

# SWANGATE INTERNATIONAL

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## CT320 Sensor Cable Test Unit



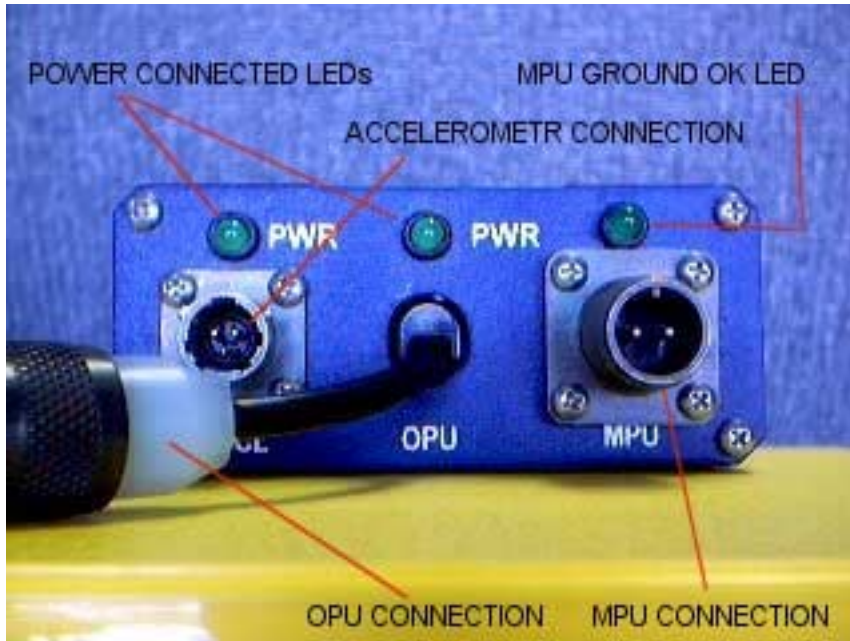
**DESCRIPTION.** The CT320 Sensor Cable Test Unit (SCTU) has been developed to test ROTORTUNER sensor cables in the field. Functional tests can be made on the standard accelerometer (H901) cables (part number 332001), magnetic pick-up (MPU) cables (part number 342001), and optical pick-up cables (part number 386002). The CT320 is powered by the Helitune Rotortuner. There is no power supply in the CT320. Testing of the cables is conducted using the Rotortuner and readings supplied by the Rotortuner. The accelerometer and optical pick-up cables supply power to the CT320 from the junction box to the test unit. A lit Green LED shows that the cable is receiving power from the Rotortuner and that both the ground and power conductors for the cable are connected. A green LED above the MPU connector indicates that the MPU ground is connected and working properly only when the accelerometer cable is used to transmit power to the CT320. The MPU and OPU cable use the same ground line therefore, any test of the MPU cable using the OPU cable will not be valid. There are no other indications of cable operation on the CT320. The SCTU sends signals down the signal lines of all connected sensor cables. Two signal types are available, "Low" and "High". The signals are controlled by a switch on the end opposite the connectors that is marked "Low" and "High". When the switch is set to "Low" a signal of about 280 RPM (4.667 Hz) and .3 inches per second (ips) is sent down the accelerometer cable's signal line and the speed signal only will be sent down the MPU and OPU signal lines. When the switch is set to "High" then a signal of about 20,950 RPM (349.16 Hz) and .15 ips is sent to the signal lines as in the same manner as when set on "Low". **IPS will read approximately as indicated above only in the balance mode and will have other readings in the FFT modes of operations. THE CT320 SHOULD NOT BE USED FOR CALIBRATION.**

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FRONT VIEW



BACK VIEW

All tests or checks suggested in this document using the CT320 are provided for use by persons in the field to check cables and the Rotortuner functions. **The tests and checks recommended in this document should not be construed to be factory standard tests. The tests and checks are designed to assist Rotortuner users to access the functional operation of sensor cables and Rotortuner. Should units that are tested not function properly, regardless of test or check result, contact your nearest Rotortuner repair facility.**

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**TESTING SETUP.** Connect the Rotortuner in the standard way. Data Management Unit (DMU) (part number 5410) connected to the Operator Console (OC) (part number 5392) with the DMU-OC Cable (part number 5377). Connect the DMU to 28 volt DC power using DMU-28 VDC cable (part number 5390). If the equipment not in the aircraft connect the DMU-28 VDC cable to the AC Adaptor (part number 5205) and connect the AC Adaptor to 110 volt AC power using 110 volt AC cable (part number 401003). Connect the Junction Box (either part number 5208 or 5647) to the DMU using DMU-J-Box cable (part number 5380). Turn the DMU On and proceed to the "executive menu".

## TEST ACCELEROMETER CABLE.

1. Set Low-High switch on **Low**.
2. Connect the Accelerometer Cable (part number 332001) that is to be tested to the **channel 2** socket of the Junction Box.
3. Connect the sensor end of the cable into the ACCL connector on the CT320.
4. TEST ITEM
  - a. Green **PWR LED ON** above the ACCL connector. Power conductor is **OK**
  - b. Green **PWR LED OFF** above the ACCL connector. Power conductor or ground conductor is possibly **BAD**.
  - c. If **BAD**. Switch the junction box end of the cable to channel 6 socket. If Green PWR LED OFF above the ACCL connector the cable has a fault. If Green PWR LED ON above the ACCL connector. There may be a problem with your connection in channel 2 , the junction box connector may be faulty, or the junction box may have a fault in channels 1 through 4.
5. TEST ITEM. PWR light ON. Check the signal conductor.
  - a. **ACCL PWR LED ON**. Display the Rotortuner Status Screen. Press Key F7 until status screen shows.
  - b. **Status Screen Channel 2 "ON"**. Signal conductor is OK. Cable is **OK**.
  - c. Channel 2 "OFF". Signal conductor may have a fault. Switch the junction box end of the cable to channel 1 and repeat test. If the channel 1 screen status for channel 1 remains "OFF" the probability is very high that cable signal conductor is fault

### WARNING

**DO NOT TEST BOTH OPU AND MPU CABLES AT THE SAME TIME USING ONLY JUNCTION BOX CHANNEL A OR B. THE TEST WILL NOT BE VALID.**

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## TEST MAGNETIC PICK-UP CABLE

1. Set Low-High switch on **Low**.
2. Connect an accelerometer cable (part number 332001) to junction box **accelerometer channel 2** socket of the Junction Box. .

**DO NOT USE AN Optical Pick-Up (OPU) CABLE (part number 386002) for this test. The test will not be valid.**

3. **Green PWR LED ON above the ACCL connector.** This provides power to the system to test the MPU cable.
4. Connect the MPU Cable (part number 342001) that is to be tested to the **MPU channel A** socket of the Junction Box.
5. Connect the sensor end of the cable into the MPU connector on the CT320.
6. TEST ITEM
  - a. Green **PWR LED ON** above the MPU connector. Ground conductor is **OK**
  - b. Green PWR LED OFF above the MPU connector. Ground conductor is **BAD**.
7. PWR LED ON. Display the Rotortuner Status Screen. Press Key F7 until status screen shows.
8. **Status Screen "RPM A:"** should read **approximately 280 RPM**. Cable is **OK**.
9. Status Screen "RPM A:" reads "0". The cable may be bad or there may be a hardware fault. Test another cable. If both cables show **BAD** check with your Rotortuner Repair Facility.

## TEST OPTICAL PICK-UP CABLE

1. Set Low-High switch on **Low**.
2. Connect the optical pick-up cable (part number 386002) to be tested to **OPU channel A** socket of the Junction Box.
3. Connect the sensor end of the cable into the MPU connector on the CT320.
4. TEST ITEM
  - a. Green PWR LED ON above the MPU connector. Power and Ground conductors are OK.
  - b. Green PWR LED OFF above the OPU connector. Ground or Power conductor is **BAD** cable is **BAD**.

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5. PWR LED ON. Display the Rotortuner Status Screen. Press Key F7 until status screen shows.
6. Status Screen "RPM A:" should read approximately 280 RPM. Cable is OK.
7. Status Screen "RPM A:" reads "0". The cable SIGNAL may be BAD or there may be a hardware fault. Test another cable. If both cables show BAD check with your Rotortuner Repair Facility.

## OTHER TESTS

Other tests that can be accomplished with the CT320 related directly to Rotortuner functionality. The following checks area possible:

- Balance Channel (channels 1 through 4) Functional Test (Low and High speed).
- FFT Functional Check (Synchronous and Asynchronous).
- Basic Line Scan Camera Check.

The Rotortuner must have an aircraft test card inserted into card reader to accomplish any of the tests indicated above. The CT320 provides a single channel vibration signal through an accelerometer cable connected to any of the eight (8) junction box accelerometer channel connectors. Speed/RPM signals are put into the Rotortuner via the junction box MPU or OPU channel connectors.

If the user is not familiar with the manual operation of the Rotortuner it is recommended that the user familiarize themselves with the Rotortuner operation by referring to sections 3 and 4 of RT-15 Operating Manual.

## BALANCE CHANNEL FUNCTIONAL CHECK.

1. Set Low-High switch on Low for low speed tests and High for High speed test.
2. Connect an Accelerometer Cable (part number 332001) that tests OK to the **channel to be tested** socket (1,2,3, or 4)of the Junction Box.
3. Connect a MPU or OPU Cable that tests OK
4. Executive Menu select "collect", F1, proceed to the collection menu and select "manual ", F4. The manual data collection matrix will be viewed.
5. Channel 1 and 2 will be viewed on "Main" or "FWD" and channel 3 and 4 will be viewed on "Tail" or "AFT". Channel 1 and 3 are Lateral Balance, Channel 2 and 4 are Vertical Balance. Vertical balance always shows up first when viewing live balance.
6. The Status Screen will display a warning , "**Warning - Selected accelerometer(s) not connected**". This happens because the Rotortuner is looking for two (2) accelerometer inputs and only one (1) is being provided. **Disregard the warning. Push F7.**

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7. The balance chart will show a balance point after a few seconds. When the CT320 Low-High switch is set Low the balance reading should be on the 0.5 ips scale on the third ring (approximately .3 ips). Switch on High the balance reading will be on the 0.25 scale on the third ring (approximately .15 ips).
8. The balance channel is working properly if the data in 6 above is seen.

## FFT FUNCTIONAL CHECK (SYNCHRONOUS AND ASYNCHRONOUS).

When conducting these checks it should be noted that the amplitude values of the signatures may vary somewhat do to the resolution of the various Fast Fourier Transform signatures. If there are any questions contact SWANGATE INTERNATIONAL.

1. **Synchronous Check.** This is accomplished using the accelerometer and one-per-revolution (speed) signal.
  - a. A simple check is to conduct the balance check as indicated above and then select "Harmonic" Key F5. The results will be saved in the review section of the Rotortuner.
  - b. Otherwise, to check a channel proceed per items 1 through 4 in balance check above.
  - c. Move the cursor to the "Vib" column and press F1
  - d. The Vibration Signature Array will appear on the screen. Select the appropriate Range (Hz), then the appropriate channel, and press "collect", F1. The machine will collect the signature and display the results.
  - e. The signature will be a primary line and some harmonics. If the primary lines are approximately the same as that indicated in the one-per-revolution signals (Low - 280 RPM (4.667 Hz) and approximately .2 to .3 ips and High - 20,950 RPM (349.16 Hz) and about .15 ips ).
2. **Asynchronous Check.** This is accomplished the same manner as spelled out in items b. through e., Synchronous Check, above without connecting the MPU or OPU cable. Asynchronous simply is a signature not tied to a speed signal. The final values may shift down somewhat from the synchronous values.

## BASIC LINE SCAN CAMERA CHECK.

The Line Scan Camera can be checked but it will not take track during this check. Both day and night functions can be checked.

1. **Day Camera Check.** This check can be accomplished using the Rotortuner setup and only the OPU Cable. If the MPU cable is going to be used then an accelerometer cable must be installed also because it is needed to supply



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power from the Junction Box. Connect the OPU Cable to the Junction Box and then connect the CT320 to the OPU Cable.

- a. From the "executive menu" select "collect", F1, and proceed to the collection menu.
- b. Collection Menu select "manual", F4.
- c. Collection Matrix select Main/FWD Trk with the arrow keys, then F1.
- d. Track Menu select F1 and watch the camera. Note that the Rotortuner screen will turn on the tracking menu but no tracking indication will be seen. Item h. below will ask you to check the screen after checking the camera.
- e. **Self Check Test.** The red LED bar on the back of the camera must ripple up and down. This is self check. If this happens the camera is "Self Checking". This function is OK.
- f. **Low Light Test.** Round Red Led (Low Light Indicator) may flash during self check. Point the camera at a bright light or out the window so that the light goes out. Block the camera lens with one hand for about 5 seconds. The LED will come on indicating low light condition. Remove the hand, still pointing at the light and the LED will go out. The Low Light function is operating properly.
- g. **Target Acquisition Test.** This can be accomplished inside or outside.  
**Outside:** With the Low Light LED Off, point the camera at a dark object within 30 feet and move the camera. The Lighted LED on the red LED bar on the back of the camera should move around as the camera is moved. **Inside:** With the Low Light LED Off, point the camera at a light and move the camera. The Lighted LED on the red LED bar on the back of the camera should move around as the camera is moved. If this happens the camera is "seeing" targets.
- h. **Sensitivity Adjustment Pot. Test.** This test is only for cameras with the sensitivity adjustment potentiometer installed and after the Target Acquisition Test, g. above. While pointing at the light move the Sensitivity Adjustment Knob (to the left of the tracking LED bar) from full counter clockwise to full clockwise two or three times taking about one second to go from one end to the other. The Tracking LEDs should ripple and move and change in number as the knob is turned. This indicates that the adjustment is functioning.
- i. **Error Message Check.** View the Rotortuner OC screen make sure that no warning messages were received, e.g., Camera Failure, Internal Command Failure. If no messages are seen continue to the next step.
- j. **Camera OK.** If tests indicated in e., f., g, and h. above test OK then the camera should track in either the day or night modes. If the Line Scan Camera fails any of the tests and fails to track, contact your nearest Rotortuner repair facility.

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- k. **Turn Track Screen Off.** Press key F8, then press "NO" and the Rotoruner Tracking Menu will be displayed.
2. **Night Camera Check.** Once the Day Camera Check has been accomplished the Night Camera functions will be checked. The only function that needs to be checked is the IR Light.

## WARNING

**DO NOT LOOK INTO THE LIGHT SOURCE AS IT CAN  
DAMAGE EYES**

1. At the Track Menu select F2, Night Track.
2. Wait for the camera to complete the Self Check as indicated in Day Camera Check above.
3. **Check IR Light.** Do not look at the light. Place a hand in front of the light lens, do not touch the lens as it **may be hot**, a red glow should be seen on the hand. If glow is seen the light is OK. When the camera is turned off the light will turn off.
4. If no light is seen the Line Scan Camera can still be used during the day. To repair the Night Tracking Light contact a Rotortuner repair facility.