1973 Cessna Skymaster 337 Instrumentation

The Cessna Skymaster 337 is a centerline thrust twin engine aircraft. In my research it seemed that no two had the same instrumentation. The aircraft instrumentation systems vary from bare bones round dial gages in the dash to full glass cockpits. I found an aircraft that was a good mix between the two extremes. It has round dial gages, instrument flight rules (IFR) capable Global Positioning System (GPS) and visual flight rules (VFR) capable GPS. The following results of hands-on research are specific to the N62S tail number. See Figure 1 for a quick overview of the instruments.

Figure 1. Photo courtesy of Bill Crews at Skymaster.com (Crews)

Figure 2. Pitot-static ports on the left wing brace. (Dickemore)

<u>The pitot static system:</u>

There is no pitot tube. It has a pitot port on the leading edge of the left wing brace. It consists of two holes – one for the pitot and one for the drain. Also on the same leading edge there are two flush-mounted static ports (Figure2). The gyros in the panel mounted gages are air operated. The alternate static source control is on the left side of the control pedestal, and the port is located inside the left wing. There is a shuttle valve that will allow air to be supplied to the gyro instruments from either engine. There is also a two way valve that lets the pilot cycle the de-icing boots when needed. This aircraft had de-ice boots installed previously, but they have now been removed. The valves and controls are still in place should boots be needed in the future. The pilot can adjust the vacuum setting on the ground with a manual regulator attached to the vacuum system intake.

The suction gage for the attitude indicator and directional indicator is located on the upper right portion of the panel. It indicates the available suction in inches of mercury. If there is not enough suction being supplied a red warning button will pop out for the vacuum pump that is not supplying the correct vacuum. Either vacuum pump is capable of providing adequate vacuum for all the gyro instruments. The operational vacuum pump is automatically selected by the shuttle valve located in front of the firewall. The redundancy of multiple engines is a blessing!

Electrical Instruments:

The turn coordinator in this Skymaster is electric. The purpose of a turn coordinator is to give the pilot a visual indication of the quality of a turn. The turn coordinator also allows the pilot to view the rate of turn in order to maneuver the aircraft to a specific location at a given time. It can be used as a backup for the air operated instruments in a pinch.

This aircraft has a versatile button cluster on the dash for use as a mode selector (Figure 3). It is used to select options for the autopilot. The flight director can either control the autopilot or direct the actual pilot using the orange flight director bars in the attitude indicator. If a go-around is initiated the pilot can push a corresponding button on the control yoke and the orange flight director bars will set the correct angle on the attitude indicator for an easy reference. This button cluster gives the pilot a way to easily choose the mode or level of assistance provided by this system. The autopilot is slaved to the heading indicator and altitude indicators. If the heading bug is twisted on the indicator the auto pilot will automatically make the heading correction. If the vacuum system becomes inoperable the auto pilot will enter erratic inputs due to its connection to the air-operated gyros in the heading and altitude indicators. The flight director may be electrical, but its successful operation depends on the proper function of the other systems.

Figure 3. Image of the Mode Selector grid . (Dickemore)

The Insight Strikefinder is a dash mounted gage (Figure 4). It has an image of an airplane in the center and strike indicators are mapped out in the area around the airplane image. It is electrical and operates off of an antenna mounted on the bottom of the fuselage. Its purpose is to show the pilot where the lightning is in relation to the aircraft. It records the electrical energy given off by the lightning and uses an azimuth to calculate the location. This gage is especially important for navigating around storms. It is not always accurate. If a weak lightning strike is close to the aircraft it may measure it as if it were a regular strike further off. An exceptionally powerful strike further off could be registered as a regular intensity strike closer to the aircraft.

GPS Instrumentation:

The MX 20 Multi Function Display (MFD) does not contain the GPS unit within itself. The aircraft is equipped with an Apollo GX-55 IFR certified GPS with distance measuring equipment (DME). (Figure 4). The GPS is coupled to both the MFD and mode selector for the autopilot.

The MX 20 MFD is IFR certified (Figure 4). It works in conjunction with the Apollo GX-55 IFR GPS system. It contains current charts and airport information data. The MFD displays a moving map via information gained from the DME and GPS. The data chip may be removed and updated via a computer download, then reinstalled into the unit. The owner/operator of this aircraft indicated that this system is more user friendly than the direct competition. It has less buttons making its operation more straight forward. The GPS antenna is mounted externally on the fuselage.

Flight Cheetah MFDs are for VFR use only (Figure 4). There is one mounted on each control wheel. The Flight Cheetahs each have an antenna mounted on top of the dash to receive GPS signals. The antenna provides strikefinder capabilities that are slightly more accurate than the dash-mounted Insight Strikefinder. They offer moving maps, virtual terrain, heading indicators, highway in the sky (HITS) options, satellite imagery, and airport information. One convenient aspect of these is they measure winds aloft and give you options for the fuel economy of the aircraft at different flight altitudes. The specific aircraft specifications get programmed into them at installation. This is very handy if you have calculated the different winds aloft on the E6B during flight planning but the weather changes and those calculations are no longer useable. With these the pilot is able to make more timely adjustments to wind speed and direction as the aircraft travels towards its destination than if they had to recalculate them manually. The pilot side Flight Cheetah also has an attitude indicator that shows up in the lower right hand corner. The screen can be split horizontally to show the moving map and the virtual

terrain. The gyro for the attitude and terrain is run off of a solid state gyro inside the unit. The HITS system provides the pilot with accurate location and approach guidance via the dash mounted GPS antennas. While the MX 20 dash mounted MFD is certified for IFR use, the Flight Cheetah's HITS capability and location so close to the pilot's fingertips is even more convenient for normal operations.

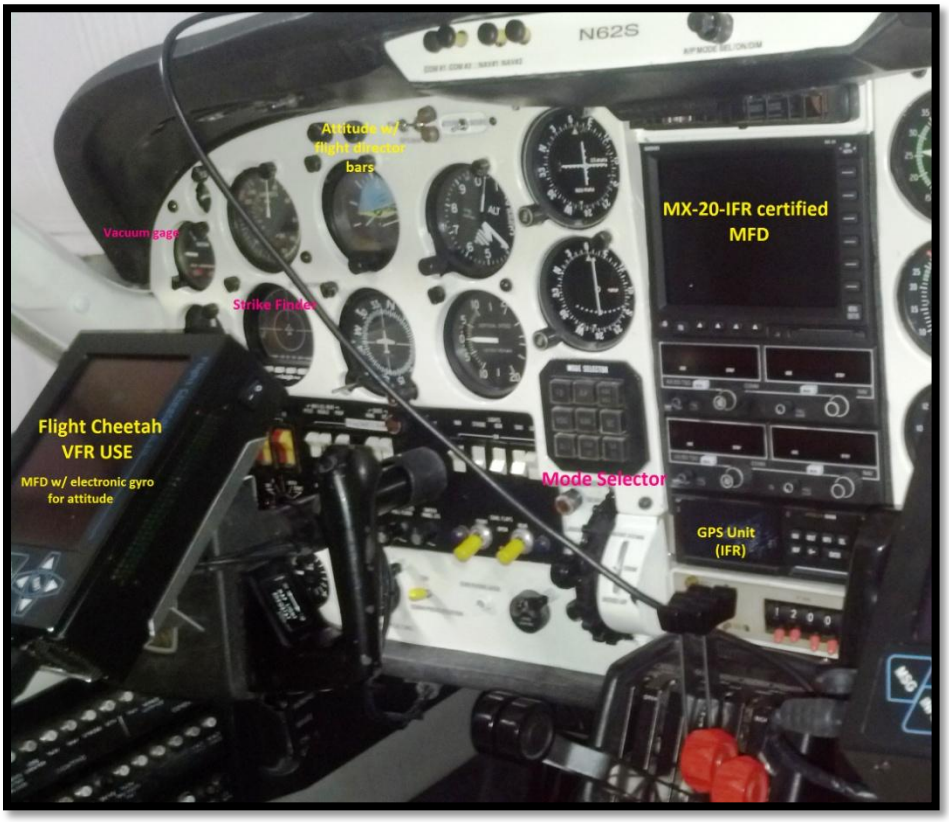

Figure 4. Layout of some specific instruments. (Dickemore)

Conclusions:

While flying this aircraft from the right seat, I found that the glare of the sun blocked my view of the dial gages in the dash. I could get the heading and airspeed information I needed from the MX 20 or the Flight Cheetah MFDs without difficulty. The liquid crystal display (LCD) screen visibility did not diminish with the sun shining on them. The redundancy of the instrumentation systems in the aircraft was welcomed. The dial gages were a somewhat difficult to see even without the glare because they sit a bit deep into the dash. If I had needed to, I could have used the attitude indicator on the pilot side Flight Cheetah. I would have preferred a duplicate for the turn coordinator as it was almost completely blocked from my view at all times. The instrumentation is all easily visible and accessible to the pilot with plenty of hassle free options. Since the instruments were split up between air, electrical, and GPS antenna power systems some would remain operational even if one or two systems became inoperable.

Works Cited

Crews, Bill. *www.skymaster.com*. 13 November 2013. Photo. 13 November 2013.

Dickemore, Maya. *Student*. Bountiful, Utah. Photos.

Lillie, Ron. *Owner/Operator* Maya Dickemore. 14 November 2013. Interview/Demonstration.

All information not cited in this report was gained during the interview and operational demonstration provided by the aircraft owner/operator, Ron Lillie.