Now We Can Explore the Universe

Harvey Morgan

The scientific myth: "Nothing can go faster than light!" is not true. Experimental results of tests on non-inductive cable have established that electrical currents, which have a small mass, can go much faster than light. The velocity of propagation (VOP) measured by determining signal current wavelength, could not be distinguished from infinite VOP. The theoretical basis for the experimental work is an equation from electromagnetics, used for decades by communications engineers and also the theoretical basis for Lenz's laws of physical optics:

$$VOP = C / \sqrt{ue}$$

where C is the vacuum velocity of light, u is magnetic permeability and e is dielectric constant. When u or e is zero, the indicated VOP is infinite.

The mechanism for making VOP infinite is cancellation of magnetic fields associated with signal current. Magnetic field cancellation is not a new technology; it has been used for decades by manufacturers of "wire-wound non-inductive" resistors. For a coil of a conductor wire to be non-inductive, the effective permeability must be zero. Inductance is due to the magnetic field of a segments of a conductor coupling to each other such segment of the conductor. When the magnetic field changes, a voltage is induced in each conductor segment which opposes the current and magnetic field change.

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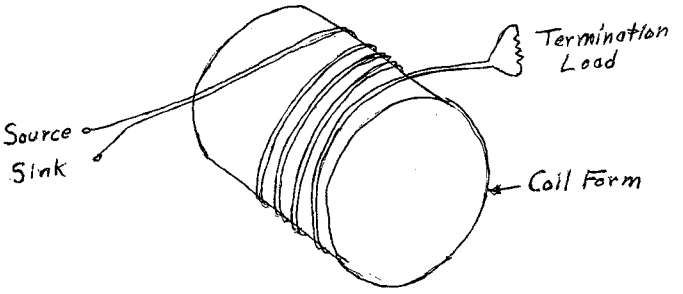

Fig. 1. Non-Inductive Coil

The technique by which magnetic field cancellation is accomplished and a conductor is rendered non-inductive is to have equal currents in opposite directions. The non-inductive wirewound resistors and a non-inductive cable consists of a loop of conductor carrying current. A length of conductor is doubled from the middle back to the start so that the current at any point on the doubled conductor is equal and opposite in conductors side-by-side, in contact. The non-inductive technique, applied to a coil, is illustrated in Figure 1. The right-hand rule states that the right hand grasping the conductor with the thumb pointing in the current direction has the magnetic field concentric about the current with the curl about the conductor in the direction the fingers are pointing. With two conductors carrying equal current in opposite directions, the tendencies for magnetic fields are equal and opposite; so they cancel.

On a non-inductive cable, the current leaves the source and returns to it. At the far end of the cable, the information of the signal needs to be transferred to the signal destination. A transformer primary connected to the two conductors of the cable will pass the signal current without change. Another mechanism for signal transfers from a non-inductive cable to a signal sink could be a light-emitting diode driving a light sensor (linear for analog signals).

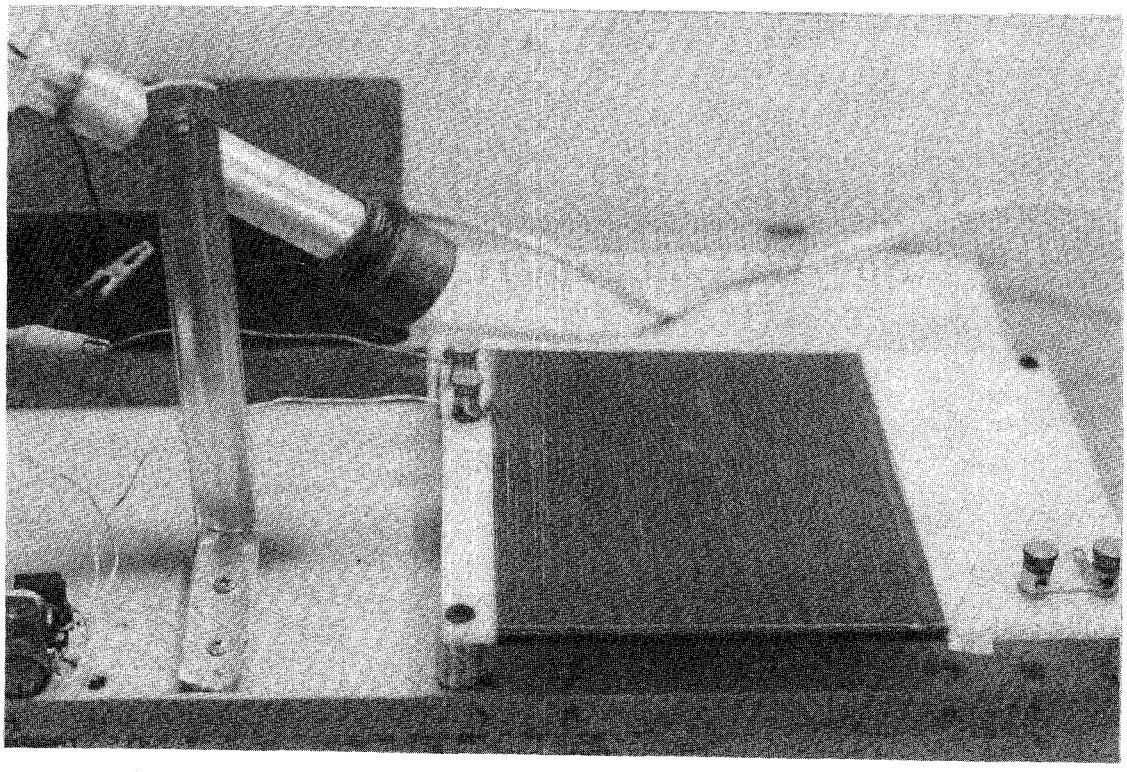

Fig. 2. Optical Effect Test Apparatus

If some signal current is diverted from returning in the cable to the signal source, there will be a partial signal current magnetic field (incomplete magnetic field cancellation) and VOP less than infinity. An electronic circuit was developed with which part of a carrier signal current through a non-inductive coil was diverted in an amount proportional to the amplitude of a modulating signal. Phase modulation resulted from changing the VOP of carrier current through the coil.

The puzzle that started this work was advertisements in the electronic trade journals for "non-inductive wire-wound" resistors. The textbooks were searched for information on how to make electrical conductors non-inductive and no such information was found. The textbooks flatly state that electric currents have associated magnetic fields. A crystal set kit purchased in 1942 provided a clue. It contained a "negative mutual inductance" coil. Examination showed two windings wound with each turn adjacent to a turn of the other winding. They were insulated wire, wound side-by-side, in contact. It was then clear what constituted the technology. An electronic magazine, published in 1960, retained because it contained one of my early published articles, also contained an advertisement for "non-inductive wire-wound" resistors, so the technology is scarcely new. Guess the designers of those resistors just didn't know about the equation cited earlier.

The first test of magnetic field cancellation was to use compasses as detectors. A 5-volt regulated power supply was loaded with a 5-ohm resistor and a single small wire from the other end of the resistor to the other power supply terminal.

Compasses were placed over the wire in two places. One compass was placed over a straight length of wire, and the other over a place where the wire was doubled back to have two conductors with equal current, side-by-side, in contact with each other. The compass over the straight length of wire deflected from North when one ampere went through the wire; the other compass did not deflect for one ampere. The magnetic field of two conductors, side-by-side, with equal and opposite current, was canceled.

Numerous non-inductive coils were wound with the two conductors side-by-side, using the in-contact technique. Their inductances, both with the two conductors in series (from start to start with the other ends connected) and singly were measured. One coil of 400+ turns had an inductance on either conductor of 1.6 millihenry but in the non-inductive mode, could not be measured as having any inductance with equipment capable of measuring to 0.3 microhenry. The effective permeability was less than 1/5000. Another test inserted a normal (one conductor) coil inside a non-inductive coil when the non-inductive coil was driven by an RF (radio frequency) signal generator. The normal coil was monitored for output by an oscilloscope and no transformer-type coupling of RF voltage was detected. The oscilloscope rating is 10 millivolts per centimeter deflection and much less than 10 millivolts could have been detected.

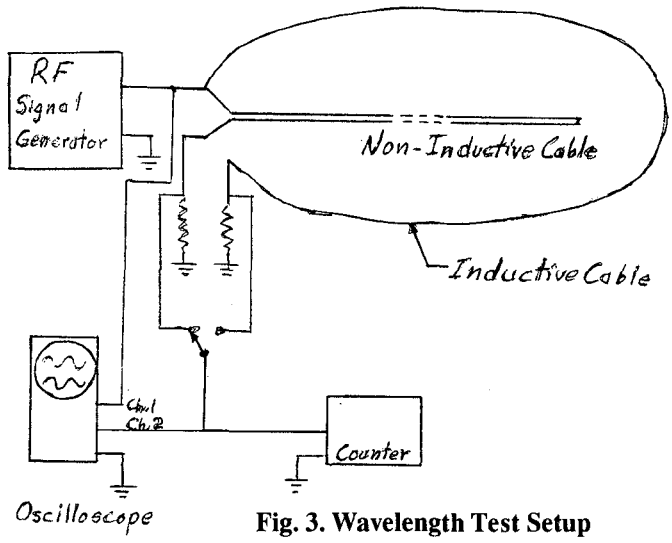

Fig. 3. Wavelength Test Setup

The textbooks say: "Space has unity permeability and utility dielectric constant." If "space" has any such properties, are they related? To test that question, another setup was devised.

A non-inductive coil was wound on a flat piece of plastic. A light source was positioned to reflect a spot of light from the non-inductive flat coil. The thought was that if "space" normally had permeability and dielectric constant properties, they might be interrelated and change dielectric properties when magnetic permeability changed with magnetic field cancellation. No such possible change in the angle of reflection was detected with a change of current to no-current or vice versa. Had there been a change of dielectric constant in the air at the coil surface, an angular change in reflection might have occurred. Figure 2, on previous page, illustrates the optical properties test.

Velocity of propagation of electric current on a non-inductive cable was measured by measuring wavelength. Wavelength of any wave phenomena is the velocity of propagation divided by the frequency of the wave. The equation expresses the relation:

$$VOP \,/\, Ncycles/sec = distance/sec \,/\, N/cycles/sec$$
$$= D/N \,/\, cycle$$

where D is distance and N is frequency. Two cables of equal conductor length, one inductive (normal) and the other non-inductive (essentially a twisted pair to keep the conductors side-by-side, in contact) were used in the test. An RF (radio frequency) signal generator drove the cables one at a time. Each cable was terminated by a 47-ohm resistor. An oscilloscope and a counter were used to monitor cable output across the terminating resistors. The oscilloscope has two channels. One channel was synchronized to the signal generator input to a cable, and the other channel displayed the cable output across the cable terminating resistor. On the oscilloscope's display, the phases of cable input and output waveforms were seen. Oscilloscope bandwidth is 50 MHz (million hertz or cycles per second) and the test frequency could be and was varied from 4 to 20 MHz, well below the oscilloscopes –3 dB (70.7% amplitude) bandwidth limit. Figure 3 illustrates the VOP measurement test setup.

The signal generator waveform (cable input) differed in phase from cable output on the inductive cable and the difference changed with frequency. The difference in phase amounted to 180° (half a cycle of 360°) at about 8 MHz and was back in phase (360° phase difference) at about 16 MHz. The voltage waveform observed on the oscilloscope was directly proportional to current through the inductive cable.

The non-inductive cable was tested in the same way by comparing waveforms of input and output of the cable. The input and output waveforms were in phase, independent of frequency. There was no phase difference noted, although a phase meter could possibly have measured a small phase difference at the 20 MHz upper test frequency limit. Complete magnetic field cancellation cannot be claimed. The wavelength indicated (no phase change in 60 feet, about 20 meters) was infinite, corresponding to an infinite VOP.

The mass of the current in either cable was about

$$M = 10^{-10}\, gram$$

per second. The momentum (MV) with infinite V would also be infinite, but no physical effects of cable movement were noted relating to changing electric current velocity from less than light speed to infinite VOP and back. Momentum is a field phenomena, as will subsequently be disclosed. The conditions for magnetic field cancellation are apparently appropriate for momentum field cancellation since it happened in the VOP test.

The original notion that momentum might be a field phenomena came from a study initiated by an engineering colleague's challenge: "What are the components (analogous to electromagnetism's magnetic and electric

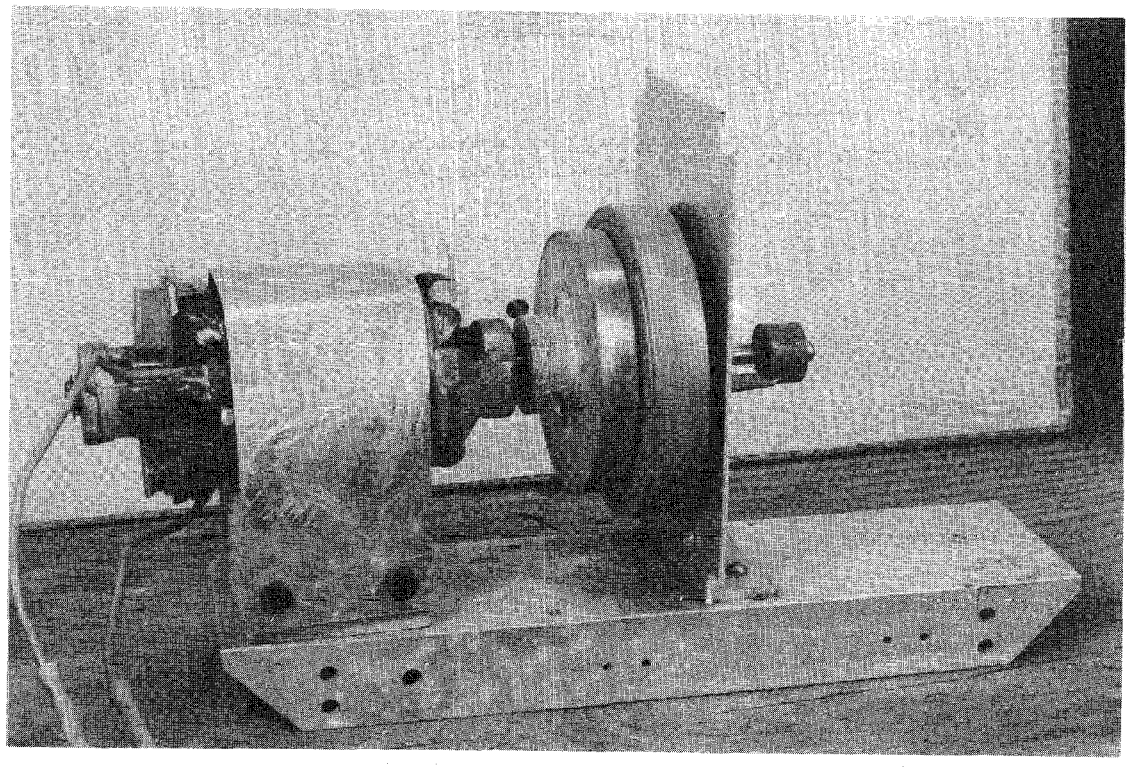

Fig. 4. Momentum Field Demonstration Unit

fields) of a gravitational wave?" Much of my spare time for the next couple of years (in the early '50's) was devoted to answering that question. Available texts I found had no hints. Finally, I came up with a *"Field Theory of Mechanics"* in which momentum and force were field phenomena. An offspring of that theory was an indication that it should be possible to generate force with a closed system. I designed and built such a hydraulic system which worked, albeit feebly. At about that time Willy Ley, the German rocket expert, went through the area on a lecture tour. After his lecture at what is now Arizona State University, I asked him if he thought a closed system could produce thrust. He said, "No. It is prohibited by Newton's third law." I could have — should have — demonstrated it to him then. Over the next several decades, I spent time designing and sometimes building mechanical devices to produce thrust since mechanical devices can be generally much faster and heavier than hydraulic centrifugal force systems.

On a rock-hunting trip in central Arizona, another rockhound and I followed a trail of quartz crystals up a mountainside to their source, a vug, which had formed as a gas pocket in molten lava and was subsequently filled with minerals by a stream of magmatic water. The vug was exposed by erosion. It contained, in a Montmorillonite clay, quartz crystals scattered throughout the clay. Those crystals had been formed from silicon dioxide molecules in a very hot, high pressure mud. Some of the crystals were clear, an indication of impurities on the order of parts per million. There had to be a very strong selective force between silicon dioxide molecules for crystals of such purity to have formed in that hot mud environment. There are many other kinds of crystals (gem materials are of the highest purity) which have been formed by similar forces. Note that the attraction force increases with temperature, which is uncommon among natural forces.

Geologists say the Earth's core rotates with respect to the surface, and has been doing so for billions of years. Recognizing there is a selective mutual attraction between like molecules at the same temperature implies that deep below the surface there are vast assemblies of minerals of all kinds with a high degree of purity. That proposition is strongly supported by the vast deposits of minerals brought to the surface by magmatic water usually associated with volcanic action. Examples are copper ore and serpentine, which are relatively soluble in very hot water.

An equation with which Einstein was associated relates the vibration frequency of atoms and molecules to their mass and absolute temperature. Momentum fields would be associated with any atomic particle's vibration and those fields would alternately be repulsive and attractive. At a given temperature, all particles of a given type will vibrate at the same frequency. Somehow they get together to form pure crystals. Purity, as witnessed by quartz being a geological "thermometer," increases with temperature.

A mechanical experiment confirmed that momentum is indeed a field phenomena. A 2 pound lead flywheel was mounted on the shaft of a small, very high speed (26,500 rpm advertised) electric motor. Another flywheel was mounted on a ball-bearing shaft aligned with the motor shaft. The two flywheel's parallel faces were separated by about 1/16″. Figure 4 is a photograph of the

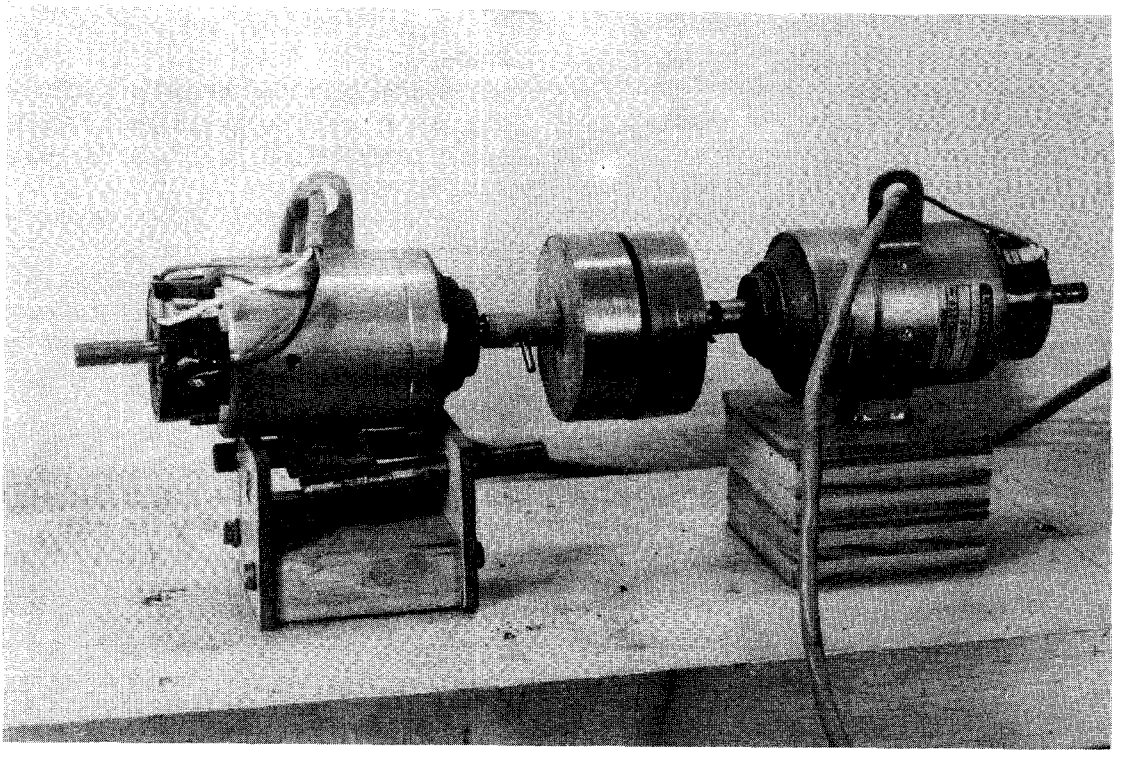

Fig. 5. Momentum Field Test Equipment to Measure Field Attraction, Repulsion and Cancellation

test setup. When the motor was energized, it accelerated the lead flywheel toward it's top rated speed. The other flywheel, in response to the changing angular velocity and momentum of the lead flywheel, started turning briskly — in the opposite direction! The changing momentum field of the lead flywheel induced a torque in the other flywheel across an airgap. Newtonian mechanics does not predict that reaction.

When the electric motor was turned off before reaching top speed, the other flywheel stopped turning. It then started turning slowly in the same direction as the lead flywheel, urged by the collapsing momentum field and the air coupling between flywheels.

Momentum has been established as a field phenomena. Its structure, both from the angular momentum test and from the momentum cancellation in the infinite VOP tests of electric current, established that momentum and magnetic field structures are duals. More mechanical tests could be performed which could verify that like momentum fields repel, and unlike momentum fields attract; and also momentum fields cancellation can be mechanically demonstrated. Such a mechanical test equipment was constructed, (Figure 5) but the recording instrumentation needed was not available.

SUMMARY

What are the consequences of electric current going FTL and momentum being a field phenomena? First, because a non-inductive cable has no magnetic field, the VOP and bandwidth are infinite (assuming perfect magnetic field cancellation). VOP of conductor cables can be much greater than light on glass fibers, and effective bandwidth will depend only on transmitters and receivers. Some development will be required both of these items.

The old scientific myth: "Nothing can go faster than light!" should be changed to: "Nothing electromagnetic can go faster than light!" Magnetic fields are revealed as the factor that controls electromagnetic phenomena velocity of propagation.

Now that it is known that infinite VOP is possible, there is another communications media whose VOP may be infinite. Both by myself and at MIT, electric field communication means have been tested. An experiment is under construction to compare electric field and electromagnetic transmission VOP. Since magnetic fields in electric field transmission will be parallel to the direction of transmission rather than at right angles, there is reason to expect that electric field transmissions will have infinite VOP. In electronics, no delay, from:

$$t = \sqrt{LC}$$

where L is inductance and C is capacity, is attributed to signal passage through a capacitor except for incidental inductance. Capacity exists because of electric fields between electrodes.

Maybe the SETI (Search for Extraterrestrial Intelligence) search should be shifted to electric wave communication rather than the present electromagnetic.

It is expected that larger masses than electrons will be able to have infinite VOP. In a spaceship in space,

accelerating a special mass through the center of mass of the spaceship with a momentum equal (almost, because the distance to be traveled is a definite finite value) and opposite to that of the spaceship's, would allow travel to Mars, for example, in microseconds. The spaceship propulsion to get to space can be other than rockets, because momentum fields can be canceled. For example: Imagine a structure in which a mass rotates. On one side of the rotation the momentum field is canceled, but not on the other. A net thrust in one direction (centrifugal force) will result. A hydraulic system has been devised in which tubing carrying a heavy liquid has one end in which all streams go the same direction; and in the other, half of the streams go in one direction and the other half for cancellation, again, centrifugal force, in the opposing direction. Alternate loops and figure 8's will do that, adding at one end and canceling at the other. It's been done electrically to add and cancel magnetic fields.

What this paper does is open the universe to human occupation and communication. Spaceship velocity can be near infinite, allowing trips to any place in the solar system or to any other solar system or galaxy. I invite you to prove me wrong, experimentally and to start the design and test work to implement what I have shown to be possible.

Harvey Morgan graduated from the University of Idaho in 1942 with a BS (Chem. Eng). He worked in the aircraft industry as a mechanical engineer from 1942-1945, then went in the Armed Services. Morgan returned to the University of Idaho for an MS in Physics in 1947. Upon graduation, he entered the electronic industry and worked in the defence industry until March 1989. Morgan retired to New Mexico to work in his electronics/mechanical home lab. He has 24 technical articles published in electronic trade journals, and many non-technical articles published locally and in two anthologies. Morgan holds four patents, is a member of IEEE since 1948, and volunteers locally at Cookes Peak Volunteer Fire Department, Deming. He is a member of six writers groups, Friends of the Library, PC Sugar computer club, and People for the West!

On The Cover (continued from page 1)

of gas and a star cluster associated with the nebula. Hubble reveals details as small as 4.1 billion miles across. Hubble Space Telescope observing time was devoted to making this panorama because the nebula is a vast laboratory for studying the processes which gave birth to our own Sun and solar system 4.5 billion years ago. Many of the nebula's details can't be captured in a single picture — anymore than one snapshot of the Grand Canyon yields clues to its formation and history. Like the Grand Canyon, the Orion nebula has a dramatic surface topography of glowing gasses instead of rock with peaks, valleys and walls. They are illuminated and heated by a torrent of energetic ultraviolet light from its four hottest and most massive stars, called the *Trapezium*, which lie near the center of the image. In addition to the Trapezium, this stellar cavern contains seven hundred other young stars at various stages of formation. High-speed jets of hot gas spewed by some of the infant stars send supersonic shock waves tearing into the nebula at 100,000 miles per hour. These shock waves appear as thin curved loops, sometimes with bright knots at their end (the brightest examples are near the bright star at the lower left). The mosaic reveals at least 153 glowing protoplanetary disks (first discovered with the Hubble in 1992, and dubbed "proplyds") that are believed to be embryonic solar systems that will eventually form planets. (Our solar system has long been considered the relic of just such a disk that formed around the newborn Sun). The abundance of such objects in the Orion nebula strengthens the argument that planet formation is a common occurrence in the universe. The proplyds that are closest to the Trapezium stars (image center) are shedding some of their gas and dust. The pressure of starlight from the hottest stars forms "tails" which act like wind vanes pointing away from the Trapezium. These tails result from the light from the star pushing the dust and gas away from the outside layers of the proplyds. In addition to the luminescent proplyds, seven disks are silhouetted against the bright background of the nebula. These dark objects allow Hubble astronomers to estimate the masses of the disks as at least 0.1 to 730 times the mass of our Earth. Located 1,500 light-years away, along our spiral arm of the Milky Way, the Orion nebula is located in the middle of the sword region of the constellation Orion the Hunter, which dominates the early winter evening sky at northern latitudes. The stars have formed from the collapsing clouds of interstellar gas within the last million years. The most massive clouds have formed the brightest stars near the center and these are so hot that they illuminate the gas left behind after the period of star formation was complete. The more numerous faint stars are still in the process of collapsing under their own gravity, but have become hot enough in their centers to be self-luminous bodies.

Technical information: To create this color mosaic, 45 separate images of the Orion nebula were taken in blue, green and red between January 1994 and March 1995. Light emitted by oxygen is shown as blue, hydrogen emission is shown as green, and nitrogen emission as red light. The overall color balance is close to that which an observer living near the Orion nebula would see. The irregular borders produced by the HST images have been smoothed by the addition of images from the European Southern Observatory in Chile obtained by Bo Reipurth and John Bally, these being about 2% of the area shown here and lying at the top left corner.

Credit: C.R. O'Dell (Rice University), and NASA

Image files in GIF and JPEG format and captions may be accessed on the Internet via anonymous ftp from ftp.stsci.edu in /pubinfo:

PRC95-45a
Orion Nebula Mosaic
gif/OrionMos.gif
jpeg/OrionMos.jpg