight with a sunny white LED, I am happy with mine.

MASHIMA -- Pete Cesaro

Item #	40321	40322	40323	40324	30321
Length (mm)	33	24	20	30	40
Width (mm)	18	18	12	13	29
Height (mm)	23	23	14	16	--
Speed (rpm)	8,500	9,200	17,000	11,000	3,700
Current (ma)	90	80	50	70	48
Shaft (mm)	2.0	2.0	1.5	2.0	3.0

All motors are rated @ 12 VDC (Conversion Factor 1 mm X .04 = inches)
http://www.ppw- aline.com/ re-power. htm

MASHIMA -- Steve Carter
The motors with the 2.0mm shafts are all double shaft motors and it appears from the photos Jason posted, the motor in the IM AC12 is a single shaft. Would you recommend using 40324 Mashima and cutting off one of the shafts? Or is there a better motor readily available?

MASHIMA 1833 – Jim
Why not cut the shaft off the 1833? -- that's what I did. It has almost the same working RPM as a 1630 and has about 25% more torque. The molded spacein the AC chassis is and exact fit for the 1833 I used. The fit is close where the wire hook-ups are so I trimmed away a little metal. You probably could get away without doing that as long as you made sure your hook-ups didn't short against the frame.

MASHIMA 1833 -- Pete Cesaro
I have not found a single shaft 1833 Mashima readily available so I would recommend using the 40321 and just cut the shaft off as close as you can. A trick I use to keep metal shavings out of the bushing is to cut a thin piece of soft rubber tubing and slide it down over the shaft you are cutting off and snug it up against the bushing. Then put some tape over any open holes, use a cutoff disk and then use compressed air to blow away the filings.

MOTORS -- Steve Carter
The motors with the 2.0mm shafts are all double shaft motors and it appears from the photos Jason posted, the motor in the IM AC12 is a single shaft Would you recommend using 40324 Mashima and cutting off one of the shafts? Or is there a better motor readily available?

SIDE RODS -- Dave
I was just out running a new DC version, and it threw an eccentric rod from the eccentric crank. Can't run that one anymore! The pin is nowhere to be found. The actual problem I sought to understand was the travel of the crosshead. The front engine's crossheads travel farther to the rear than the rear engine, which isn't correct. Not only that, the crosshead guides angle apart slightly as opposed to remaining parallel their entire travel. Running in the opposite direction around track three, things are no longer wonderful, with repeated derailings of the front truck with every lap. What has IM given us????

SIDE RODS -- Pete Hall
Sorry to be late in replying to this thread, but this posting caught my eye - I found a similar problem with the engineer's side of my loco's forward engine.

The vertical linkage connecting the cross head to the valve piston rod had trouble. These links are beautifully made. However, at the top of the vertical link, the u-joint was not deep enough to allow the angle it makes with the valve piston rod. I pushed out the pin holding them together, filed the u-joint deeper, and reassembled - that solved the first problem.

A second problem was that the horizontal arm connecting to the crosshead impacted the cylinder bracket at the greatest penetration of the cylinder on every rotation. There was no way to increase the clearance, so I filed the back side of the arm and bent it out slightly so that it now slides by the cylinder bracket.

These are small problems compared with the issues of underpowered motors, overheating, and gearbox problems, but every bind you can eliminate gets the loco closer to smooth running.

28 SPEED TABLE PROBLEMS -- John Moonan, Suncoast MRR, FL
I've been reading others experience with the new AC12s as well as the article on Tony's site. I have to agree with what is being said.
I received my new AC12 Friday a week ago. I ran out it at our club Open House the next day. Pulling about 25 cars I was running at about speed step 8 - 10 (out of 28) which was a good speed for the way I run. However, if I tried to run faster, the chuffs would speed up but the engine would not go much faster. That didn't bother me as the speed was adequate. However, after about 15-20 minutes of running the engine would stop with the Tsunami flashing the lights 9 times which means it was over heating. After it set for about 30 seconds it would start running again but then would repeat this sequence every 5 - 10 minutes. I tried running the engine by itself and it ran continuouly but once again once I got to about speed step 12 it would not go any faster.
I then called IM and talked with Richard. He indicated that the problem was low track voltage. I did not have any confidence in this as this layout has been operating for years and this is the first time and the only engine to exhibit this behavior. So I pulled the top off of the tender and was not happy with what I found. While the engine is a thing of beauty, the decoder installation is very poor. I have installed decoders for a couple of hundred customers and I would never send out an engine with this sloppy an installation. One thing I did notice is that the Tsunami was installed with the heat sink down and glued to the top of the speakers. This blocks cooling air so I cut it loose and turned it over so that the heatsink is facing up and completely exposed to the air. Then last Thursday I ran it again at the club for about 1-1/2 hour continuously pulling 24 cars and no more over heating problems.
I have to agree that the problems that we are seeing is indicative of an undersized motor. Now we just need someone to develop a motor retrofit and document it. With all of the plumbing on this model I'm hesitant to open this guy up.

SPEED ISSUES / INCREASE VOLTAGE Some InterMountain AC-12 Notes -- Bill Rogers, Fort Collins
InterMountain recommends running your DCC system at 16 to 18 volts. So I tried moving my DCS100 command station switch to "O" gauge. This increased the track voltage (as measured with a Rramp meter) from 13.5 to 18 volts. No problem getting to 70 MPH now! But I just don't want to run my HO layout at "O" gauge voltages. So I compromised. The Dgitrax documentation says that the maximum HO voltage can be as high as 15 volts. So I set the command station switch back to HO gauge, took the cover off the DCS100, and adjusted the track voltage to 15 volts again as measured with a RRampmeter. I confirmed the max voltage using a Tektronix oscilloscope. I also did some looking around the Internet with Google for information about maximum track voltages and came to the conclusion that decoders in general are supposed to withstand up to 22 volts. I don't know how much to rely on this, but it gives me some reassurance that going from 13.5 to 15 volts is probably OK.
The locomotive then had a top speed of 46 MPH and with the heat sink it will run for apparently unlimited periods without overheating the decoder. Given this modest success and the fact that I love the way it looks and sounds, I ordered another one from Ulrich Models in Berthoud, CO and had it the next day. I made the same modifications to it as to the first AC-12.
I also read on the Espee group about the sliding electrical pickups being too tight, causing excessive drag. I removed the axle cover plates on the bottom of the loco to gain access to the sliding electrical pickups. Once the axle covers are removed the electrical pickups can be lifted out and bent back to where they touch the backs of the drivers only very lightly. This reduced the current draw from .45 amps to about .35 amps and increased the first loco's top speed to 55 MPH and the second loco's top speed to 63 MPH. There may still be some scope for reducing drag in the drive train, but that will have to wait until I'm ready to open the boiler. Right now I have a certain reluctance to start hacking away at all those intricate piping details.
After doing some speed matching with the AC-12 speed tables, I consisted the AC-12s with a BLI AC-4 and have them pulling a 33 car train up a 2.5% grade. One AC-12 is leading, the other is mid-train, and the AC-4 is pushing at the rear. They are quite a sight and make a wonderful sound! For some pictures of this see the InterMountain AC-12 Album.

Remaining Issues -- The locomotives still draw 0.35 amps and the orange headlight should be replaced with a whiter one. Jim Bright has posted a note about his IM AC-12 Problems and Fixes at the Espee Yahoo group. He describes correcting three problems in the drive train that were causing excessive drag. After fixing these problems, and replacing the motor he reported a top speed of 84 MPH and a current draw of 0.25 amps. Since my locomotives are now operating satisfactorily (though perhaps not at their optimum) and I'm reluctant to open the boiler, I am inclined to forego any further tweaking for now.

There is also a photo album showing the AC-12s in operation on my layout. If you are interested, please have a look. Scroll to the bottom of the first page for links to the article and album.

LEDS -- J. Bright
I replaced the orange LED in my AC with a sonny white which if tinted a bit yellow with some translucent paint. I was looking at the orange LED I had removed and scratched on the surface to see if the orange was just paint. It was! The paint is pretty easy to remove. I rubbed it for a minute with some 90% alcohol and it all came off easily using just my fingernail. You probably don't even need the

alcohol. The LED with the paint off looks like it might be a sonny white. So, it looks like you can get of that orange color without replacing the LED.

LEDS -- Jim Bright
No, I haven't done anything with the number board lights. I tinted the sonny white LED I used for the headlight with some translucent yellow. When lit it is a slight bit lighter than the number boards and seems to blend quite well. I'll have to reassess them when I get the decals on. If you want a fairly white headlight then you'll probably want to do something with the number boards. What I want to do is get the number boards off the same circuit the headlight and taillight are on so I can operate them independently.

LED -- Paul Vernon
When/if you get around to changing the LED on the AC-12, be aware that under the insulation on the LED circuit there is a very small 1000 ohm resistor. If you miss it, the new LED WILL burn out in about 20 minutes!

Hmmm. I should have added that the top half of the boiler comes off at the running boards AFTER you VERY CAREFULLY do the following.
1. Remove the steam turret, move aside the associate piping and remove the screw under it.
2. Remove the steam dome and remove the screw under it.
3. Remove the piping connected to it AND the feedwater heater and remove the screw under it.
4. Remove the door handholds on both sides of the cab
5. Remove the wires along the bottom of the cab
6. Remove the generator on the side and front of the boiler.
7. Remove or push aside any other assorted piping.
8. Remove the screws under the very front of the cab. They are very hard to get to or even see without good strong light.

If you are not sure about your skills, I recommend you leave the loco as is.
JUST REMEMBER THE CAB FORWARD HAS A LOT OF DELICATE PIPING AND PARTS ON IT.

LED -- J. Bright

You're right -- there is a lot of blue in that LED light without the orange coating. In order to get it to look right you will need to use an amber color paint that is only slightly translucent or some amber color film. That's going to be as much trouble or more that doing a replacement. The LED looks pretty much the same as a sunny white and I was expecting something in the "soft white" range. I guess after all the other shortcomings with this model I was going out of my way to be optimistic about something.

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LED CHANGE -- Steve Carter

Following Jason's instructions, I removed the cab of my DC unit to install a sunny white LED. With a great deal of care, I was able to get the new LED soldered in place of the old one, only to find that one of the wires moved rather freely from the direction of the light circuit board (under the boiler shell). A quick test confirmed my fear that the wire had come loose from the board. So I opened up the shell enough to access the light circuit board. It looked like an electronics 101 student had been assigned the task of solder the wires to the board. I re-soldered the offending wire and it tested out fine.

DISGUST -- Tim O'Connor
In Espee@yahoogroups.com, Tim O'Connor <timboconnor@... wrote:
I think I am going to throw in the towel on these locos. Although they are beautiful, I just don't need the headache.
I took mine to the club this week and ran it for a couple of minutes. At home on the test track I never had it wide open, so I immediately noticed: At Speed Step 8 (out of 28) it reached its maximum speed. Increasing the Speed Step changed the SOUND (chuff rate) but had no effect whatever on the actual velocity. As the locomotive began on a 40 foot 2.0% grade, it slowed down noticeably (it had only been running for about two minutes) and clearly was struggling to get itself up the grade. Reversing, it headed downhill slightly faster but clearly lacked any enthusiasm for it.
It's a shame. They can't possibly have evaluated these models in any kind of a "real" situation, pulling a load for some period of time. Totally bizarre really, since I know for a fact Intermountain rigorously tested their F unit drives (which have Buehler can motors). I will use the proceeds of the sale to pay for a Tsunami installation for one of my Challenger AC's... :-(

DISSATISFACTION -- Chris Coscia

On a serious note, I urge all of you to contact IM and express your strong displeasure with these 2 runs of AC12s. I will only use mine as nice, detailed roundhouse queens. I would much rather put my effort into detailing brass ACs then fixing this Chinese disaster, again. After working hard to get the first run to operate at near 40mph, I have no desire to trash this next run and have returned our order of ACs with a long disparaging note. Now if IM would sell these at cost to the public and acknowledge their screw ups, then fixing them would be worthwhile. But being a dealer and having them make a profit on them selling them to me and leaving me to be the one to address the complaints, no thanks.