

# **Torsion Field School Network**

# Overview

The conventional system teaches a semester of subject matter in serial sequence. The torsion field school network breaks up semester courses into pieces small enough so that all of these pieces can be taught in parallel all year long without seasonal constraints. In other words, the archaic conventional system turns out to be merely a small-scale, static version of the full-scale, dynamic version of the torsion field school network.

One dozen to four dozen schools are to be linked into a single network. The school network's three-layer computer system would comprise of a network coordinating and scheduling computer as the top layer, an administrative computer in each school as the middle layer, and personal computers as the bottom layer. The network's customized software would include network management and coordinating functions, two layers of software for the teachers to support 100 different functions, and 25 different functions for the students, only one of which is computer-assisted instruction. Each student's personal computer would have a monitor capable of also displaying televised or recorded classes.

Schools normally do not contain enough students to enable the new system to operate economically. High-performance torsion field communications and video equipment will link a number of schools into a single network large enough to achieve the required scale. To cope with the massive bookkeeping, new and efficient management techniques will be coupled with the marvelous computing machinery that is now available. Careful equipment configuring and reliable software should enable the synthesis of a smooth-running, modern educational system.

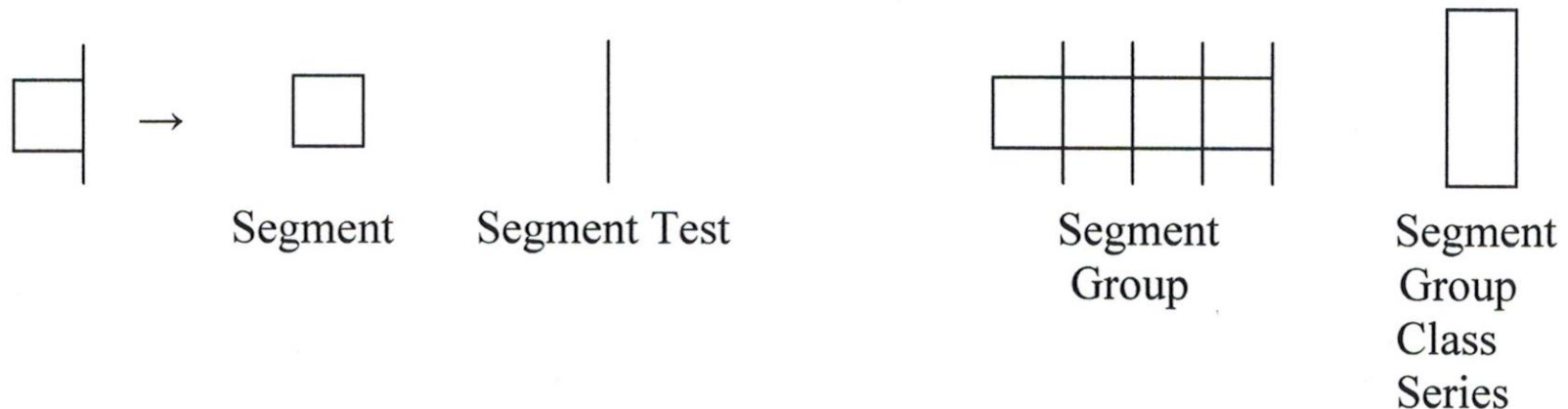
# Segment and Segment Test

A segment is the amount of subject matter covered in a week with a conventional course. After a student studies a segment, he/she is given a short segment test. If he/she does well, he/she may advance to the next segment in the course. If not, the student reviews and attempts to pass another test on the same segment.

The segment test allows the student to demonstrate his/her mastery of the material and to move on to the next segment without waiting for other students or his/her instructor. The segment test should also be a helpful homework supplement.

Most of the segment tests would be given and graded by the controlling software via a remote terminal. A few segment tests would be given and graded manually. In addition, one oral segment test could optionally be given on a key segment in the latter part of each course.

Segment tests may be given at any time. Segment test grades would NOT be recorded; but the fact that a student has successfully passed a segment test would become an input datum for several different software routines periodically processed by an electronic data processing system.

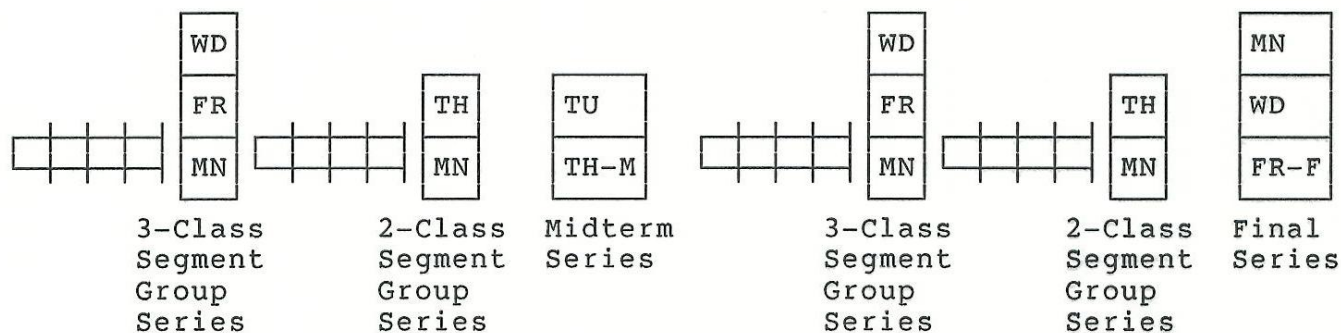


# Diagram of a Simplified Segmented Course

The diagram is of a simplified segmented course. Each box represents a segment, and each vertical line on the right side of a box represents a segment test. A segment group would usually consist of three or four segments. There may be as few as one segment in a segment group. Following each segment group, one or more segment group class series are held. A segment group class series consists of two or three small classes. The series consisting of two classes would be held on Thursday and Monday. The series consisting of three classes would be held on Wednesday, Friday and Monday.

Each series would be selected for machine scheduling no less often than once every several weeks. A large enough network of schools should be able to economically allow selection of each type of series at least once a week.

After one to several segment groups, either a midterm or a final series would be held. A midterm series would consist of one relatively large lecture and either another lecture or a one-hour examination. A final series would consist of two large lectures and either a third lecture or a final examination. Examination grades would be recorded. They would be unique and usually not graded by computer.

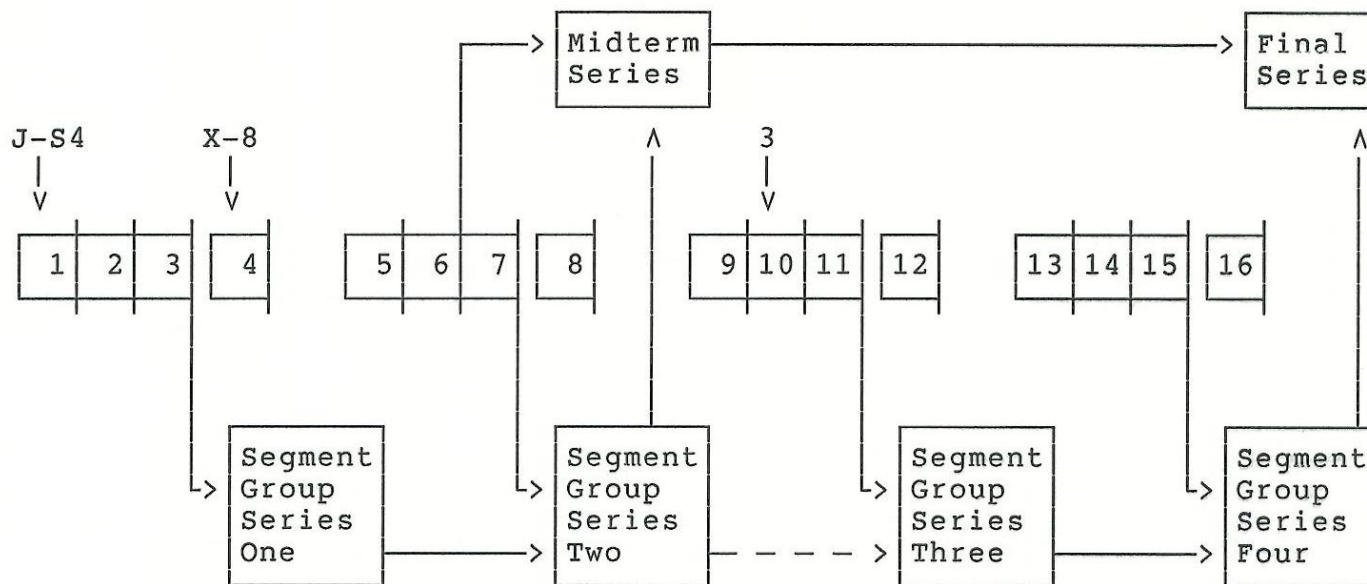


# Series Prerequisite Chart

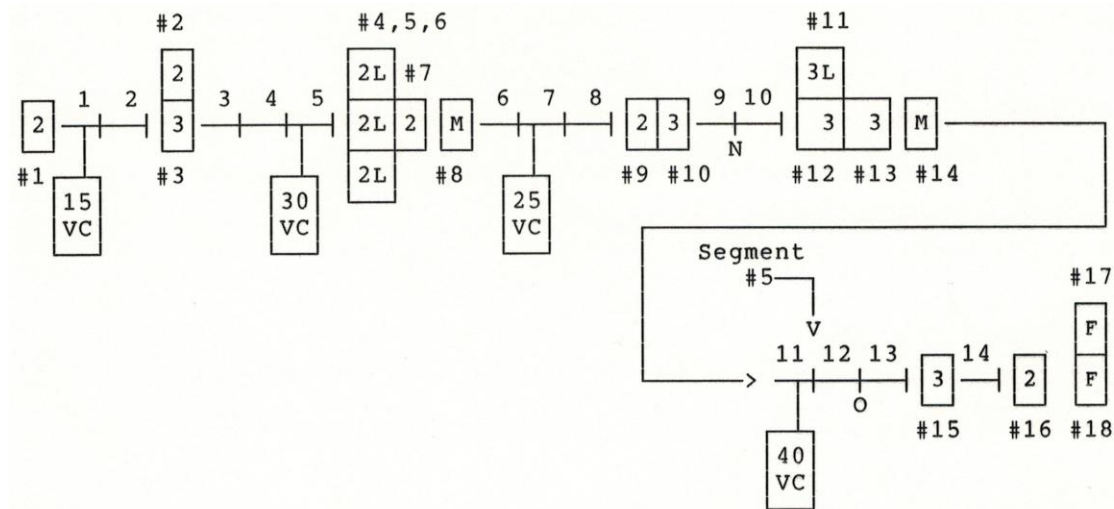
The midterm series and the final series would be selected for scheduling not as often as segment group class series. The duration of the midterm and final series would be no longer than a week. The sequence of the various pieces shown in the diagram of a simplified segmented course follows the subject matter contained in the course. But the sequence is NOT necessarily chronological.

The chart shows one set of prerequisites for each of the series in the simplified segmented course. It is followed by the processor when it is determining the eligibility of students for the various segment group class and lecture-plus-examination series in the course.

Segment group class series #2 would always be scheduled a half-week before the midterm series. Likewise, segment group class series #4 would also always be scheduled before the final series. Because of class size differences, all segment group class series would be selected for scheduling more often than the midterm and final series.



# Possible Segmented Course Variations



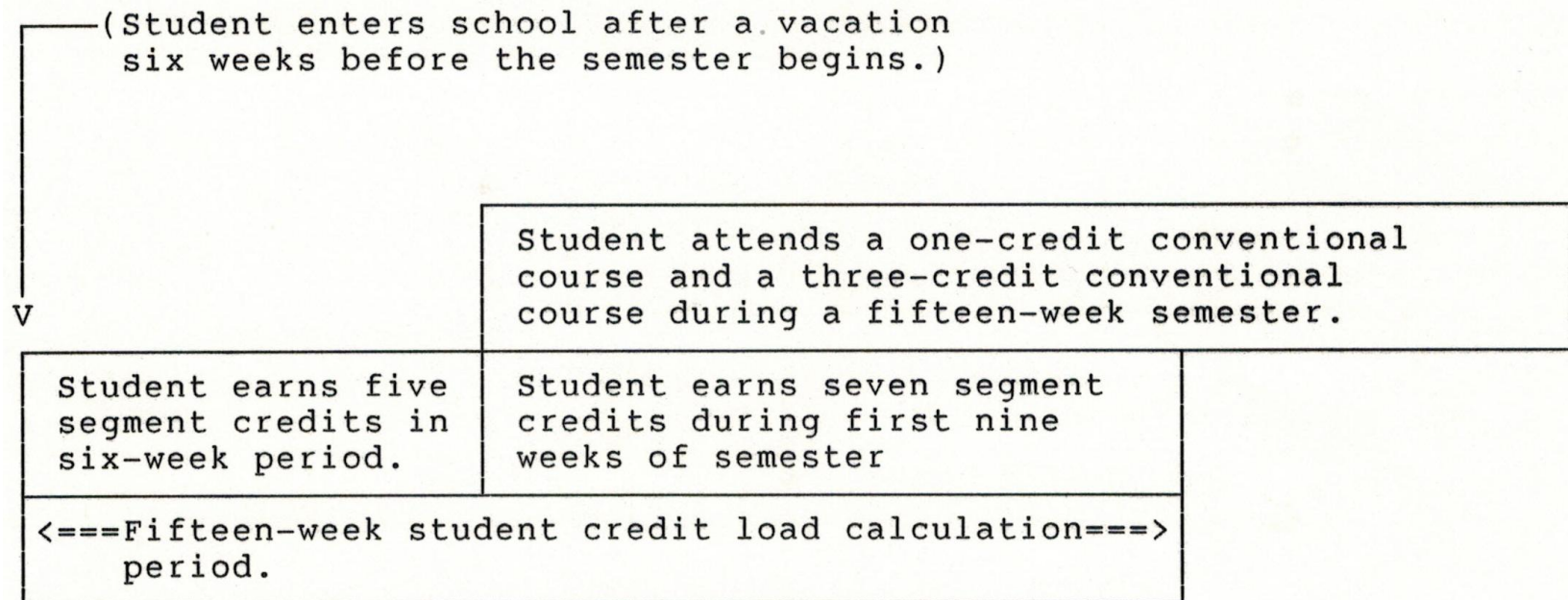
## Legend:

—	==>	Segment with Segment Test	<div>2 3</div>	==>	2-Class Segment Group Series in Week Before 3-Class Segment Group Series (Horizontal Stack)
<div>2</div>	==>	2-Class Segment Group Series	<div>2</div>	==>	2-Class Segment Group Series in Same Week with 3-Class Segment Group Series (Vertical Stack)
<div>3</div>	==>	3-Class Segment Group Series	<div>2L</div>	==>	Two Three-Hour Labs in Week Before 2-Class Segment Group Series (Vertical/Horizontal Stack)
<div>2L</div>	==>	2-Class Laboratory Segment Group Series	<div>2L 2</div>	==>	Two Three-Hour Labs in Week Before 2-Class Segment Group Series (Vertical/Horizontal Stack)
<div>M</div>	==>	Midterm Series	<div>2L</div>	==>	Two Three-Hour Labs in Week Before 2-Class Segment Group Series (Vertical/Horizontal Stack)
<div>F</div>	==>	Final Series	<div>15 VC</div>	==>	15-Minute Lesson Prerecorded on Video Cassette
—  N	==>	Segment with Non-Computer-Graded Segment Test			
—  O	==>	Segment with Oral Segment Test			

# Student Credit Load Calculation

Credit load units would be a quantitative measure with which the controlling software could determine each and every week whether students should be placed on probation for not carrying a minimum academic load. The credit load unit for each of the segments in a segmented course would, on the average, be equal to the number of credits at which the course is rated divided by the number of segments contained in the course.

Calculating the credit load a student has carried during a specified number of weeks would take into consideration the amount of work accomplished in both his/her segmented and conventional courses. If a student's load was calculated for a semester or quarter, his/her load would be the sum of the number of credits earned by passing conventional courses and the credit load units earned by passing segment tests. The figure illustrates a student credit load calculation example.





# Series Selecting

The series scheduling procedure would consist of two basic steps: The first step would be to determine whether each series should be selected for computerized scheduling. The second step would be the actual scheduling. The entire procedure would be reinitialized every Thursday night. It would end two and one-half weeks later with the holding of the last classes and examinations of series that had been selected and then scheduled.

The procedure would begin with the computation of the series-selecting queues. Weekly progress reports would be prepared for distribution to the instructors monitoring each segmented course. Some of the series are then selected for scheduling by both the course monitors and the computer. The controlling software optimizes a schedule, which is then published.

Five types of series-selecting queues (with quotas) are recommended. The first two are simple; the number of weeks elapsed since a series was last held, and the number of students that have satisfied the prerequisites for each series. The prerequisites for a series are a segment for which a segment test has been passed, and one or more preceding series in the course series sequence which the student either has previously attended, or is presently attending as scheduled the previous week.

The third type of series-selecting queue (with quota) would be a composite of the number of students that have satisfied the prerequisites of a series, and the number of weeks each student has been eligible. When the controlling software is evaluating the possible selection of a series for computerized scheduling, a student that has been eligible to attend a series for three weeks, for example, should be given the same weight as three students that have been eligible for one week.



# **Segmented Course Weekly Progress Reports**

After the series-selecting queues have been calculated, the controlling software would prepare a weekly progress report for each segmented course. On Friday, the segmented course's monitor (a teacher assigned to monitoring the segmented course) would display the current report on a terminal. Temporary adjustments of series-selecting quotas could then be made. With such a report on the current status of the students and the series, the monitor could supplement computerized series-selection with human judgment.

When selecting a series for computerized scheduling the following weekend, the monitor would temporarily reduce one of the series-selecting quotas below its present queue. To postpone a series, the monitor would either temporarily increase all series-selecting quotas for the series, or directly select the series for scheduling.

The segmented course's monitor could also suggest future dates for holding series so that students could pace their studies accordingly. Current weekly progress reports would always be available to students to facilitate their course-work planning.

While all series would be selected by the controlling software for scheduling on the basis of pre-set series-selecting quotas, segmented course monitors would have the privilege of overriding the controlling software on the basis of weekly progress reports, personal requests from students and lecturers, or other considerations such as holidays.

# Example of a Segmented Course Weekly Progress Report

If the first segment has been closed by the pacing procedure, include the number of students who have registered their intent to attend the course with their academic advisor's consent. The students who have passed the segment test for each segment or are studying the first segment in the course should be included.

## Example:

Segment Number	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Number of Students	3	8	0	4	5	8	3	1	9	2	6	10	8	5	5	21

The students that are eligible for each segmented-group class series should be included. They would be all the students that have passed a segment test for a particular segment, usually the next-to-last segment in a group, and those students who did not attend the series when it was last held.

# Series Eligibility Table

Each series of smaller segment group classes or larger lectures with examinations would have its own eligibility table.

Example:

## Series Eligibility Table

=====

One week	Number of students who have been eligible for the series for no more than one week.
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Two weeks	Number of students who have been eligible for the series for no more than two weeks.
-----------	--

And so forth....

The segmented course's weekly progress report would include the numbers of students eligible for the midterm and final series. These numbers would include students that did not attend the series when they were last held. Also included would be eligibility tables similar to the segmented-group class series tables except that eligibility requirements would be more elaborate for the midterm and final series.

# Example of Series Eligibility Tables

Example:

Segment Group 1*	Segment Group 2	Other Midterm Series*	Segmented Groups	Final Series
=====	=====	=====	=====	=====
1 – 3	1 – 6	1 – 42		1 – 37
2 – 6	2 – 4	2 – 19		2 – 23
3 – 3	3 – 5	3 – 8		3 – 14
5 – 2	10 – 1	4 – 21		
6 – 4		5 – 13		
		6 – 5		
		12 – 2		

\* One of the series-selecting queues exceeds its corresponding quota.

The first number in the pairs shown above is the number of weeks the students have been eligible for the series. The second number indicates the number of students that have been eligible that number of weeks. Unless it is overridden by a course monitor, the controlling software would include the series in the list of series to be scheduled.

The weekly progress report would include the current total series-selecting queues and quotas for each series in the segmented course. Queues and quotas would also be displayed for each school in the torsion field school network.

# Series Scheduling Schedule

The schedule is shown for selecting, scheduling, and publicizing segmented course series of classes, collecting series attendance reports, the normal weekday for each class of each type of series, and an examination schedule. The schedule is initialized every week. It begins in the first week with recording of lists of students not attending the first session of the each series that had been previously scheduled. These lists would also include the names of students that had attended and become eligible to attend by passing a segment test after the schedule had been published. These lists would be considered when the series-selecting queues are calculated.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
First Week	First Sessions of Previously Scheduled Series Generate Lists of Non-Attending Scheduled Students and Lists of Eligible Attending Unscheduled Students				Course Monitors Review Reports; Select Some Series	Final Selection of Series; Schedules of Classes and Examinations
	-----   Compute Queues;   Prepare Reports					
Second Week	Class and Examination Schedules Distributed and/or Displayed on Terminals		First Class of 3-Class Segment Group Series	First Class of 2-Class Segment Group Series	Second Class of 3-Class Segment Group Series	
Third Week	Second Class of 2-Class Segment Group Series	Third Class of 3-Class Segment Group Series				
	----- First Lecture of Final Series	----- First Lecture of Midterm Series	Second Lecture of Final Series	Second Lecture/Exam of Midterm Series	Third Lecture/Exam of Final Series	

# **PACING GROUPS OF STUDENTS THROUGH UNPOPULAR COURSES**

Whenever a segmented course's economics dictate pacing groups of students through the course, students would be aperiodically denied admission to the course.

Whenever a segmented course is opened after enough students have registered for it, all of the course's segment tests would be re-entered in the repertory of segment tests by the segmented course's monitor. The monitor may or may not enter the series-selecting quotas.

Every few weeks, the first segment in the segment-group following the last closed segment-group in the course would have its segment test removed from the repertory. This would be done at the discretion of the course monitor who would monitor the progress of the students being paced through the weekly progress reports.

Tentative dates, and possibly reserved class periods, would be set by the segmented course's monitor and publicized. Two middle series could be tentatively scheduled two or three weeks apart two months after opening day. Likewise, two overview series could be tentatively scheduled three or four weeks apart three or four months after opening day. Such an arrangement would facilitate two different rates of progress for the students to ensure maximum understanding by learning at the optimum rate and to compensate for possible contingencies.

The student pacing procedure would be useful also when making a major revision of a course's subject matter.

# CRITICAL PATH METHOD

The structure of the segmented course evolved from a study of network planning, e.g., PERT/TIME (Program Evaluation and Review Technique – a management method of controlling and analyzing an engineering or construction program using periodic time reports to determine labor status at any given time). Another project management aid is the Critical Path Method. Perhaps the Critical Path Method could also be modified for more versatile educational administration.

Assume that a large university had converted to segmented courses in computer science, mathematics, biochemistry, engineering, neurophysiology, etc. Under conventional educational methods, students ordinarily choose courses to satisfy a major, take some elective courses, and receive their diploma after four years or so in college.

But there is also a need for graduates who are expert in several different fields. Unfortunately, the inflexible nature of the conventional college curriculum makes it almost impossible for one person to acquire, in a reasonable amount of time, such a broadly-based competence. If such a university were to modularize its courses by segmenting them and placing them under a computerized segmented course management system, it may be possible to combine bits and pieces of segmented and conventional courses into curricula that could train such people in a reasonable amount of time.

The key to efficient administration of such curricula seems to lie in a modification of the Critical Path Method. A committee of outside consultants from government and industry, as well as professors from the various departments involved, could outline an interdisciplinary critical path curriculum. Such a curriculum would contain all and only such material considered absolutely necessary for a reasonable degree of relevant competence in the several disciplines. A torsion field-connected network of universities and colleges would allow offering a much larger selection of course segments to choose from when assembling critical path subnetworks.



# Critical Path Sub-Networks

Another way of thinking about the segmented course is to consider it as if it were a standard linear sub-network of segments and series. Suppose a group of segmented courses, or standard sub-networks, is made available for use by students interested in following an interdisciplinary critical path curriculum. Since time is valuable, they should study only those parts of segmented courses that are likely to be helpful and relevant.

These segmented courses could be re-organized as CRITICAL PATH sub-NETWORKS (CRIPANETs). For example, if part of a CRIPANET should consist of a segment-group (including the corresponding segment-group series) offered as part of a segmented course, the critical path students could meet as a separate group during the series and take a one-hour final examination on the course's segment-group plus the remaining material in the CRIPANET. Other patterns in which a CRIPANET could be organized are as follows:

- A simple CRIPANET comprising of the first portion of a segmented course plus the midterm series.
- The first segment-group in a segmented course, a pair of special segments, a CRIPANET series of two lectures, and a final examination on the CRIPANET. The final examination would count 80% of the CRIPANET grade.
- An introductory special segment, a segment-group from a segmented course, another special segment, an oral segment test, and a CRIPANET series.
- A specially written group of segments, a one-hour panel discussion by some of the critical path curriculum professors, and a CRIPANET series.
- Three weeks of lectures in a conventional course and a final examination.

# Student Interest Groups

A solution to the problem of too many anonymous televised series of classes may be for the students to form 'student interest groups' who will try to remain a group for at least part of the course. Each student interest group would be defending itself against the attrition due to vacations, illness, and televised class series. Student interest group members could optionally formalize their relationship by adopting a name such as 'Eagles', 'Easy Street Sweepers', or 'Parity Errors'. The membership of the student interest group would probably be somewhat fluid.

A 'Weekly Student Interest Group Report', accessible at any terminal at any time, would enable student members to keep track of themselves. These reports would include the identification of the student interest group, the faculty advisor, the elected leader, a roster of members, a schedule of future series, social events, etc.

One important sociological consequence of replacing the conventional system with segmented courses is that students would not have any distinct group, particularly 'grades', to identify with, and, especially in the larger schools, would have increased difficulty in forming friendships since they would be part of a swirling mob with each student pursuing his/her own destiny. By forming student interest groups, students could try to cover more than one course together, and could adjust their work pace in courses not included in the student interest group list so slower members could keep up.

If a student didn't feel compatible with the student interest group he/she was in, he/she could speed-up or slow-down his/her pace to align himself/herself with a student interest group with which he/she felt more at ease. Student interest groups would be able to schedule themselves for short vacations, bus trips to ski slopes, beaches, or the mountains since they could take vacations whenever they wish. Student members not so inclined would simply switch to another student interest group which would more nearly reflect their work ethic.

# Advantages of Student Interest Groups

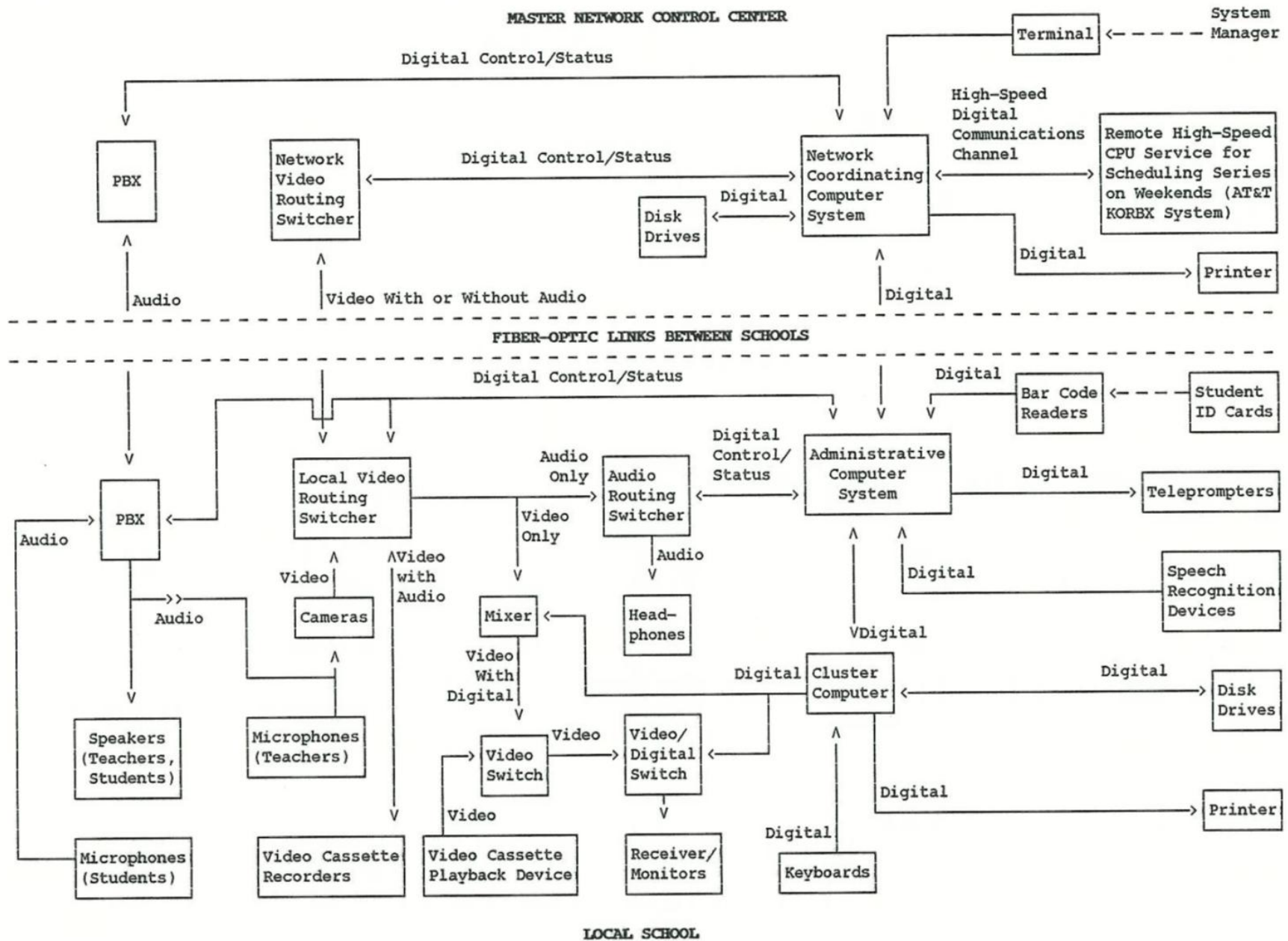
Forming student interest groups should be encouraged for economic reasons as well as the sociological benefit of the students. At the same time, we don't want to come full-circle and return to the disadvantages of the inflexible conventional system. A good time for a ceremonial party would be when all members of the student interest group have completed their degree requirements, and this could occur any time of the school year. This party, which could be scheduled in conjunction with others, should be an acceptable substitute for the conventional graduation ceremony. Instead of class reunions, there could be student interest group reunions.

Series containing competitive examinations, laboratory sessions, or other special requirements, would need the elaborate series-selecting procedures much more than segment-group series. Segment-group series requirements could often easily be satisfied with television series.

If the schools in a network have enrollments in a segmented course that are all about the same size, they will on the average all have an equal chance at holding live series. But if some of the schools have enrollments four or five times larger, for example, than the smaller schools, they will probably dominate the local classes. Then the smaller schools will then have to give greater emphasis to forming student interest groups than usual in order to hold local classes at least occasionally.

In a really large school network, series could be multiple-scheduled each week. If a student were faced with a long wait for a scheduled local series after passing a segment test, he/she might choose to apply for scheduling in a television series. If a television series is available and has an opening, he/she would be scheduled. If no opening exists, he/she would be placed into the series queue.

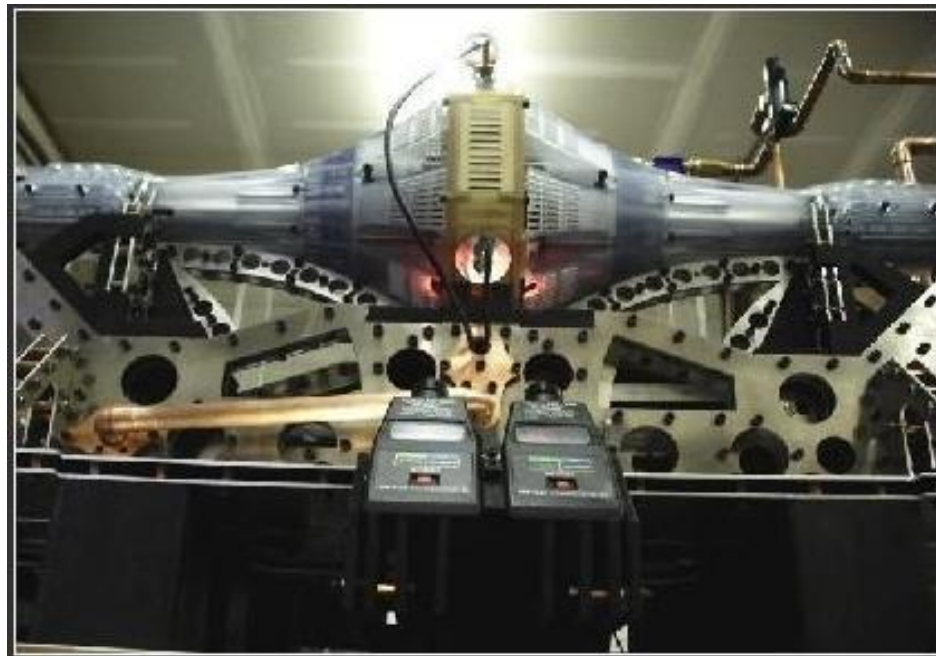
# Overall System Hardware Configuration



# **Internet Plus**

## **Torsion Field Communications can Link Schools into a Single Network**

The Internet offers unlimited capability to link together a school network with wideband data, audio and video channels. The theoretical maximum capacity of torsion field communications is apparently 40 billion channels of holographic television through the entire earth without attenuation at a speed of one billion times the speed of light. Torsion field communications is made possible with special crystalline lattice cells. Torsion field communications, with components only the size of coins or less, may eventually displace all forms of electronic communications including telephones, television, radio, fiber optic cable, microwave, and communications satellites, plus the entire Internet backbone.



Prototype Torsion Field Generator

# Master Network Control Center

The master network control center would provide the following services:

- Switch audio channels between the schools.
- Switch video channels between the schools.
- Switch digital channels between the schools.
- Switch audio, video, and digital channels within the school where the control room is located.
- Allocate capital equipment, such as video cameras and laboratory equipment, and schedule transfers of shared equipment between schools.
- For scheduling series, either link with an outside service center computer or house a local large-scale computer.
- Prepare, load, and validate segment tests.
- Train course monitors and instructors how to interact with the system.
- Select, prepare, and load course materials into the system. The instructors in the different schools would be encouraged to participate in this, but they would be governed by standards for each segmented course. There may be some provisions for exceptions to standardization, however, in local options.
- System software would provide the resident System Manager access to the entire network – including the computer-controlled switching equipment and the computerized class scheduling hardware and software.

# Teacher Input/Output Functions

Approximately 100 input/output functions, categorized as follows, would be performed by teachers, student counselors, segmented course monitors, and other staff members at computer terminals

- Segmented and conventional course registration
- Segment tests
- Credit load unit adjustment
- Segmented course structure
- Series selecting
- Series scheduling
- Student interest group management
- Video and audio channels assignments
- Student access disable
- Student status reports
- Weekly teacher supervision reports



# Student Input/Output Functions

Approximately 25 input/output functions, categorized as follows, would be performed by students at computer terminals. Immature students would be blocked from access to the more complicated student I/O functions unless they are being assisted by a teacher, a teacher's assistant, or a more mature student.

- Language choice
- Computer-assisted instruction
- Segment tests
- Student interest groups
- Schedules of week-long series of classes and examinations
- Video
- Credit load units
- Student status reports
- Network's electronic bulletin board

# Superlearning

Normally, the human brain is constantly bombarded with new signals from the five senses. To prevent itself from being overwhelmed, the brain employs a filter known as the Reticular Activating System (RAS). The RAS sorts out the deluge of signals, passes through signals that are at least vaguely familiar, and *blocks new information*.

Superlearning is a technique for bypassing the RAS. There are three aspects of superlearning – special music, deep breathing, and presentation of the material to be learned. The music is of the ‘baroque’ style at exactly 60 beats per minute. Out of over 25,000 compositions which have been tested, only 24 have the desired effect.

The deep, rhythmic breathing, which takes a little practice, is done in 8-second cycles – 4 seconds of inhaling, 4 seconds of holding, 4 seconds of exhaling, and 4 seconds of holding. Combined with the music, the body relaxes, bringing the heartbeat down to 60 beats per minute and dropping the brain waves down to 7 cycles per second (the borderline between alpha and theta). It is at this point that optimum learning occurs. The RAS is ‘bypassed’, and the filters that prevent new information from entering memory no longer function.

In the Bulgarian studies of superlearning, over 500 words of a foreign language per day were introduced. After 3 months, the learners were tested and found to retain 96% of the vocabulary.

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February 12, 1992

TO WHOM IT MAY CONCERN:

Please be advised that we support Gary Vesperman's efforts to investigate the applicability of optic fiber telecommunications as it relates to classroom education.

Further, if this project is funded, it is our intent to explore the feasibility of piloting the project in several of our schools.

Brian Cram  
Superintendent of Schools

# References:

A 125-page “Torsion Field School Network” detailed design document is available for free downloading at [padrak.com/vesperman](http://padrak.com/vesperman) and [commutefaster.com/vesperman.html](http://commutefaster.com/vesperman.html).

For torsion field communications see pages 110-261 of “Space Travel Innovations” at [padrak.com/vesperman](http://padrak.com/vesperman) and [commutefaster.com/vesperman.html](http://commutefaster.com/vesperman.html).