PULSE CIRCUITS

ELN 211

NUMBER OF THEORY PERIODS: 21
NUMBER OF LABORATORY PERIODS: 21

PREREQUISITIES: ELN 101, Electronic II

TEXTBOOKS: Fundamentals of Pulse and Digital Circuits (3rd Ed.), by Ronald F. Tocci

BLOCKS	THEORY PERIODS	TOPIC DESCRIPTION	REFERENCE CHAPTERS
I	7	Pulse Waveform Analysis RC Circuits	1, 2 3
II	6	Switching Devices Signal Conditioning Circuits	4 6
III	8	Pulse Generating Circuits Tektronix Oscilloscope Model	11 11

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title:	PULSE CIRCUITS
Code No.:	ELN 211-3
Program:	ELECTRICAL/ELECTRONIC TECHNICIAN
Semester:	THREE
Date:	AUGUST, 1986
Author:	P. SZILAGYI

New: X Revision: _____

APPROVED: _____ 86-11-17
Chairperson Date

OBJECTIVES

BLOCK I:		THEORY PERIODS
Introduction	- Ideal pulse signals - Ideal switching devices	1
Pulse Waveform Analysis	- Pulse distortion - Periodic pulse waveforms - Harmonic content of periodic waveforms - Non-periodic pulse	2
RC Circuits	- The exponential form - RC low-pass circuits - RC high-pass circuits - RC circuit response to periodic inputs	3
BLOCK TEST		1
BLOCK II:		
Switching Devices	- The diode as a switch - The BJT as a switch - Field effect transistor switches	2
Signal Conditioning Circuits	- Diode clippers - Operational amplifier clipper - Transistor inverter - Buffer circuits - Differential comparator - The schmitt trigger	3
BLOCK TEST		1
BLOCK III:		
Pulse Generating Circuits	- Unijunction oscillator circuit - Programmable UJT (PUT) - Schmitt trigger oscillators - One shot circuits connected as an oscillator - Oscillators made from inverters	3

ELN-211 PULSE CIRCUITS

COURSE TEXT

Ronald F. Tocci - Fundamentals of Pulse and Digital Circuits, 3rd Edition - Merrill 1983

REFERENCE TEXTS AND MATERIAL

R. A. Pearman and C. P. Szilagyi - Power Electronics

David A. Bell - Solid State Pulse Circuits, 2nd Edition - Reston 1981 TK 7868 P8 B44

Jacob Millman and Herbert Taub - Pulse, Digital and Switching Waveforms - McGraw-Hill 1965

Jacob Millman - Microelectronics: Digital and Analog Circuits and Systems - McGraw-Hill 1979 TK 7874 M 527

Tektronix Model 2213 Oscilloscope Instruction Manual - Tektronix 1981

RCA Application Note AN6865 - Thyristors

GENERAL OBJECTIVES

The general objectives of the course are to develop an understanding of the

1. parameters of a pulse signal.
2. frequency content of various shapes of pulse waveforms and the response characteristics required of an amplifier intended to amplify such various pulse signals.
3. nature of the response characteristics of RC circuits to pulse signals.
4. effects of some types of loading on RC pulse circuits.
5. behaviour of the diode, BJT and FET as switching devices.
6. behaviour of numerous diode clipping and clamping circuits.
7. operational amplifier configured as a clipper.
8. operation of a BJT as an inverter.
9. need for and characteristics of buffer circuits.
10. operation of the differental comparator.

11. operation of the Schmitt Trigger.
12. operation of the UJT oscillator and the PUT.
13. operation of the Schmitt Trigger oscillator.
14. operation of the 555 timer as a one shot MV.
15. operation of the 555 timer as an oscillator.
16. operation of an oscillator made from inverters.
17. operation of basic SCR firing circuits.
18. requirements of a sweep waveform and some methods by which such waveforms are generated.
19. oscilloscope triggered sweep circuit.
20. triggered sweep circuit used in the Tektronix 2213 oscilloscope.
21. various circuits studied by means of laboratory experiments. Only some of the circuits can be studied experimentally.

All of the text material, under the topic headings listed above, will not necessarily be covered, or may be only briefly covered. Further, limited coverage of a few other topics may occur as ongoing circumstances require.

SPECIFIC OBJECTIVES

Specific objectives consist of understanding, knowing and being able to apply the details contained within each of the general objectives already stated. A very specific objective is that the student shall be able to answer any of the questions or problems assigned during the theory or laboratory classes or any questions or problems similar to those assigned. Specifically included are most of the questions and problems at the end of each textbook chapter. Also included are those worked out problem examples provided within text material or additional ones provided during classes.

REH 1986 June

LABORATORY ACTIVITY

JOB 1	Pulse Waveform and Pulse Distortion
JOB 2	Effect of Low Pass and High Pass Filters on Pulse Waveforms
JOB 3	RC Circuit Response to a Pulse Train
JOB 4	Diode and Transistor Switching Parameters
JOB 5	Differential Comparator and Schmitt Trigger
JOB 6	Pulse Generating Circuits
JOB 7	Sweep Generating Circuits

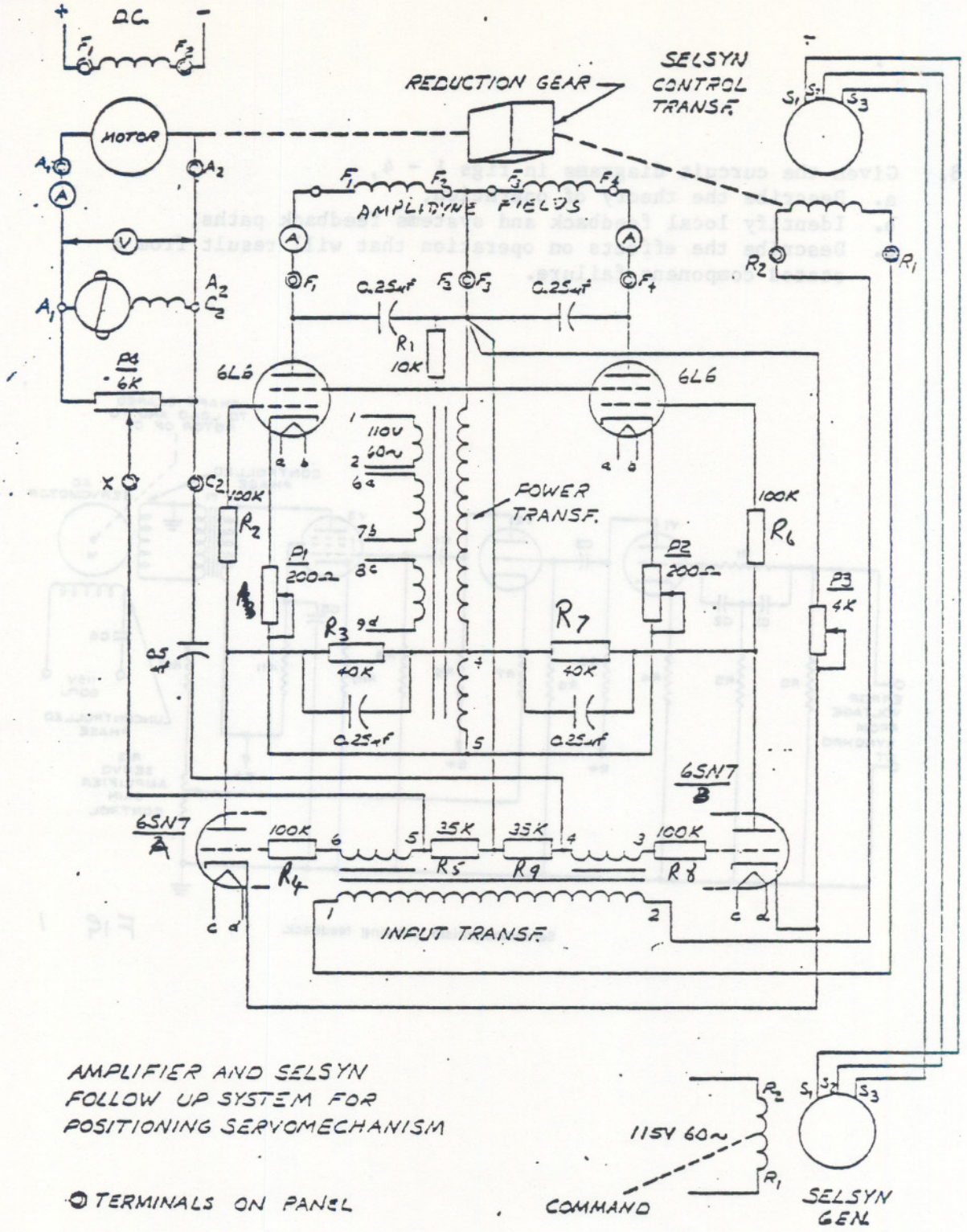


FIG 2

AMPLIFIER AND SELSYN FOLLOW UP SYSTEM FOR POSITIONING SERVOMECHANISM

⊙ TERMINALS ON PANEL

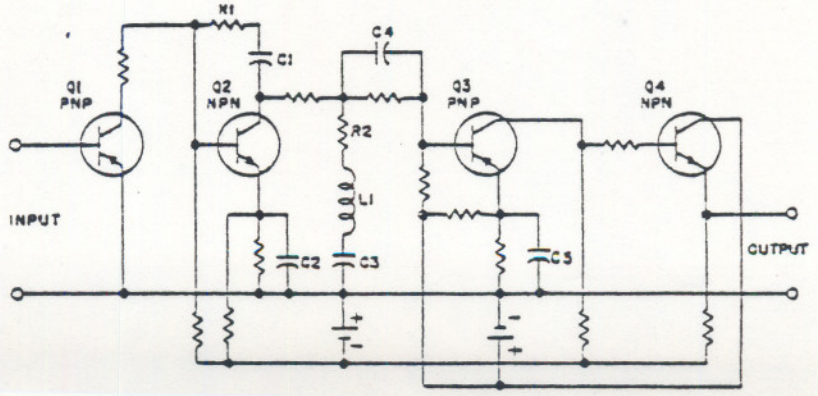
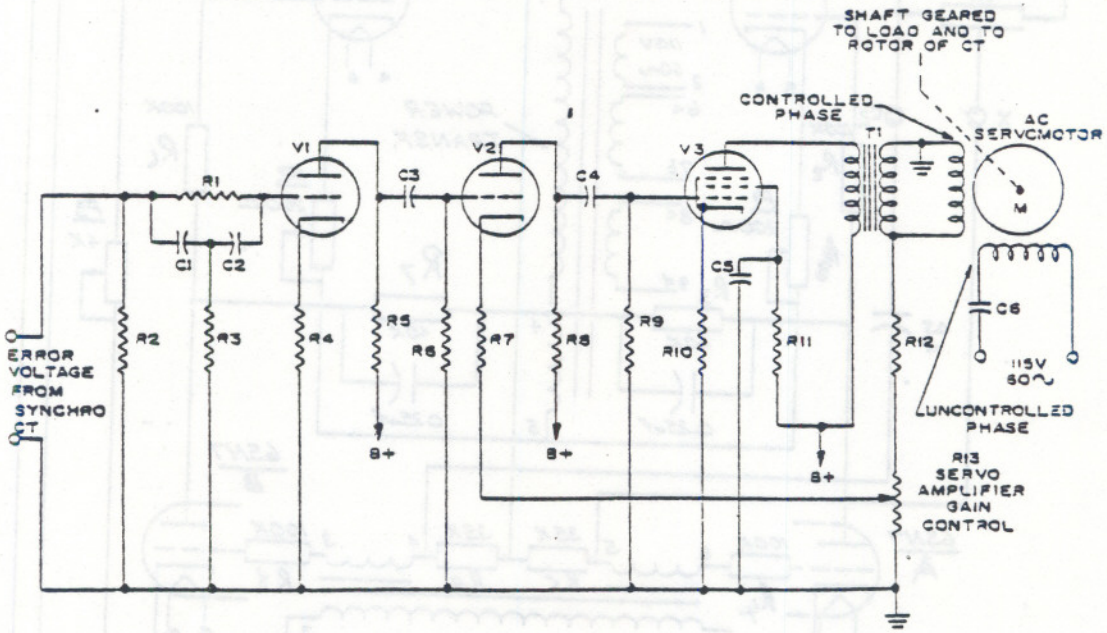


FIG. 3

Four-stage transistorized operational amplifier.

8. Given the curcuit diagrams in figs 1 - 4,
   a. Describe the theory of operation,
   b. Identify local feedback and systems feedback paths,
   c. Describe the effects on operation that will result from a stated component failure.



Servomechanism showing feedback.

Fig 1