Garmin, Bendix King, Honeywell, Collins, Aspen, Avidyne—the list goes on. You know all these names; they’re avionics manufacturers—the big guys. While some have been around for a long time, others are new to the avionics arena. Still, ALL are competing for your avionics dollar—more accurately, your dollars... and LOTS of them! All are also deep into research and development trying to design the next “gotta have” avionics product that we will all want.

In my opinion, however, none of them set out to make avionics that are both reliable and affordable! Fortunately, there is one company that has been doing just that—and they’ve been doing it for almost 50 years! That company is TKM, Inc. / Michel Avionics.

While the big name avionics manufacturers get the majority of the press, there are smaller avionics manufacturers who also have a story to tell. They frequently fill a niche or a special need, but also offer good, simple, and, often, more affordable solutions. From time to time, I’ll introduce you to one I think is worth talking about. Let’s start with TKM, Inc.

I think Michel Avionics, as they are better known, holds the record for being the most mispronounced manufac-
TKM, Inc. / Michel
Located in
Scottsdale, Arizona
Manufacturer of: Avionics
Test Equipment and
“Replacement” Avionics
Established 1968
Years in Business: 46
Phone: (800) 233-4183 or
(480) 991-5351
Fax: (480) 991-3759
Email: customerservice@
tkmavionics.com
Hours:
6:00 AM - 4:30 PM (MST)
Number of Employees:
9 (presently)
Number of TKM radios
placed in service since 1983:
37,000
NEW Website:
www.tkmavionics.com
turer in avionics. They have been called Mitchell (actually a manufacturer of analog instruments) and Michelle (like Obama’s Wife), but the correct pronunciation is Michel (Mike-El, just like John Travolta when he was an angel). The name comes from the company’s founder Bill Michel, who has recently been described to me as “…a brilliant avionics engineer and designer.” Bill and TKM got their start with avionics test equipment in 1968; and the TKM NC2210 Avionics Ramp Tester continues to be a popular—and affordable—choice for avionics shops. When your shop tests your NavCom on the ramp, there’s a good chance it’s the TKM NC2210. I’ve never met Bill Michel, but I knew his primary distributor, Don Hawkins, from back in the ’70s. Don, in my opinion, was one of the sharpest avionics “gentlemen” I have ever met. Don was with Narco back in their ‘60s heyday and went on to form his own company, which became the primary representative for Bill Michel and his test equipment.

I was close to Don and his wife and partner, Carol, and I purchased avionics through their company. Sadly, Don is now with the big avionics shop in the sky, but as Don told me, it was he who suggested to Bill that there was a fleet of legacy aircraft out there with factory-installed avionics that were getting tired. Bill took the idea from there and began work on the concept.

Bill and Don researched the market and saw that the majority of these old radios were from King Radio (now Bendix King), ARC (Aircraft Radio and Control - then found exclusively in Cessna aircraft), and Narco, who, again, was the dominant avionics manufacturer in the ‘60s. Bill designed a “solution” for each of these radios and the Michel line of affordable, slide-in radios, was born when the first TKM MX-170 was introduced in 1983. Let’s take a look at the TKM / Michel product line and where they apply.

**MX-170C: THE KING RADIO SOLUTION**

As mentioned, the MX-170 was the first Michel model. It was designed to replace the early KX-170 series (KX-170, KX-170A, KX-175 and the KX-175A (TSO’d versions) from King Radio (pre-Bendix King). All of these radios were only 360 channels.

Designed to replace these early models, the MX-170 is no longer viable today since this series of King radios is no longer legal in the eyes of the FCC. If you come across an MX-170, don’t buy it—it’s not a solution for your KX-170B.

King later introduced the KX-170B, which was an improved design (all 720-channel) and it went on to become the standard in NavComs of that era. Only the venerable KX-155, introduced in the early ‘80s was able to knock the KX-170B off its pedestal.

TKM followed suit with the introduction of the MX-170B. Today, many pilots flying legacy aircraft are still using the KX-170B. Frankly, the 170B suffers from weaknesses in the old tuning circuitry and is approaching the end of its useful life. So what do you do if your KX-170B is getting tired and your avionics budget is getting smaller? Sadly, this is becoming a harsh reality in today’s environment with $6 per gallon avgas prices. In my opinion, the solution is a used MX-170B (if you can find one) or the new TKM MX-170C.

**MX-170B/170C?** This gets a little confusing so I’ll keep it simple. A number of years ago, the addition of a harmonic filter became a requirement in some avionics equipment flown in European airspace. Most NavCom manufacturers responded by adding the filter. In order for TKM radios to be used in this airspace, they added the filter to the MX-170B; but this created confusion for European Aviation Authorities so they asked TKM to change the designation to the MX-170C. The MX-170B and 170C are essentially the same radio; however, some of the early versions of the MX-170B did not have the harmonic filter. All MX-170Cs do!

While we are clearing up some confusion regarding the MX-170B/C, let’s address the KX-170B/175B confusion as well. Today, most avionics manufactured for certified aircraft are TSO’d. To be TSO’d the radio must go through stringent testing and only when such testing is passed, will it receive the TSO. While the TSO is not required, certification (like shop/FAA paperwork) is simplified by the TSO. In the ‘60’s and ‘70’s when the KX-170 and 170B were introduced, aircraft flown for private use did not require a TSO. However, aircraft flown with the goal of carrying passengers were required to have the TSO. The KX-170B was the choice for private aircraft. In order to get the TSO, King Radio was essentially required to put the KX-170B through the extra testing (and extra expense) to obtain the TSO. Those radios were designated KX-175Bs. For all I know, the radios are the same, and history has shown that the KX-175B was no more reliable than the 170B. I’ve heard people say the 175B had glideslope and the 170B did not, but this is not true. All radios in the ‘60’s and ‘70’s required external glideslope receivers. The KX-155 and the Narco MK-12D were the first NavComs to incorporate internal glideslope receivers. That’s a lot of history for one radio! Bottom line: the MX-170B or C replaces all the KX-170, 175, 170A, 175A, 170B or 175B radios in service and the MX-170B and MX-170C are TSO’d radios that interface with most existing Course Deviation Indicators (CDIs) that are working with your KX now. Note that some of the old CDIs are pretty much done and you may find yourself having to address that at the same time. Also note, that TKM offers a unique new CDI (MC-60) that works with all their models. We’ll talk about the MC-60 later.

A SV tagged MX-170B will cost you in the range of $1200-1300.

A “New” MX-170C (with 2-year warranty) will cost about $1850-$2050.

Note: You’re not likely to find MX-170Cs on the used market. If your budget is tight, go for a SV MX-170B. If you see yourself keeping the airplane for some time, my advice is to buy a new MX-170C with the 2-year warranty.
**CDI options with the MX-170B/C:** As I mentioned, all Glideslope receivers were remote back then. King Radio offered an interesting alternative known as the KI-211 and KI-214 series CDIs. These units contained a built-in glideslope receiver. The KI-211 proved problematic and was replaced by the KI-214, which simplified the installation and, frankly, worked very well for a long time. But, that “long time” is now gone! If you have a working KI-214 you’re lucky, so stay with it until it fails, but forget the concept of repair—it’s just not worth it! If you need to maintain G/S, look for a good deal on a KI-209 CDI and KN-75 G/S receiver or note that TKM offers their MC-60 CDI, which is a very affordable, new alternative with a 2-year warranty. Non-glideslope applications used the KI-201 or 201C CDI for VOR. They’re simpler than the KI-214 and you may still get some life out of it. When it dies, you can buy a modern KI-208 CDI for about $600 in SV condition or the MC-60.

**MX-300: THE ARC RADIO SOLUTION**

Shortly after the end of WWII and the Korean Conflict, the U.S. saw an economic resurgence and a boost in general aviation as well. ARC (Aircraft Radio Corporation) had been building radio and navigation equipment for the military since 1924. You may have read about the first test flights of “blind” navigation equipment flown by Jimmy Doolittle? These were the first attempts to design reliable navigation equipment for IFR—that was ARC. In 1959, Cessna Aircraft bought ARC and changed their handle to Aircraft Radio & Control (preserving the ARC acronym). As a division of Cessna, the “new” ARC then became the exclusive manufacturer of all radios, navigation equipment, and transponders going into each factory new Cessna. Frankly, it’s hard to find anyone who was enthusiastic about the performance of the ARC radios, either the 14-volt RT-328 series or the 28-volt RT-385 series. In 1983, Cessna sold ARC to Sperry and also offered avionics packages from other manufacturers like King Radio and Narco. If you’re still flying behind the old ARC radios then you’re likely flying on a budget. When your ARCs fail or when you get the hankering for something better, consider the financial benefits of going with the Michel slide-in replacements.

The Michel MX-300 is designed to replace the whole series of RT-3XX 14-volt NavComs with a few exceptions. All the Michel radios are now 760 channels with digital flip-flop tuning and offer memory storage on both the comm and nav sides so they are a nice upgrade from the analog 300 series.

MX-300 street prices are about $1200-$1300 for a good serviceable (SV) unit and factory new, with a two-year warranty will cost you about $1850-$2000.

Note: The MX-300 is available with a black or tan faceplate, but don’t go for the tan. Everything that’ll go into your panel from this day forth will be black!

**MX-385: THE 28-VOLT ARC SOLUTION**

Around 1978, Cessna and ARC made the switch to 28-volt aircraft and therefore 28-volt avionics. Cessna offered the RT-385A and the upgraded RT-485A, which had limited memory. They were an improvement with digital displays and, again, many are still in service. Like the 14-volt ARC series, the RT-385/485s suffer from synthesizer failures and parts are no longer available.

The MX-385 is your affordable solution and gives you the added feature of memory storage on both the comm and nav sides.

MX-385 Street prices run about $1100-$1300 for a good SV unit.

New MX-385s with 2-year warranty will run you about $1850-$2000

**CDI Options for the MX-300/385:** Actually, most of the original CDIs and glideslope receivers that came with the ARC radios from the factory are still working okay and are a better bet to keep working for a while. You can stick with them and save even more money vs. alternative avionics choices.

**MX-12 AND MX-11 COMM: THE NARCO SOLUTION**

While Cessna had ARC, Narco (National Aeronautical Corporation) seemed to be the popular choice for factory installed radios in ‘60s- and ‘70s-era Piper aircraft. Narco was pretty much the leader back then. My first Piper, a 1964 Colt, had a Narco “coffee grinder” NavCom in it, but in 1965, Narco introduced the MK-12 Series. The MK-12, MK-12A, and MK-
12B featured 360 channels and had a remote power supply. My 1969 Cherokee “Six” had dual MK-12Bs when I bought it in 1986. They were okay then, but 720-channel was already taking hold—with 760 channels not far behind. Like the early KK-170 series, the MK-12, 12A, and 12B suffered from an outdated frequency spacing issue and were deemed illegal by the FCC in 1990. Narco had already introduced the MK-12D well before this became an issue.

Replacing a MK-12 (+A or B) requires an extra step because of the remote power amp used by the MK12 series. The amp must be removed (usually by a shop) and you will have to adjust your aircraft’s weight and balance accordingly. One additional item that comes with the MX-12 package is a plug. Apparently, power passes from the radio to the power amp and back to the radio, and this plug goes into the original harness where the power pack used to be. Note that as the owner of an aircraft with an ARC radio or KK-170B, you can swap out the radio for a Michel MX radio and make a simple logbook entry yourself without involving an avionics shop. With an MX-12 swap-out, you’ll still need a shop or someone who can handle the paperwork—more on this later.

Street prices for new and used MX-12s are pretty much in line with MX-170Bs and MX-300s/385s. Like the MX-170B, MX-300/385, you get all the same features in the MX-12 with 760-channel, flip-flop, and memory storage, but going with the MX-12 upgrade is not without additional concerns. If you have glideslope on the MK-12 you are replacing, some additional wiring is required. While this is relatively minor, CDIs—especially original CDIs—are often suspect!

**CDI Options for the MX-12:** The primary issue you need to consider when considering the MX-12 as a replacement for your early MK-12 series is the condition of the existing CDIs. Bottom line: most VOA Series CDIs that were working with the old MK-12s are junk and repairing or overhauling them is a bad investment. Additionally, the old UGR series glideslope receivers are receiving equally poor marks. If the CDI is the problem, TKM offers a compatible new CDI called the MC-60. They are very affordable. If your original glideslope is also suspect, we’re no longer looking at a “slide in” replacement option and maybe it’s time to consider an alternative. This is where I used to recommend the Narco MK-12D with built-in glideslope and modern CDI. Narco, however, has been gone since 2011 and it makes no sense to send your money in that direction.

**MICHEL MX-11 COMM**

![Image](image1.png)

In the ‘70s and early ‘80s, Narco also offered a series of Comm-only units that were frequently found in legacy Pipers. The Com-11, Com 111, Com-11A, Comm 111A, Comm 11B, and the later Comm-120 had analog tuning and basic features. They were frequently found with a unique self-contained Nav/CDI unit known as the early Nav-11 or Nav-12 (with glideslope) or the later Nav-121 and Nav-122 (glideslope). These are getting tired, but if a comm-only fits your needs, the Michel MX-11 replaces any of these comms with digital flip-flop tuning and 10-channel memory storage. MX-11 street prices are about $650-$800 for a good SV unit and about $1050 to $1100 for factory new with a 2-year warranty.

**MICHEL MC-60 CDI**

Sensitive needle movements are the weakness in a CDI. After all, they’re mechanical which means they wear and must be replaced from time to time. It was logical that someone would design a solid-state CDI and eliminate this issue. I believe Bendix (before Bendix King) was the first to bring something like that to market. You may better remember the Terra Tri-Nav CDIs that essentially replaced the needles with LED lights and the OBS around the perimeter with an LED window that shows your exact heading. The MC-60 is exactly that: a digital, solid-state CDI that eliminates meter movements and replaces them with modern electronics. Frankly, it’s a good idea that has been difficult to take hold. I’ve found pilots are reluctant to let go of their needles, but I’ve also found those who did let go... liked it! I remember a customer who had dual Michel MX-12s in his airplane - both with the old Narco CDIs — and one failed. We had the discussion and he bought an MC-60. He was reluctant at first, but called back a few weeks later and ordered a second. He got it! Honestly, if you have an MX-12 and those old Narco CDIs fail, the Michel MC-60 is the only way to go. You’ll have to rewire as this is not a slide-in replacement (as such), but it works, it’s affordable, and it’s a much better choice than most alternatives. Remember, Narco coding was different back then, and the simple fact is that there are virtually no alternatives to replace a tired old Narco VOA indicator. Say goodbye to needles and say hello to lights! The most interesting thing for me about the MC-60 is how they eliminated meter movements and replaced them with modern electronics. It was the first to bring something like that to market. You may better remember the Terra Tri-Nav CDIs that essentially replaced the needles with LED lights and the OBS around the perimeter with an LED window that shows your exact heading. The MC-60 is exactly that: a digital, solid-state CDI that eliminates meter movements and replaces them with modern electronics. Frankly, it’s a good idea that has been difficult to take hold. I’ve found pilots are reluctant to let go of their needles, but I’ve also found those who did let go... liked it! I remember a customer who had dual Michel MX-12s in his airplane - both with the old Narco CDIs — and one failed. We had the discussion and he bought an MC-60. He was reluctant at first, but called back a few weeks later and ordered a second. He got it! Honestly, if you have an MX-12 and those old Narco CDIs fail, the Michel MC-60 is the only way to go. You’ll have to rewire as this is not a slide-in replacement (as such), but it works, it’s affordable, and it’s a much better choice than most alternatives. Remember, Narco coding was different back then, and the simple fact is that there are virtually no alternatives to replace a tired old Narco VOA indicator. Say goodbye to needles and say hello to lights! The most interesting thing for me about the MC-60 is how they designed it to work with just about any nav radio—from the vintage Narco’s to a modern 430W.

You won’t likely find any MC-60s on the used market. New ones are a very affordable $600-$700, but I’m finding few dealers advertising them. This is a trend that I’ll talk about later.

**MG-200 GLIDESLOPE RECEIVER (DISCONTINUED)**

It’s safe to say that the market for remote glideslope receivers is pretty much gone. For years, TKM offered a new remote glideslope receiver (first the MG100 and the later MG200) that not only worked with their models, but also in...
most other NavCom applications where a remote glideslope receiver was required. Simply stated, TKM wasn’t selling enough of these to continue with it. The “economy of scale” was gone and the MG200 is no more.

MICHEL NC2210 NAVCOM RAMP TESTER

I would be remiss if I did not mention the item that got Bill Michel started. If you think you have an issue with your comm, nav, glideslope, or marker beacon, the first thing your local avionics shop will likely do is test on the ramp. That’s exactly what the Michel NC2210 does—and, generally, it does it for less than most competitors. You may not have an avionics shop, but if you operate a flight school or a fleet of rental aircraft and enjoy the ability to test your own NavComs from time to time, the NC2210 is for you.

UPGRADING TO MICHEL REPLACEMENT RADIOS

If you decided to invest in a Michel, there are some commonsense things you should do when doing the swap. First, if you’re doing this because your old radio is intermittent or under-performing, consider that it may not just be the radio—it could be the installation. Remove the old radio and clean the contacts in the back of the tray with electrical contact spray cleaner. This is important because your radio has been in there for a lot of years and a slight patina on the connector could interfere with the performance of the new radio. The connector of a Michel may touch the tray connector in a different spot and a clean connector is key. If things aren’t right, the old harness may be suspect, especially the antenna cable or antenna itself. In the ‘60s and ‘70s, we used a lot of RG-58 antenna cable. We now know that was not the best choice. RG-58 breaks down and loses its electrical properties. If you’re trying to send a signal through it, it’s like sending water down a clogged pipe. A comparison of the output at the back end of the radio versus at the antenna can tell you if this is an issue. Replace the cable. If your antenna is really old (typically all wire and no fiberglass base), it was likely designed for 360 channels and will not perform correctly in the upper channels. Replace the antenna. The Michel radios have more output power in most cases and should perform better with more range. If not, check the “plumbing”!

It’s safe to say that I’m pretty positive on the Michel products—and I’m not alone. Take a look at some posts - old and new - from the Cessna and Piper Avionics Forums:

FROM 2004 -

“I have the TKM (Michel) MX170Bs in my 172G and I love them. They have higher transmit power than the King KX175Bs I had and they provide flip-flop and memory storage for frequently used frequencies. Avionics shops don’t like them because they don’t make much money on the install since they replace existing radios using existing trays and wiring. The TKM factory people are very nice and they do most repairs for under $100.”

“On the subject of the TKM radios, I have owned two in the past and found them to be every bit as reliable as the 155s I had been using.”

FROM 2014 -

“I have 2-MX300 Nav-Coms in my 210, one 720 and one 760. I had an issue with one of them being too dim and it would work about 30 minutes before quitting. The other one you would have to turn it on several times before it would work plus the audio was weak, and then one day it just stopped working. The local avionics shop said it would be $100 each to check them out but couldn’t guarantee they could fix them. I called TKM and they said they have a $95 flat rate labor no matter what it takes to repair it...plus parts of course. Both of these radios are over 20 years old, one closer to 25 years old so I’m not expecting miracles. Final cost to go through these with the 720 now a 760, new face on one and both working like new was just under $800. I am extremely pleased with the finished product, price, and speed in repairing them.”

“TKM is way under-appreciated. They play fair, and their stuff is absolutely topnotch. It’s a bit simpler than some of the competition, but that might be a good thing.”

TKM GETS AN UPDATE!

Sure, not all the posts are positive, but they’re more positive than not. But, I’m here to tell you that TKM doesn’t do everything well! In my mind, they have one serious issue—marketing. As I pointed out early, Michel products are not promoted by local avionics shops and, unfortunately, they frequently will talk them down. Why? There’s no money in it for the shops. TKM has depended on the big guys - the large avionics companies with significant internet presence and an over-the-counter market - to promote the Michel brand. From what I see on the internet, less of these big shops are listing and promoting the Michel product line.

TKM-Michel has been slowing down a bit in the last few years. Bill Michel is 85 and he’s slowing down too. I’ve noticed that TKM has not kept up with “new” demand—especially for their most popular model, the MX-170C, as there is frequently a back-order on these units.

Enter Ken Beckemeyer, new owner of TKM/Michel! After 30 years as CEO with AmSafe, an Aerospace and Defense
company, Ken was looking to acquire a small GA avionics manufacturer and he found one right in his own backyard. Ken also recognized that TKM-Michel had a good product and was meeting a niche in that market. He also recognizes that TKM, Inc. needs some updating - not only in the product line, but also the company infrastructure - and he knows that it's time for TKM to develop a marketing program and no longer depend on the big avionics retailers to tell his story. By the time you read this, TKM's new Website, www.tkmavionics.com, will be up and running.

Their story is a good one, and I expect that TKM Inc, Michel Avionics will be around for quite a while continuing to make good quality, affordable avionics with the budget-minded avionics buyer in mind and that's a very good thing!

Until next time, Safe and Happy "budget" flying!  
See you on the Forums!  
Bob Hart  
www.AvionixHelp.com

ABOUT THE AUTHOR

Bob Hart purchased his first airplane in 1971 at age 21. He's owned five others since. As a Senior Avionics Consultant at Eastern Avionics, Bob has personally sold over 20 Million in Avionics. Bob now offers avionics advice through many on-line forums and through his website: www.AvionixHelp.com and is semi-retired and living the good life with his wife in Santa Marta, Colombia.

Editor's Note: Bob Hart is a regular participant on the Cessna Owner Organization's and Piper Owner Society's forums and is available to answer your avionics-related questions. To contact him, visit www.CessnaOwner.org or www.PiperOwner.org, click the Forums tab, and scroll down to the "Avionics" forum. COO or POS membership is required.

Tamper-Proof, Can’t Be Duplicated

Unique Medeco Key can only duplicated by us ...

Locks for Cessna, Piper, Raytheon, Bombardier, Gulfstream, Mooney, Embraer since 1981.

AIRCRAFT SECURITY & ALERT SYSTEMS
5 Grantley Court Dallas, TX 75230
800-594-8094 • 214-956-9563 • www.aircraftsecurityalert.com

Hartzell Propeller Inc.
Piqua, Ohio U.S.A.

Since 1917...
Ready for Takeoff

Since there have been airplanes, there have been people pushing them to their peak performance.

We are those people.

Hartzell Propeller’s Top Prop conversion program provides your airplane enhanced performance for:

- Shorter take-off distance
- Lower noise levels
- Better ground clearance
- Reduced tip erosion
- Increased climb rate
- Increased cruise speed
- Smoother operation

We love to fly, And we love the people who love to fly.
Prepare for takeoff.

Swap Your Prop

Most Top Prop orders ship from stock within 3 days.

PIPER
Comanche 180 (2-blade)
Comanche 260
Arrow & Turbo Arrow
Cherokee 235 & Dakota
Cherokee 140 & 180
Aztec
Twin Comanche (2-blade)
Sensica II & III
Malibu/Mirage/Matrix (3-blade composite)
Lance & Turbo Lance
Apache (2-blade)
Seminole

Learn more at
HartzellProp.com
Contact us at 800-942-7767

Built on Honor since 1917

PIPEROWNER.ORG