EUROPEAN PATENT OFFICE
U.S. PATENT AND TRADEMARK OFFICE

CPC NOTICE OF CHANGES 1558

DATE: JANUARY 1, 2024

PROJECT MP11842

The following classification changes will be effected by this Notice of Changes:

Action	**Subclass**	**Group(s)**
SCHEME:		
Titles Changed:	H03F	SUBCLASS
	H03F	1/0283, 1/08, 1/13, 1/16, 1/34
	H03F	3/02, 3/04, 3/181, 3/189, 3/34, 3/38
	H03F	7/00
Warnings Modified:	H03F	SUBCLASS
DEFINITIONS:		
Definitions Deleted: (no frozen (F) symbol definitions should be deleted)	H03F	3/02
Definitions Modified:	H03F	SUBCLASS
	H03F	1/08, 3/38, 7/00

No other subclasses/groups are impacted by this Notice of Changes.

This Notice of Changes includes the following *[Check the ones included]:*

1. CLASSIFICATION SCHEME CHANGES
   - ☒ A. New, Modified or Deleted Group(s)
   - ☒ B. New, Modified or Deleted Warning(s)
   - ☐ C. New, Modified or Deleted Note(s)
   - ☐ D. New, Modified or Deleted Guidance Heading(s)
2. DEFINITIONS
   - ☒ A. New or Modified Definitions (Full definition template)
   - ☒ B. Modified or Deleted Definitions (Definitions Quick Fix)
3. ☐ REVISION CONCORDANCE LIST (RCL)
4. ☐ CHANGES TO THE CPC-TO-IPC CONCORDANCE LIST (CICL)
5. ☐ CHANGES TO THE CROSS-REFERENCE LIST (CRL)

CPC NOTICE OF CHANGES 1558

DATE: JANUARY 1, 2024

PROJECT MP11842

1. CLASSIFICATION SCHEME CHANGES

A. New, Modified or Deleted Group(s)

SUBCLASS H03F - AMPLIFIERS

Type*	Symbol	Indent Level Number of dots (e.g. 0, 1, 2)	Title "CPC only" text should normally be enclosed in {curly brackets}**	Transferred to#
M	H03F	SUBCLASS	AMPLIFIERS	
M	H03F 1/0283	3	{Reducing the number of DC-current paths}	
M	H03F 1/08	1	Modifications of amplifiers to reduce detrimental influences of internal impedances of amplifying elements (wide-band amplifiers with inter-stage coupling networks incorporating these impedances H03F 1/42)	
M	H03F 1/13	3	in discharge-tube amplifiers	
M	H03F 1/16	3	in discharge-tube amplifiers	
M	H03F 1/34	1	Negative-feedback-circuit arrangements with or without positive feedback (H03F 1/02 - H03F 1/30, H03F 1/38 - H03F 1/50, H03F 3/50 take precedence {; for rejection of common mode signals H03F 3/45479})	
M	H03F 3/02	1	with tubes only	
M	H03F 3/04	1	with semiconductor devices only	
M	H03F 3/181	1	Low-frequency amplifiers, e.g. audio preamplifiers	
M	H03F 3/189	1	High-frequency amplifiers, e.g. radio frequency amplifiers	
M	H03F 3/34	1	DC amplifiers in which all stages are DC-coupled (H03F 3/45 takes precedence)	
M	H03F 3/38	1	DC amplifiers with modulator at input and demodulator at output; Modulators or demodulators specially adapted for use in such amplifiers {(switched capacitor amplifiers H03F 3/005)}	
M	H03F 7/00	0	Parametric amplifiers	

*N = new entries where reclassification into entries is involved; C = entries with modified file scope where reclassification of documents from the entries is involved; Q = new entries which are firstly populated with documents via administrative transfers from deleted (D) entries. Afterwards, the transferred documents into the Q entry will either stay or be moved to more appropriate entries, as determined by intellectual reclassification; T= existing entries with enlarged file scope, which receive documents from C or D entries, e.g. when a limiting reference is removed from the entry title; M = entries with no change to the file scope (no

reclassification); D = deleted entries; F = frozen entries will be deleted once reclassification of documents from the entries is completed; U = entries that are unchanged.

NOTES:

- **No {curly brackets} are used for titles in CPC only subclasses, e.g. C12Y, A23Y; 2000 series symbol titles of groups found at the end of schemes (orthogonal codes); or the Y section titles. The {curly brackets} are used for 2000 series symbol titles found interspersed throughout the main trunk schemes (breakdown codes).
- U groups: it is obligatory to display the required "anchor" symbol (U group), i.e. the entry immediately preceding a new group or an array of new groups to be created (in case new groups are not clearly subgroups of C-type groups).Always include the symbol, indent level and title of the U group in the table above.
- All entry types should be included in the scheme changes table above for better understanding of the overall scheme change picture. Symbol, indent level, and title are required for all types .
- "Transferred to" column must be completed for all C, D, F, and Q type entries. F groups will be deleted once reclassification is completed.
- When multiple symbols are included in the "Transferred to" column, avoid using ranges of symbols in order to be as precise as possible.
- For administrative transfer of documents, the following text should be used: "< administrative transfer to XX>", "<administrative transfer to XX and YY simultaneously>", or "<administrative transfer to XX, YY, ...and ZZ simultaneously>" when administrative transfer of the same documents is to more than one place.
- Administrative transfer to main trunk groups is assumed to be the source allocation type, unless otherwise indicated.
- Administrative transfer to 2000/Y series groups is assumed to be "additional information".
- If needed, instructions for allocation type should be indicated within the angle brackets using the abbreviations "ADD" or "INV": <administrative transfer to XX ADD> , <administrative transfer to XX INV>, or < administrative transfer to XX ADD, YY INV, ... and ZZ ADD simultaneously>.
- In certain situations, the "D" entries of 2000-series or Y-series groups may not require a destination ("Transferred to") symbol, however it is required to specify "<no transfer>" in the "Transferred to" column for such cases.
- For finalisation projects, the deleted "F" symbols should have <no transfer> in the "Transferred to" column.
- For more details about the types of scheme change, see CPC Guide.

B. New, Modified or Deleted Warning(s)

SUBCLASS H03F - AMPLIFIERS

Type*	Location	Old Warning	New/Modified Warning
M	H03F	1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups: • H03F 1/44 covered by H03F 1/42 • H03F 1/46 covered by H03F 1/42 • H03F 3/18 covered by H03F 3/00 • H03F 3/32 covered by H03F 3/30 • H03F 7/06 covered by H03F 7/00 2. In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.	1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups: H03F 1/44 covered by H03F 1/42 H03F 1/46 covered by H03F 1/42 H03F 3/18 covered by H03F 3/00 H03F 3/32 covered by H03F 3/30 H03F 7/06 covered by H03F 7/00 2. {In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.}

*N = new warning, M = modified warning, D = deleted warning

NOTE: The "Location" column only requires the symbol PRIOR to the location of the warning. No further directions such as "before" or "after" are required.

2. A. DEFINITIONS (modified)

H03F

Definition statement

Delete: The last two lines of the Definition statement, so that the updated Definition statement reads as follows.

- Linear amplification, there being linear relationship between the amplitudes of input and output, and the output having substantially the same waveform as the input;
- Dielectric amplifiers, magnetic amplifiers, and parametric amplifiers when used as oscillators or frequency-changers;
- Constructions of active elements of dielectric amplifiers and parametric amplifiers if no provision exists elsewhere.

References

Delete: The entire Limiting references section.

Replace: The existing Informative references table with the following updated table.

Informative references

Attention is drawn to the following places, which may be of interest for search:

Measuring; Testing	G01R
Optical parametric amplifiers	G02F
Circuit arrangements with secondary emission tubes	H01J 43/30
Semiconductors or other solid state devices	H01L
Waveguides, resonators	H01P
Masers; Lasers	H01S
Emergency protection circuit arrangements	H02H
Dynamo-electric amplifiers	H02K
AC/DC, DC/DC, AC/AC power converters	H02M

Generation of oscillations	H03B
Modulation	H03C
Demodulation	H03D
Control of amplification	H03G
Coupling arrangements independent of the nature of the amplifiers, voltage dividers	H03H
Amplifiers capable only of dealing with pulses	H03K
Control of generators of electronic oscillations or pulses, e.g. phase locked loops	H03L
A/D and D/A converters, sigma delta modulators	H03M
Repeater circuits in transmission lines	H04B 3/36, H04B 3/58
Application of speech amplifiers in telephonic communication	H04M 1/60, H04M 3/40
Nanotube transistors	H10K 99/00

Special rules of classification

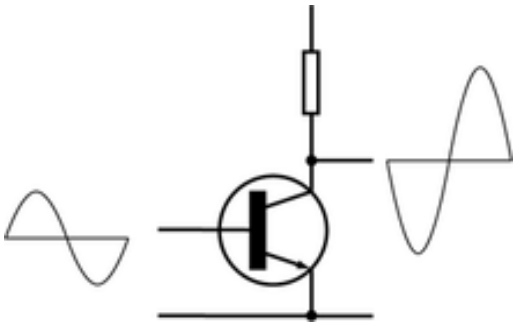
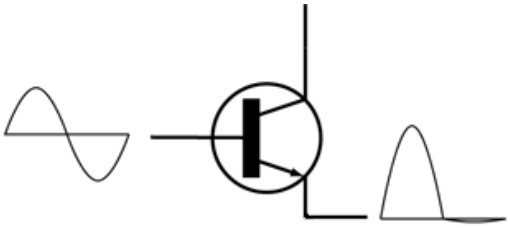
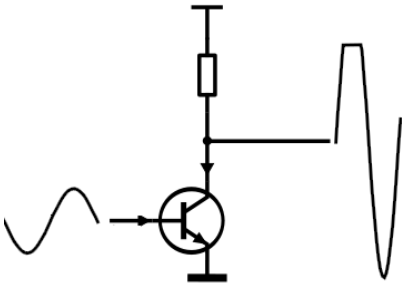
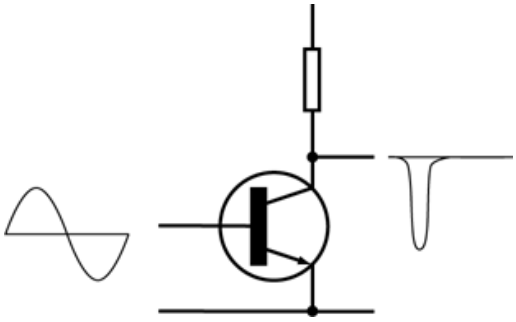
Delete: In the first paragraph, the two occurrences of the term “EC”, so that the updated first paragraph of the Special rules section reads as follows. The rest of the section following the first paragraph should be left as-is.

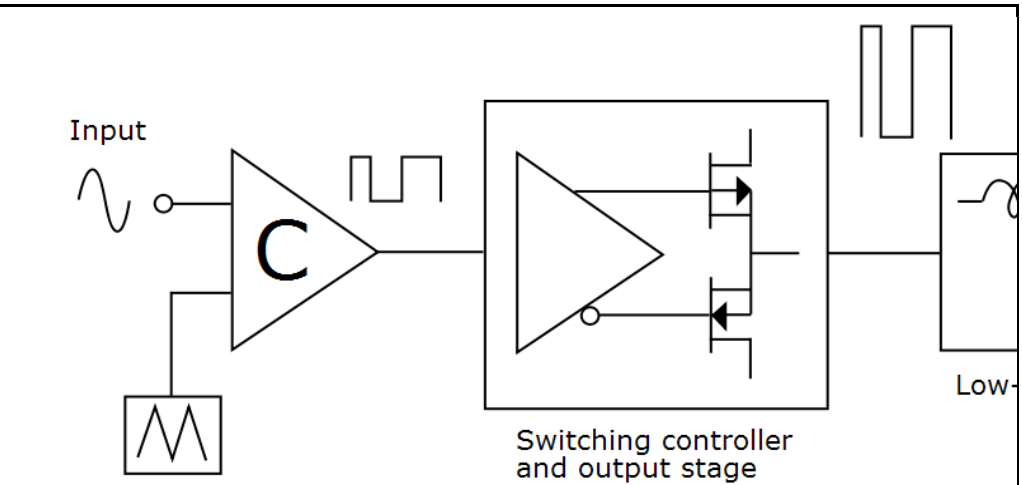
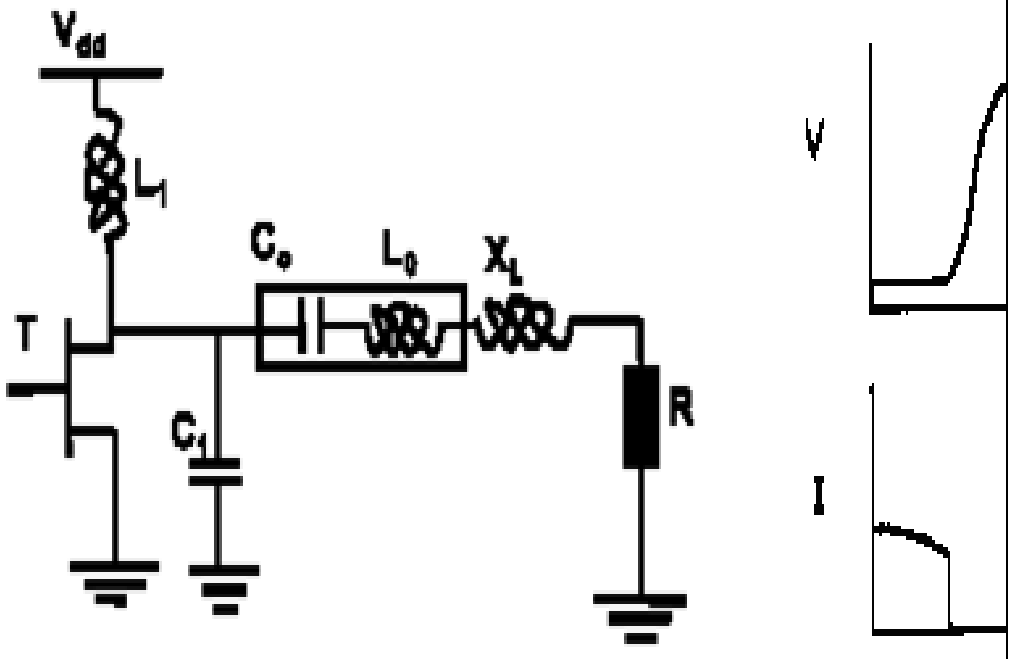
> As general remark, it must be noted that multiple classification symbols may be given. The philosophy is to classify documents in several sub-groups as the case may be, i.e. the classifier should not stop the classification task once that the first suitable symbol is found, but he should continue to assign symbols until all the aspects have been properly classified.

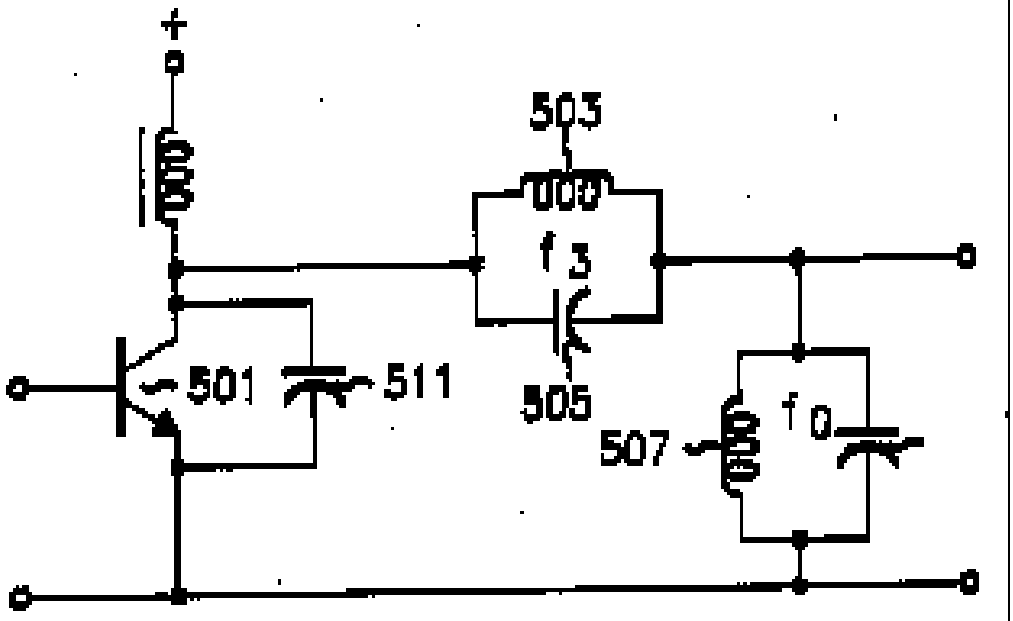
Glossary of terms

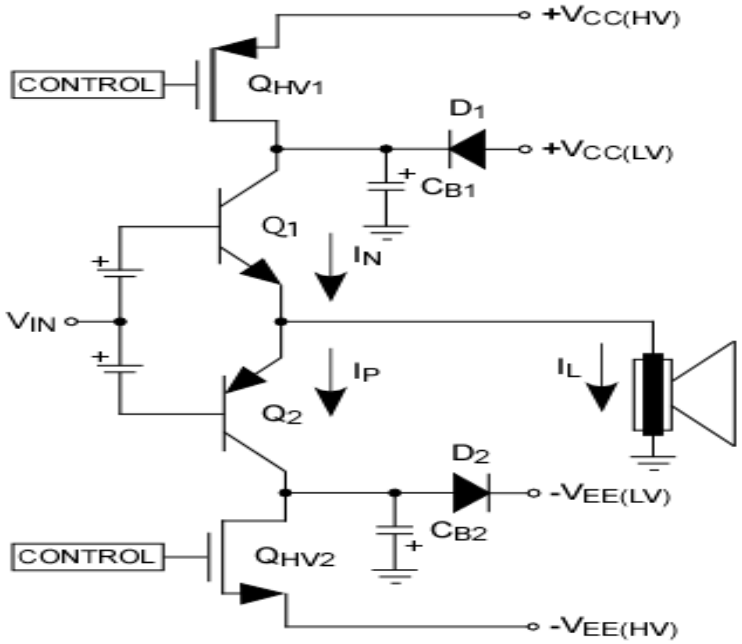
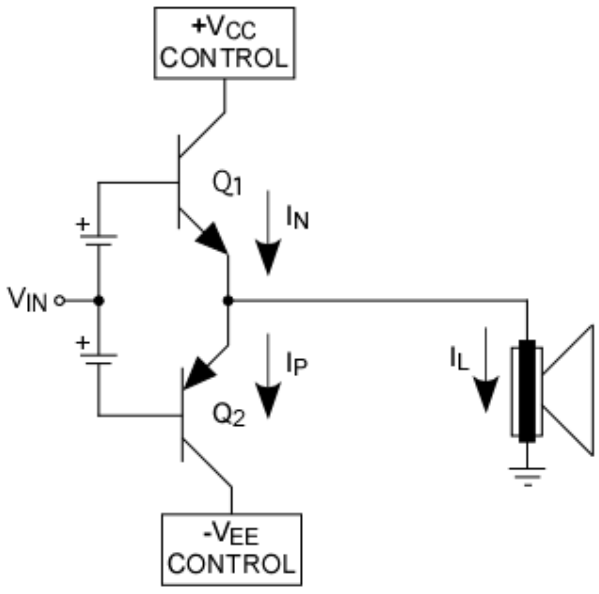
In this place, the following terms or expressions are used with the meaning indicated:

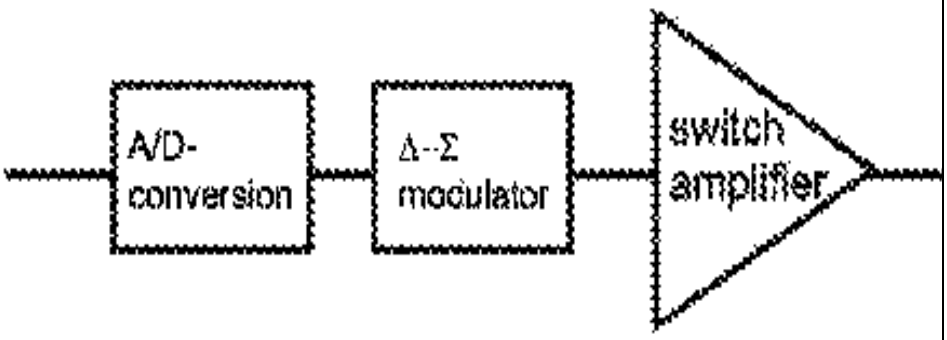
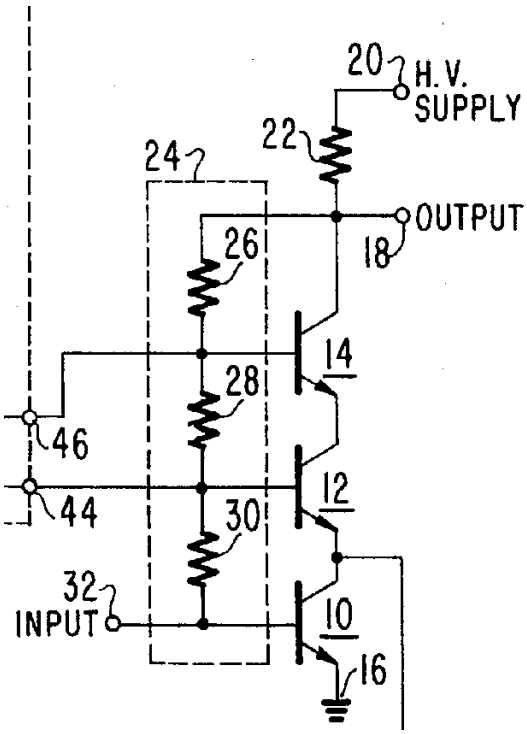
Delete: Each phrase beginning with “(drawing extracted from…” that occurs at the end of the paragraphs within the Glossary of terms table, so that the updated table appears as follows.

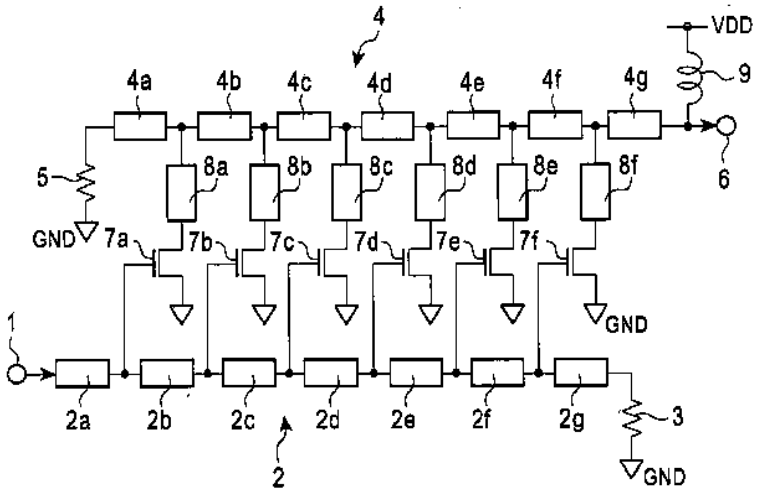
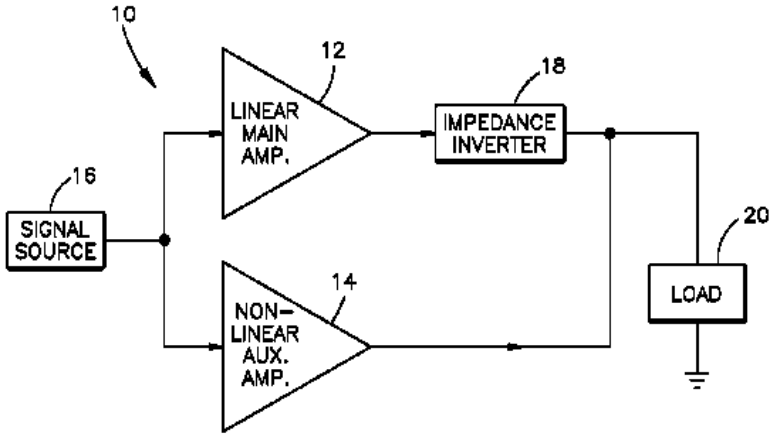
Class A	 Amplifying devices operating in class A conduct in their linear range over the whole of the input cycle.
Class B	 Amplifying devices operating in class B conduct in their linear range half of the time and are turned off for the other half
Class AB	 Amplifying devices operating in class AB conduct in their linear range for more than half of the time
Class C	 Amplifying devices operating in class C conduct in their linear range for less than half of the time

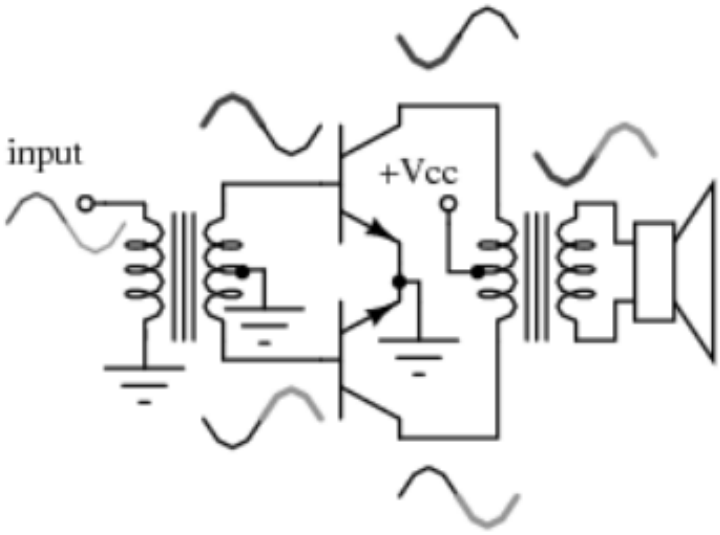
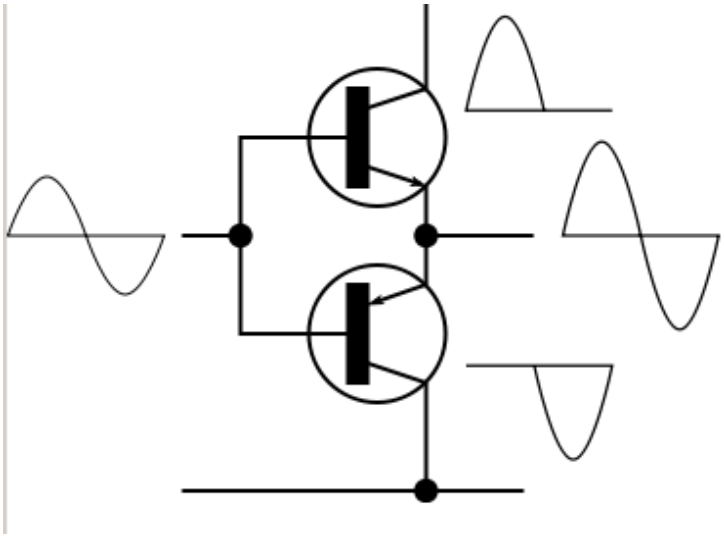
Class D	 In the basic class-D amplifier the input signal is converted into a sequence of pulse width modulated (PWM) pulses via a comparator (C). Said PWM sequence is amplified via switching amplifying devices and filtered in order to produce an amplified replica of said input signal at the output.
Class E	 The basic topology of class-E amplifier includes a transistor T, operated as a switch, a shunt capacitor (C1) which includes the

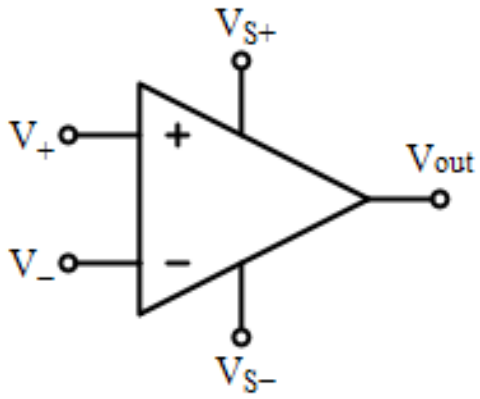
	intrinsic transistor output capacitance, RF choke inductor (L1), a load resistor R, a series resonance circuit (Co, Lo), and an excess inductance XL. The reactive elements shape the current and voltage waveforms across the transistor as shown. Thus as current flows, there is essentially no voltage across the device and a highly efficient switching power amplifier is achieved.
Class F	 In realizing a class F amplifier, the active device operates primarily as a switch and the output network, generally, is designed to yield short circuit impedances at even harmonics of the fundamental frequency and to yield open circuit impedances at odd harmonics of the fundamental frequency.

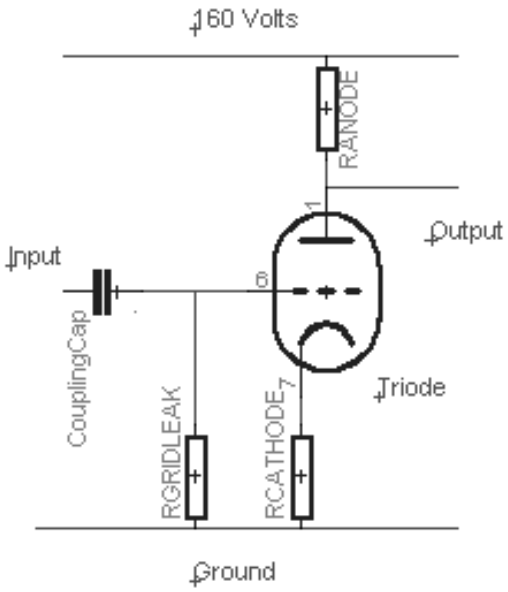
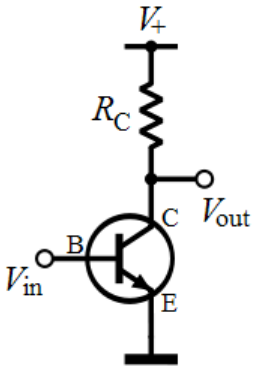
Class G	 The Class G amplifiers (which use "rail switching" to decrease power consumption and increase efficiency) provide several power rails at different voltages (HV, LV) and switch between them as the signal output approaches each level. Thus, the amplifier increases efficiency by reducing the wasted power at the output transistors.
Class H	 Class-H amplifiers take the idea of class G one step further creating an infinitely variable supply rail. This is done by modulating the supply rails (VCC, VEE) so

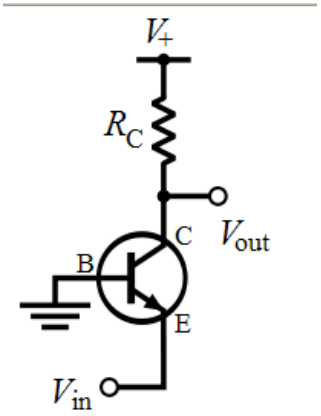
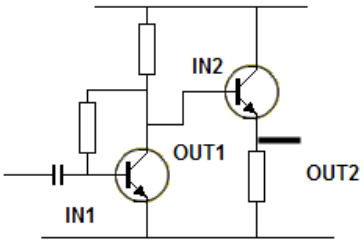
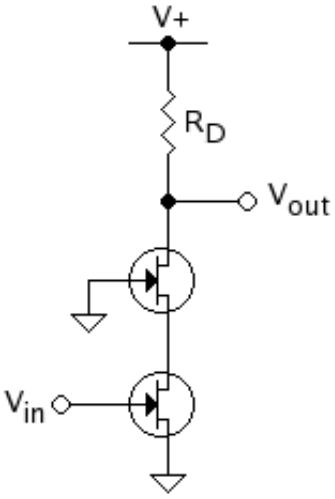
	that the rails are only a few volts larger than the output signal at any given time. The output stage operates at its maximum efficiency all the time. Switched-mode power supplies can be used to create the tracking rails.
Class S	 Class S amplifiers are used essentially for RF transmitters or as tracking power supply building blocks. The basic architecture consists of a modulator, e.g., of delta-sigma type, a fast broadband switch-mode amplifier, and an advanced filter at the output. The big advantage of the concept is that it can potentially be driven with a digital input without A/D conversion at the input.
Totem pole	 Amplifier with two or more amplifying elements having their DC paths in series with the load, the

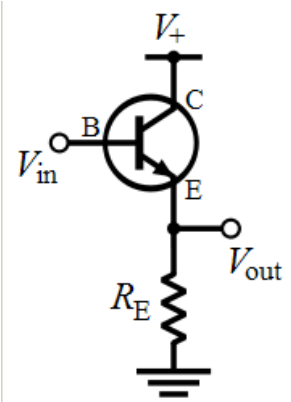
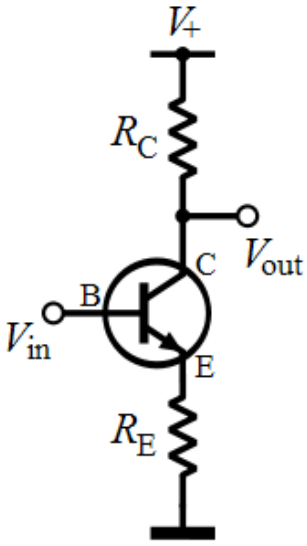
	control electrode of each element being excited by at least part of the input signal.
Distributed amplifier	 The input/output terminals of the amplifying elements are connected in series through respective distributed elements.
Doherty Amplifier	 Amplifier using a main and one or several auxiliary peaking amplifiers wherein the load is connected to the main amplifier using an impedance inverter.

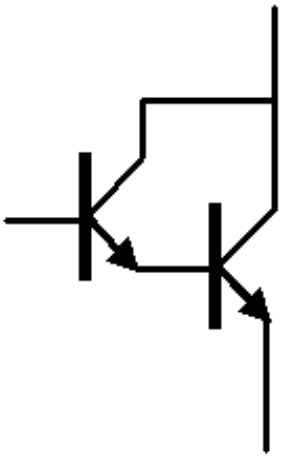
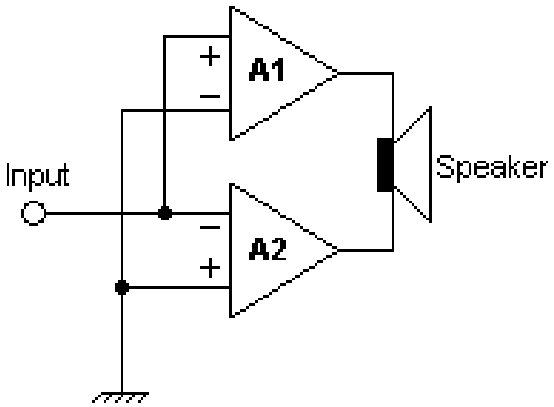
Push Pull	 The amplifying devices are each used for amplifying the opposite halves of the input signal.
Single Ended Push Pull	 Push pull amplifier wherein the output terminals of the amplifying elements are tied together as a single ended output without additional balun elements.

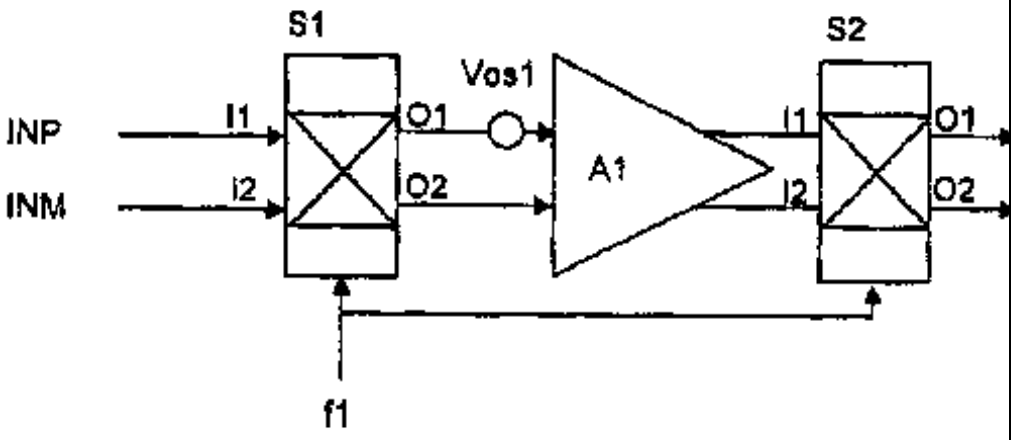
Differential amplifier	 the basic differential amplifier amplifies the difference between two voltages; the output voltage is determined according to the following equation: $$V_{\text{out}} = A_{\text{d}}(V_{\text{in}}^{+} - V_{\text{in}}^{-}) + A_{\text{c}}\left(\frac{V_{\text{in}}^{+} + V_{\text{in}}^{-}}{2}\right)$$ wherein Ac is the common mode gain and Ad is the differential mode gain.
Common mode rejection ratio	the common-mode rejection ratio (CMRR) indicates the ability of the amplifier to accurately cancel voltages that are common to both inputs. The common-mode rejection ratio is defined as: $$\text{CMRR} = 10\log_{10}\left(\frac{A_{\text{d}}}{A_{\text{cm}}}\right)^2 = 20\log_{10}\left(\frac{A_{\text{d}}}{\lvert A_{\text{cm}}\rvert}\right)$$

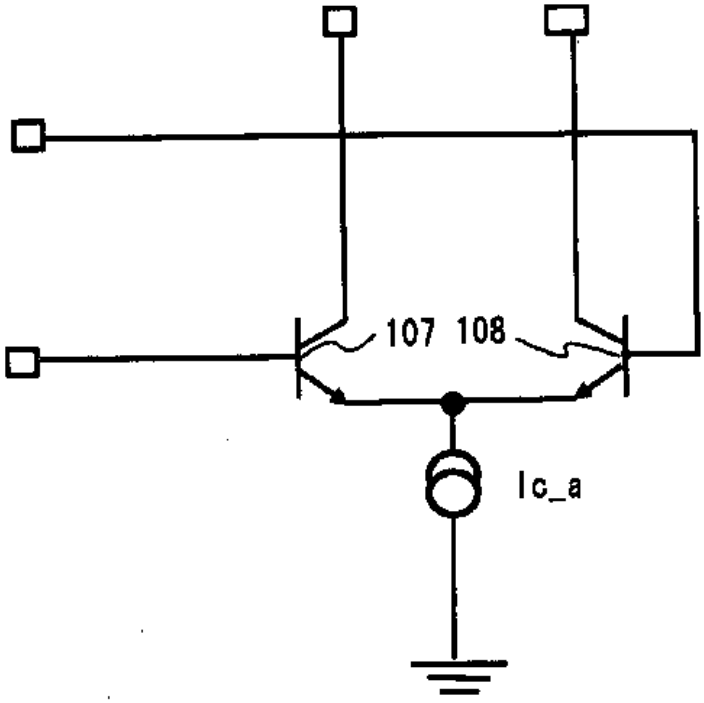
Vacuum tube amplifier	 Until the invention of the transistor in 1947, all practical amplifiers were made using Vacuum tubes, which rely on thermionic emission of electrons from a hot filament (cathode), that then travel through a vacuum toward a collecting electrode (anode). The simplest vacuum tube was invented by John Ambrose Fleming while working for the Marconi Company in London in 1904 and named the diode, as it had two electrodes. The diode conducted electricity in one direction only and was used as a radio detector and a rectifier. In 1906 Lee De Forest added a third electrode (grid) and invented the first electronic amplifying device, the triode, which he named the Audion. This additional control grid modulates the current that flows between cathode and anode.
Common emitter/source /cathode	 Amplifying device wherein the emitter/source/cathode terminal is connected to RF ground/earth and the input (control) terminal is the base/gate/grid.

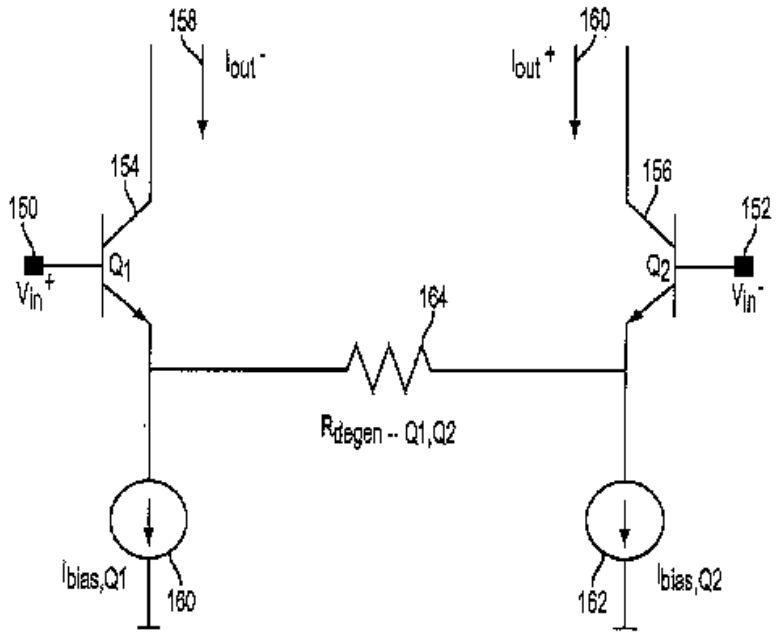
Common base/gate /grid	 Amplifying device wherein the base/gate/grid terminal is connected to RF ground/earth and the input (control) terminal is the emitter/source/cathode.
Cascade coupling	 Two or more amplifying devices wherein the output terminal of the first device is connected to the input (control) terminal of the second device in order to form a chain of amplifying elements.
Cascode coupling	 A cascade coupling of a common emitter/source/cathode amplifying device followed by a common base/gate/grid amplifying device.

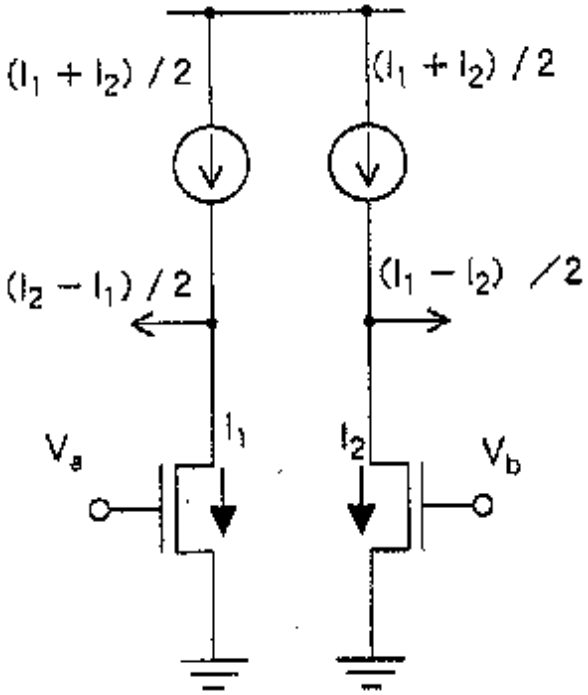
Common collector/drain/anode, i.e. Emitter/source /cathode follower	 Amplifying device wherein the input (control) terminal is the base/gate/grid, and the output terminal is the emitter/source/cathode. The output voltage "follows" the input voltage, because the voltage gain almost equals one.
Emitter/Source degeneration	 Amplifying device in common emitter/source/cathode configuration wherein an additional element (degeneration element) is connecting the emitter/source/cathode terminal with the RF ground/earth.

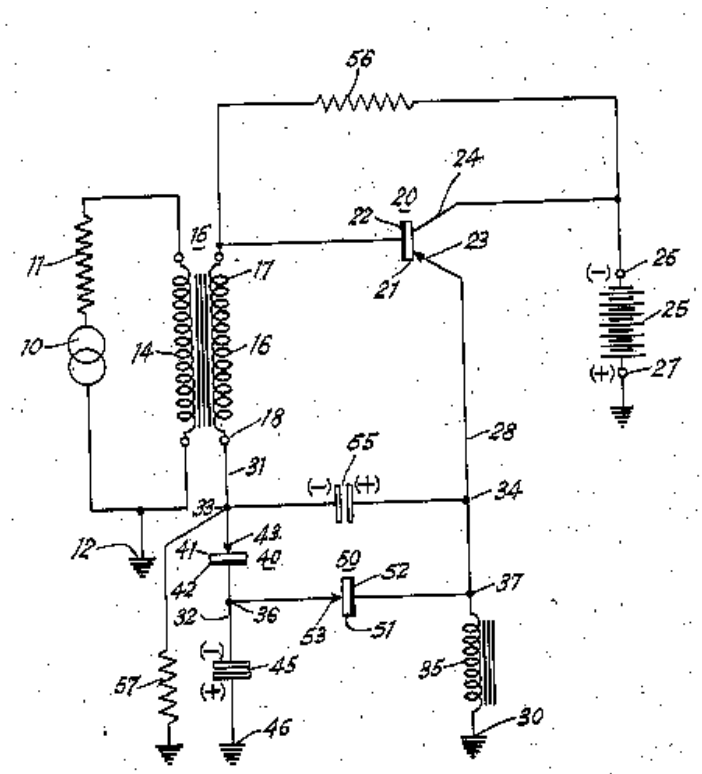
Darlington amplifier	 Bipolar transistors are in Darlington configuration when they have the collector terminals tied together and the emitter of the first transistor is connected to the base of the second transistor so that the current gain of the composite transistor is increased.
Bridge type	 Two amplifying devices are in bridge type when the output signal of one device is in opposition of phase with the output signal of the other device. A load is connected between the two amplifying device outputs, bridging the output terminals. This can double the voltage swing at the load as compared with the same amplifying device used alone without bridging.
Esaki diode	 Esaki diode is a type of semiconductor diode which is capable of very fast operation, well into the microwave frequency region, by using quantum mechanical effects.

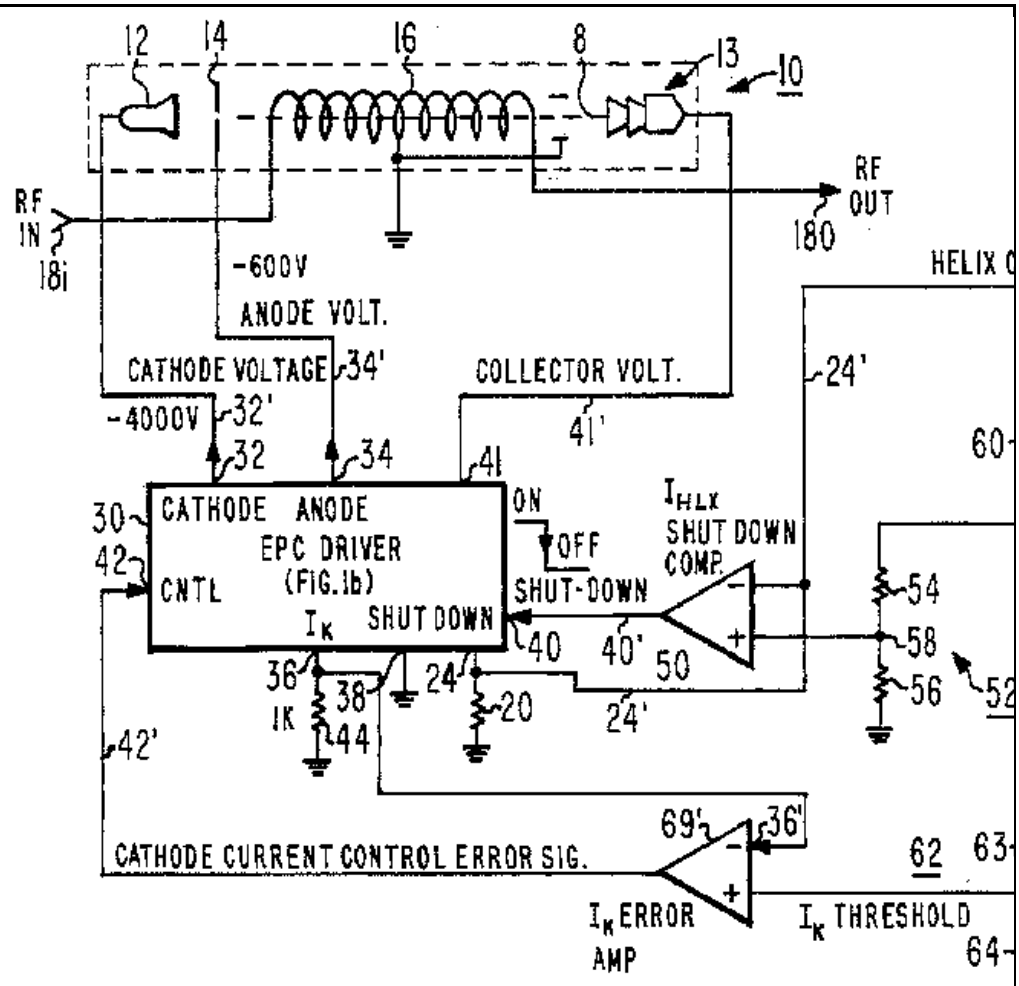
	When forward-biased, an odd effect occurs called "quantum mechanical tunnelling" which gives rise to a region where an increase in forward voltage is accompanied by a decrease in forward current (negative resistance region)
Chopper amplifier	 A basic chopper amplifier is formed by adding so-called choppers S1 and S2 before and after an input stage A1. The choppers consist of switches with two positions. In the first position, the inputs I1 and I2 are connected to the outputs O1 and O2, respectively. In the second position, the inputs I1 and I2 are connected to the outputs O2 and O1, respectively. The choppers S1 and S2 are synchronized to repeatedly switch between the first and the second positions at the rate of a clock signal f1. This configuration is commonly used to reduce the offset (e.g. Vos1) and the flicker noise.

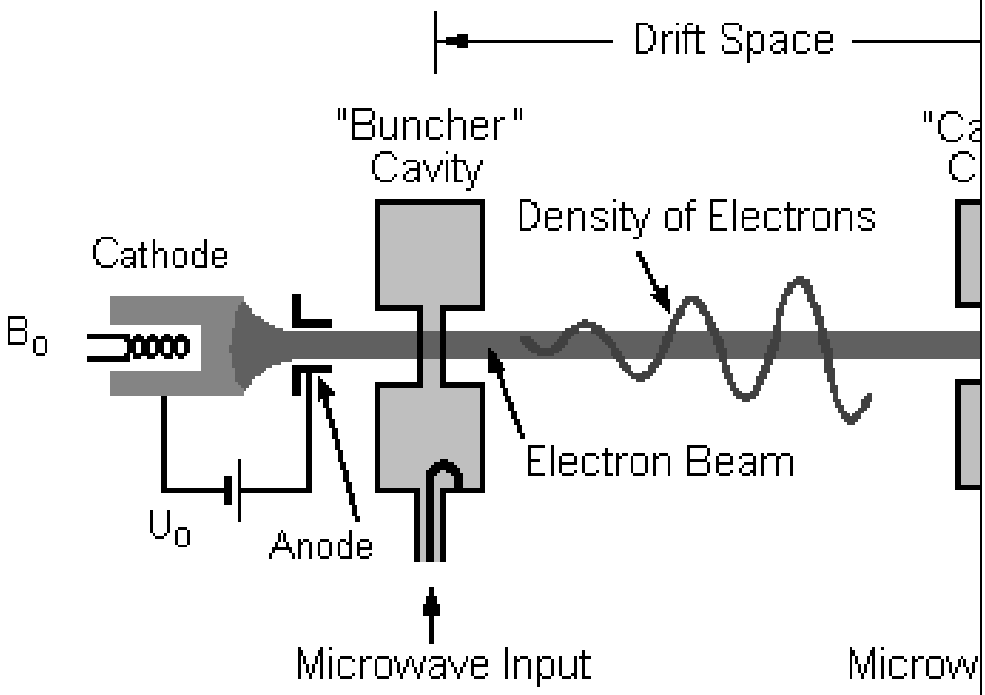
Differential amplifier long tail pair	 The basis configuration of a long-tailed pair (LTP) differential amplifier consists of two amplifying transistors, which are connected so that the BJT emitters (or FET sources, or valve cathodes) are connected together. The common electrodes are then connected to a circuit, forming the "long tail" of the name, the long tail providing a current source, i.e. having a very high equivalent impedance in parallel, so that high common mode rejection ratio is achieved.

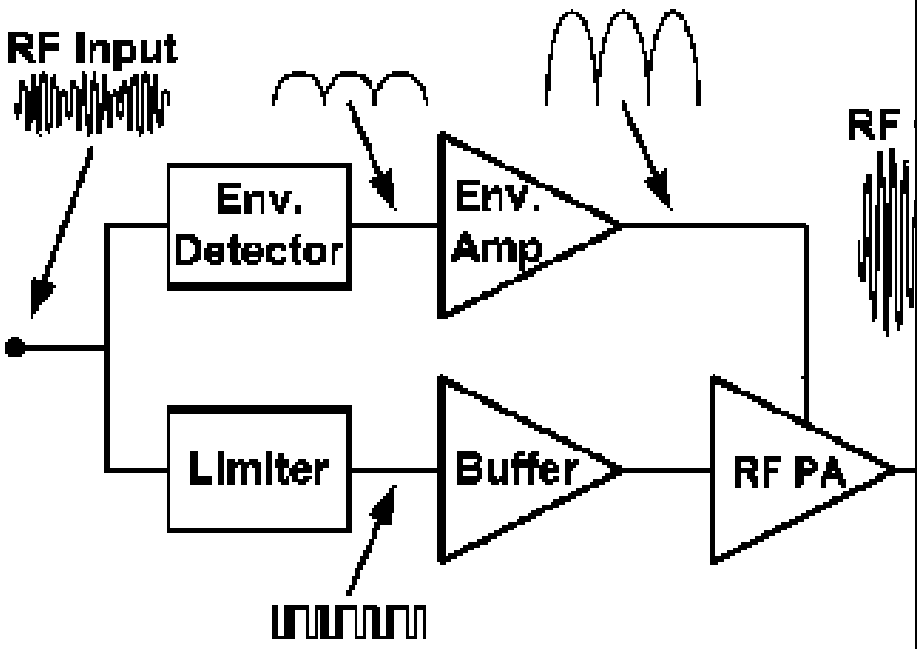
Differential amplifier PI type	 The basic configuration of a PI type differential amplifier consists of two amplifying transistors, which are connected so that the BJT emitters (or FET sources, or valve cathodes) are connected together via a resistor. The resistor terminals are then respectively connected to a shunting current source, forming the "PI" of the name, so that high common mode rejection ratio is achieved.

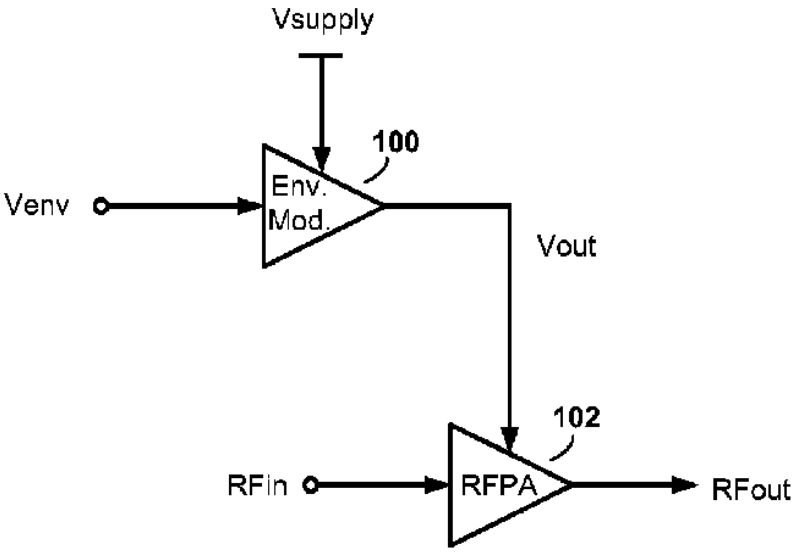
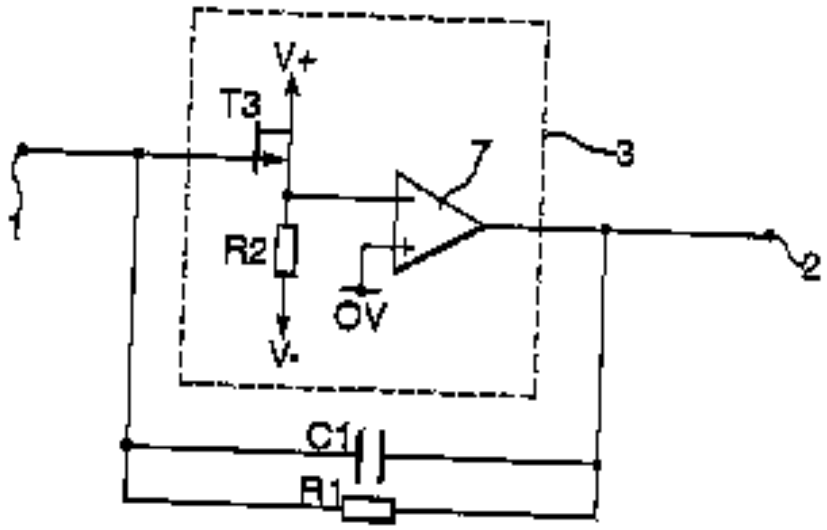
Pseudo differential amplifier	 The basic configuration of a pseudo differential amplifier consists of two amplifying transistors, wherein the BJT emitters (or FET sources, or valve cathodes) are not connected together but directly coupled to the ground. Thus, since the difference between I1 and I2 is output in proportion to the difference between gate signals Va, Vb, the configuration acts as a differential transconductance amplifier.

Reflex amplifier	 In a basic reflex amplifier an AC input signal is amplified and then rectified and, using the same circuit elements, the fed back resultant rectified DC signal is again amplified. The reflex circuit thus achieves two stages of amplification, plus rectification, in a single stage.

Travelling Wave Tube Amplifier (TWTA)	 A travelling wave tube (TWT) integrated with a regulated power supply and protection circuits is referred to as a travelling wave-tube amplifier (TWTA). The basic configuration of a TWT is an elongated vacuum tube with an electron gun (a heated cathode that emits electrons) at one end. A magnetic containment field around the tube focuses the electrons into a beam, which then passes down the middle of an RF circuit (wire helix or coupled cavity) that stretches from the RF input to the RF output, the electron beam finally striking a collector at the other end. A directional coupler, which can be either a waveguide or an electromagnetic coil, fed with the low-powered radio signal that is to be amplified, is positioned near the emitter, and induces a current into the helix. The RF circuit acts as a delay line, in which the RF signal travels at near the same speed along the tube as the electron beam. The electromagnetic field due to the RF signal in the RF circuit interacts with the electron beam, causing bunching of the electrons (an effect called velocity modulation), and the electromagnetic field due to the

	beam current then induces more current back into the RF circuit (i.e. the current builds up and thus is amplified as it passes down). A second directional coupler, positioned near the collector, receives an amplified version of the input signal from the far end of the RF circuit.
Klystron	 A klystron amplifies RF signals by converting the kinetic energy in a DC electron beam into radio frequency power. A beam of electrons is produced by a thermionic cathode (a heated pellet of low work function material), and accelerated by high-voltage electrodes (typically in the tens of kilovolts). This beam is then passed through an input cavity. RF energy is fed into the input cavity at, or near, its natural frequency to produce a voltage which acts on the electron beam. The electric field causes the electrons to bunch: electrons that pass through during an opposing electric field are accelerated and later electrons are slowed, causing the previously continuous electron beam to form bunches at the input frequency. To reinforce the bunching, a klystron may contain additional "buncher" cavities. The RF current carried by the beam will produce an RF magnetic field, and this will in turn excite a voltage across the gap of subsequent resonant cavities. In the output cavity, the developed RF energy is coupled out. The spent electron beam, with reduced energy, is captured in a collector.

Envelope Elimination and Restoration (EER)	 The Envelope elimination and restoration technique was first proposed in 1952 by L.R. Kahn as a way to linearise nonlinear amplifiers. In Kahn's approach, an RF input signal is processed by two parallel paths. In one path, the envelope of the RF input signal is "eliminated" using a limiting amplifier that removes any amplitude modulation and which provides a phase modulated signal. In the other path, the RF input signal envelope is detected, amplified, and applied to the PA as an amplitude modulating power supply voltage. The EER technique allows the phase modulated signal to be amplified with high efficiency using a saturated power amplifier, which has an amplitude modulating power supply voltage, in order to restore the RF signal envelope at the output of said amplifier and to obtain linear amplification of the RF input signal.

Envelope Tracking (ET)	 In the Envelope Tracking configuration, the power amplifier is fed with a fully-modulated RF signal (RFin) at the input and supplied with a modulated drain bias (Vout) in accordance with the envelope of the modulated signal (Venv). As a result, the power amplifier at all times is kept near saturation where the efficiency is highest.
Charge amplifier	 A charge amplifier is a current integrator driven by an electrical source with capacitive nature such as a piezoelectric sensor. Contrary to what its name may suggest, a charge amplifier does not amplify the electric charge present at its input (it can amplify only the exciting input

	voltage). The charge amplifier just transfers the input charge to another reference capacitor and produces an output voltage equal to the voltage across the reference capacitor. Thus the output voltage is proportional to the charge of the reference capacitor and, respectively, to the input charge; hence the circuit acts as a charge-to-voltage converter. Charge amplifiers are usually constructed using op-amps with a feedback capacitor.

Delete: The Note below the Glossary of terms table.

H03F 1/08

References

Limiting references

This place does not cover:

Replace: The existing Limiting references table with the following updated table.

Wide-band amplifiers with inter-stage coupling networks incorporating these impedances	H03F 1/42

Informative references

Attention is drawn to the following places, which may be of interest for search:

Replace: The existing Informative references table with the following updated table.

Eliminating transit-time effects in vacuum tubes	H01J 21/34
Distributed amplifiers using coupling networks with distributed constants	H03F 3/605
Gain control in emitter coupled or cascode amplifiers	H03G 1/0023
Modifications of control circuit to reduce distortion caused by control	H03G 1/04
Muting circuits	H03G 3/26, H03G 3/34
Amplitude limiters	H03G 11/00

H03F 3/38

References

Insert: The following new Limiting references section.

Limiting references

This place does not cover:

Switched capacitor amplifiers	H03F 3/005

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Delete: The following reference from the Application-oriented references table.

Switched capacitor amplifiers	H03F 3/005

H03F 7/00

Definition statement

Replace: The existing Definition statement text with the following updated text.

Parametric amplifiers, i.e. wherein a component parameter such as capacitance or inductance is varied to achieve amplification.

References

Insert: The following new Informative references section.

Informative references

Attention is drawn to the following places, which may be of interest for search:

Devices or arrangements for the parametric generation or amplification of light, infrared or ultraviolet waves	G02F 1/39
Amplifiers using superconductivity effects	H03F 19/00

2. B. DEFINITIONS QUICK FIX

Symbol	**Location of change** (e.g., section title)	**Existing reference symbol or text**	**Action; New symbol; New text**
H03F 3/02	Limiting references		Delete the entire Definition

Notes:

Use this Definitions Quick Fix (DQF) table to:

- Delete an entire definition
- Delete an entire section
- Change a reference symbol
- Delete a reference symbol
- Delete text in a References section
- Correct one error in spelling, article use, or verb tense

Otherwise, use the standard template.

Reminder: Never delete F symbol definitions.