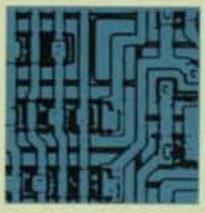
Anne Hadley
650-327-4224

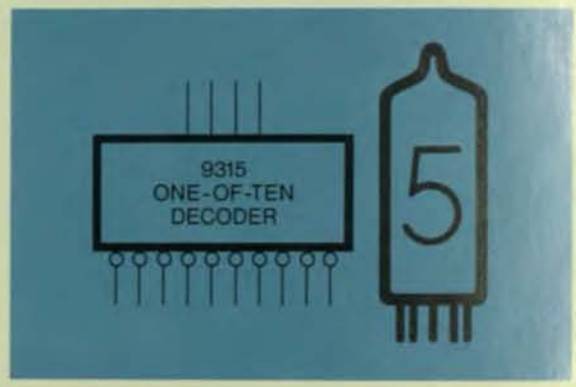
To make Decoders that can drive every major display device,

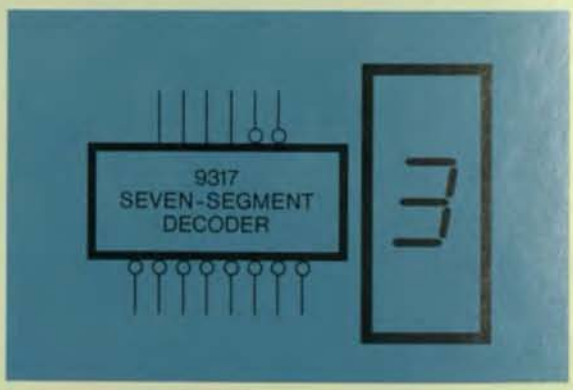


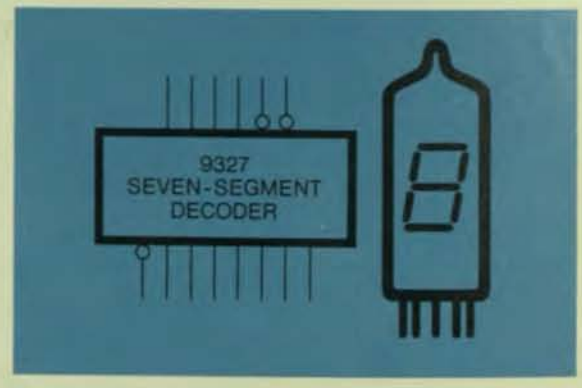
Three Fairchild MSI decoder/drivers cover the requirements of every major military and industrial display device on the market. The 9315. The 9317. And the brand new 9327. Each device has a built-in driver stage—an important feature that means smaller, lower-cost systems with higher reliability.

NIXIE—The 9315 One-of-Ten Decoder/Driver accepts decimal inputs and provides ten mutually exclusive outputs which directly drive NIXIE* tubes. Stable high-voltage output characteristics also make the 9315 ideal for driving relays, lamps and similar devices.

SEVEN-SEGMENT—Fairchild's 9317 and 9327 Seven-Segment Decoder/Drivers convert 4 inputs in 8421 BCD code into appropriate outputs for driving seven-segment numerical displays. The 9317 is designed for use with incandescent lamps, neon, electroluminescent and CRT displays, as well as light emitting diode indicators. The 9327 is used for DIGIVAC S/G** vacuum fluorescent readouts. Both devices feature automatic ripple blanking, lamp intensity modulation, lamp test facility, and blanking output. Outputs are disabled by codes in excess of binary 9. Flags are removed on the 6 and 9, which reduces the number of ambiguous states.







*NIXIE is a registered Trademark of Burroughs Corporation.
**DIGIVAC S/G is a registered Trademark of Wagner Electric Corporation.

To order these Decoder/Drivers, call your Fairchild Distributor or ask for:

PART NUMBER	PACKAGE	TEMPERATURE RANGE	PRICE (1-24)	(25-99)	(100-999)
U4L931551X	Flat	−55°C to +125°C	$22.00	$17.60	$14.65
U4L931559X	Flat	0°C to + 75°C	11.00	8.80	7.30
U6B931551X	DIP	−55°C to +125°C	20.00	16.00	13.30
U6B931559X	DIP	0°C to + 75°C	10.00	8.00	6.65
U4L9317513	Flat	−55°C to +125°C	28.00	22.40	18.70
U4L9317593	Flat	0°C to + 75°C	14.00	11.20	9.35
U7B9317513	DIP	−55°C to +125°C	25.40	20.30	17.00
U7B9317593	DIP	0°C to + 75°C	12.70	10.15	8.50
U4L9327591	Flat	0°C to + 75°C	13.05	10.50	8.80
U7B9327591	DIP	0°C to + 75°C	11.90	9.55	8.00

you have to get serious about MSI family planning.

We put together a family plan by taking systems apart. All kinds of digital systems. Thousands of them.

First we looked for functional categories. We found them. Time after time, in a clear and recurrent pattern, seven basic categories popped up: Registers. Decoders and demultiplexers. Counters. Multiplexers. Encoders. Operators. Latches.

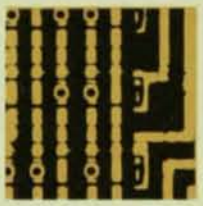
Inside each of the seven categories, we sifted by application. We wanted to design the minimum number of devices that could do the maximum number of things. That's why, for example, Fairchild MSI registers can be used in storage, in shifting, in counting and in conversion applications. And you'll find this sort of versatility throughout our entire MSI line.

OPERATORS
9304 – Dual Full Adder/Parity Generator

Finally, we studied ancillary logic requirements and packed, wherever possible, our MSI devices with input and output decoding, buffering and complementing functions. That's why Fairchild MSI reduces – in many cases eliminates – the need for additional logic packages.

LATCHES
9308 – Dual 4-Bit Latch
9314 – Quad Latch

REGISTERS
9300 – 4-Bit Shift Register
9328 – Dual 8-Bit Shift Register



MULTIPLEXERS
9309 – Dual 4-Input Digital Multiplexer
9312 – 8-Input Digital Multiplexer

DECODERS AND DEMULTIPLEXERS
9301 – One-Of-Ten Decoder
9315 – One-Of-Ten Decoder/Driver
9307 – Seven-Segment Decoder
9311 – One-Of-16 Decoder
9317 – Seven-Segment Decoder/Driver
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ENCODERS
9318 – Priority 8-Input Encoder

FAIRCHILD
SEMICONDUCTOR

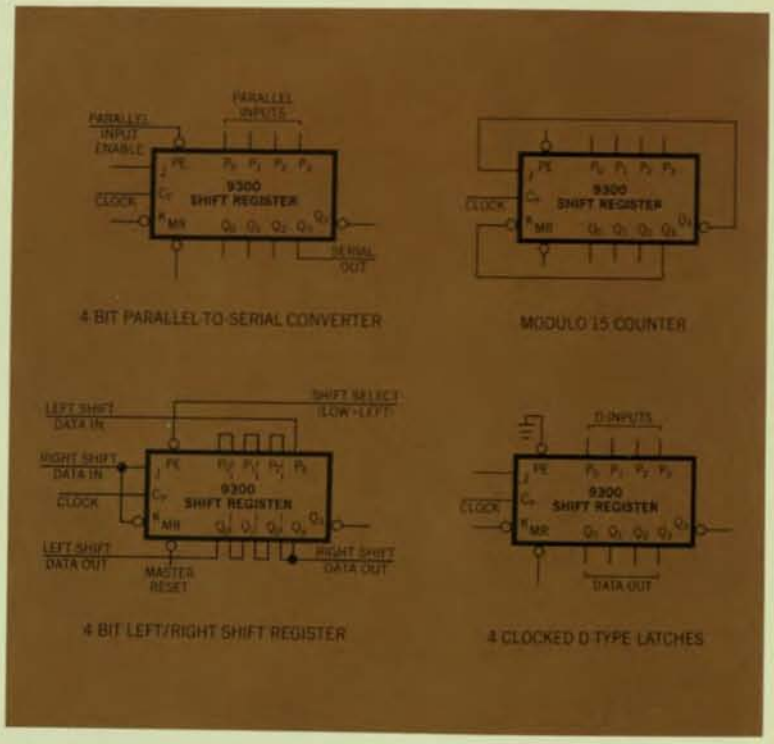
FAIRCHILD SEMICONDUCTOR A Division of Fairchild Camera and Instrument Corporation Mountain View, California 94040, (415) 962-5011 TWX: 910-379-6435

To make a Register that does a lot more than shift,

Fairchild's 9300 is the world's most versatile shift register. And we can prove it. The 9300 Four-bit Universal Register can perform as a high-speed shift register, modulo N counter, up/down counter, storage element, four clocked D-type latches, a programmable divider, a binary to BCD shift converter, serial to parallel converter (and vice versa), and a dozen other functions. It's a prime example of the kind of versatility inherent in Fairchild's entire MSI family.

Other features which help make the 9300 the fastest-selling register on the market include a 20MHz shift frequency, J and $\overline{K}$ inputs (which, tied together, provide D-type input), gated synchronous parallel inputs, Q and $\overline{Q}$ outputs.

The 9300 is completely compatible with all Fairchild MSI elements. It comes in a 16-lead hermetic DIP and Flatpak in both military and industrial temperature ranges.



To order the 9300, call your Fairchild Distributor and ask for:

PART NUMBER	PACKAGE	TEMPERATURE RANGE	PRICE (1-24)	(25-99)	(100-999)
U4L930051X	Flatpak	−55°C to +125°C	$21.45	$17.15	$14.30
U4L930059X	Flatpak	0°C to + 75°C	10.70	8.60	7.15
U6B930051X	DIP	−55°C to +125°C	19.50	15.60	13.00
U6B930059X	DIP	0°C to + 75°C	9.75	7.80	6.50

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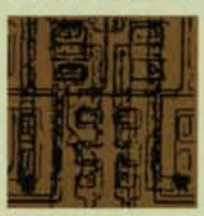

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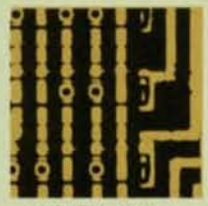

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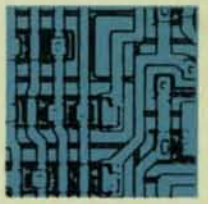

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FAIRCHILD
SEMICONDUCTOR

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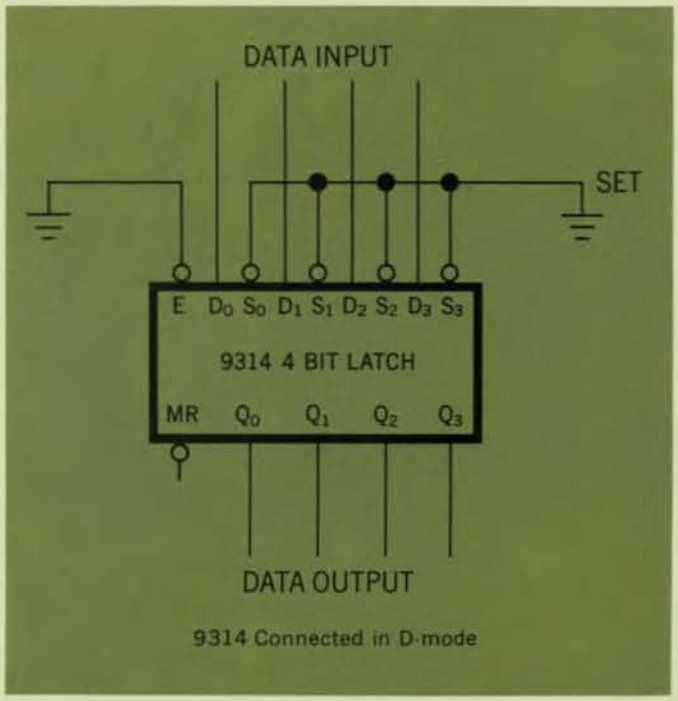
To make a Quad Latch that's both R/S and D compatible,

Fairchild's new MSI 9314 Quad Latch is a versatile, high-speed device that can be used in any application requiring a single-input D-type latch or an R/S-type latch. It has no undefined states in the R/S mode. Its unique multi-function capabilities make it useful in a number of applications: four-bit storage latches, contact bounce eliminators, multi-input active high set/reset latches, counting and holding display systems, eight-bit addressable latches, A/D conversions, zero and ones catching storage.

The addition of this device to our MSI family gives you everything you need for just about any latching application you could name. Use the new 9314 for maximum function versatility. Or the 9308 Dual Four-Bit Latch when minimum package count is most important. Your Fairchild Distributor has complete specs on both MSI devices.



9314 Connected in D-mode

To order the 9314, ask for:

PART NUMBER	PACKAGE	TEMPERATURE RANGE	PRICE (1-24)	PRICE (25-99)	PRICE (100-999)
U6B931451X	DIP	−55°C to +125°C	$19.40	$15.50	$13.00
U6B931459X	DIP	0°C to + 75°C	9.70	7.75	6.50
U4L931451X	Flat	−55°C to +125°C	21.35	17.05	14.30
U4L931459X	Flat	0°C to + 75°C	10.70	8.55	7.15

To order the 9308, ask for:

PART NUMBER	PACKAGE	TEMPERATURE RANGE	PRICE (1-24)	PRICE (25-99)	PRICE (100-999)
U6N930851X	DIP	−55°C to +125°C	$25.40	$20.20	$17.00
U6N930859X	DIP	0°C to + 75°C	12.70	10.10	8.50
U4M930851X	Flat	−55°C to +125°C	27.95	22.20	18.70
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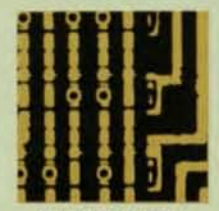

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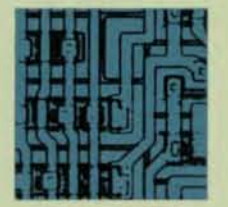

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Nobody makes MSI the way Fairchild does.

FAIRCHILD SEMICONDUCTOR

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LINEAR

Linear Integrated Circuit technology is happening so fast, it's difficult to determine which development to advertise first. So, we've decided to advertise everything at once. As it happens.

Every month, you'll see this weird-shaped ad in the trade press. It will include new product announcements, applications, marketing decisions, assorted breakthroughs, a design contest, what-have-you. Sort of a something-for-everybody compendium of LIC information. If you see something you like, write us and we'll tell you more about it.

New Op Amp has Gain of 3,000,000.

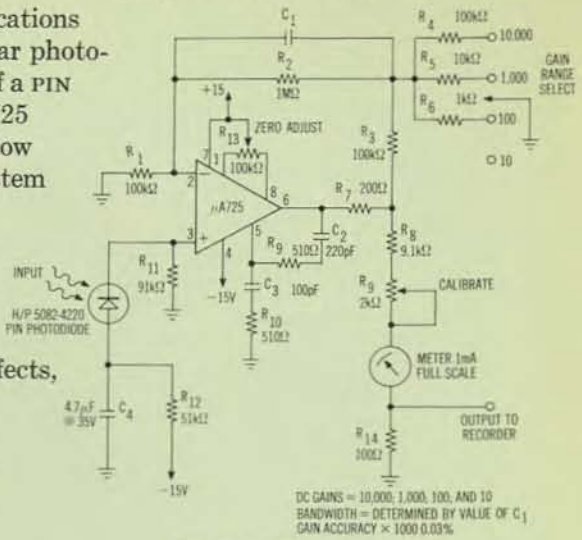
Fairchild's new μA725 Instrumentation Operational Amplifier can do the same jobs that used to require expensive chopper-stabilized or complex discrete component amplifiers. The μA725 is ideally suited for use in Low Level Signal Conditioners, Instrumentation Amplifiers, Precision Measuring Equipment, Process Control Systems and Data Acquisition Equipment.

Electrical Performance/Features

Low Input Noise Current . . . 0.6pA/ Hz
High Open Loop Gain 3,000,000
Low Input Offset Current 3nA
Low Input Offset
Voltage Drift . . . . . 0.5μV/°C
High Common Mode Rejection . 120dB

One of the many applications for the μA725 is in Linear photodetection systems. Use of a PIN Photodiode with the μA725 provides the user with a low noise linear detection system which operates from low voltage supplies and has none of the inherent disadvantages of photomultiplier tubes (high voltage supplies, aging effects, large physical size, high power dissipation).

Reader Service Number 100



μA725 PIN PHOTODIODE AMPLIFIER

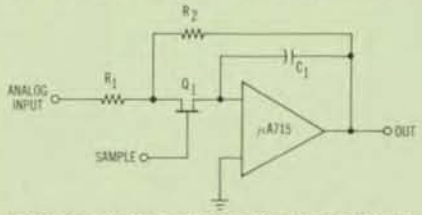
μA715 Basis of Fast Sample/Hold Circuit.

Many data acquisition systems require a sample and hold circuit to improve analog-to-digital conversion accuracy. The requirements of a good S/H circuit are:

1. minimum droop during the hold period
2. high open loop gain for good closed loop gain accuracy
3. high speed
4. minimum temperature drift

A basic sample and hold circuit configuration looks like this:

In the sample mode, the sampling switch Q_1 is turned on and



BASIC OPERATIONAL SAMPLE AND HOLD CIRCUIT

the circuit functions as an inverting operational amplifier.

When Q_1 is switched off, the circuit functions as an integrator, holding the output voltage constant at the sampled value.

The acquisition time when going from the hold mode to the sample mode is a function of the time constant R_2C_1 and the required accuracy, and is given by:

$$t_a = R_2C_1 \ln\left(\frac{100}{\%\ \text{accuracy}}\right)$$

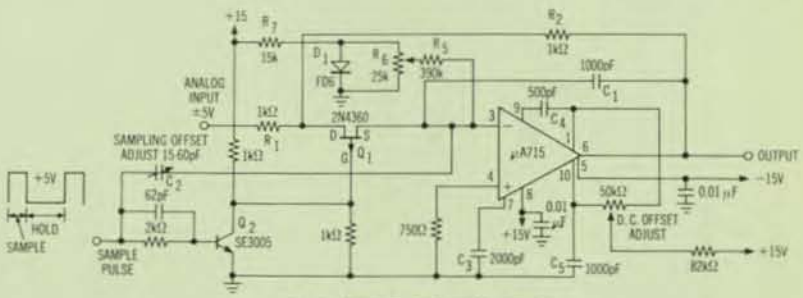
A complete sample and hold circuit is shown below. It includes the components necessary to compensate for the DC and AC errors inherent to the basic configuration. The DC offset is adjusted to zero by a 50k potentiometer (R_4). C_3, C_4, and C_5 provide unity gain frequency compensation.

A junction field effect transistor is used as the sampling switch Q_1. Because there is some capacity from the gate to the source of Q_1, a portion of the gate signal to the switch is coupled through the device onto the holding capacitor C_1 causing an offset error which is bucked out by an opposing signal, coupled by C_2, from the sample pulse input onto the holding capacitor.

Holding Accuracy. During the hold time the output voltage will tend to drift as the holding capacitor integrates the input bias current of the amplifier. This drift is compensated by supplying temperature compensated bias current from a separate source, R_5, R_6, R_7 and D_1.

With a 10 volt step input (±5 volts to ∓5 volts) the settling time to ±0.05% is 10μsec. This is slightly longer than that given by equation 1 due to the finite "on-resistance" of the sampling switch Q_1. If C_1 is decreased to 100pF the settling time is about 1μsec. Temperature drift of the output in the hold mode is approximately 0.001% per degree Centigrade for a hold time of 100μsec.

Reader Service Number 101



μA715 SAMPLE AND HOLD CIRCUIT

New Product Digest

In addition to the μA715 and μA725, Fairchild is introducing the following new Linears:

μA731 Dual Channel Sense Amplifier
2mV Threshold Accuracy
5nSec Strobe Time Variation
Internal Memory Data Register
Reader Service Number 102

μA735 Micro Power Amplifier
100μW Power Consumption
2nA Offset Current
±3V to ±18V Supply Voltage
10MΩ Input Resistance
Reader Service Number 103

μA739 Dual Low Noise Op Amp
$1\mu V_{rms}$ Noise (20Hz to 150KHz)
50μA Offset Current
20,000 V/V Voltage Gain
Reader Service Number 104

μA742 Zero Crossing AC Trigger
Operates from AC or DC Supply
2 Amps Peak Output Current
Time Proportioning Operation
Adjustable Hysteresis
Reader Service Number 105

μA747 Dual Internally Compensated Op Amp
Short Circuit Protected
Latch-up Proof
Offset Voltage Null Capability
± 30V Differential Input Voltage
200,000 V/V Voltage Gain
Reader Service Number 106

μA748 High Performance Op Amp
Short Circuit Protected
Latch-up Proof
±30V Differential Input Voltage
200,000 V/V Voltage Gain
Reader Service Number 107

μA749 Dual Op Amp
92dB Voltage Gain
20MHz Bandwidth
Latch-up Proof
Short Circuit Protected
Reader Service Number 108

EDITORIAL

If We Can't Sell You Ours, We'll Sell You Theirs.

For a long time, Fairchild built only linears designed by Fairchild engineers. We didn't think anything else was worth the effort. People said we had an NIH (Not Invented Here) complex. And, they were right.

However, it's been brought forcefully to our attention that a couple other guys in this business know what they're doing. The competition is coming out with some pretty worthwhile linears. Our customers have noticed too, because they're talking to other manufacturers about linears we don't make. They're even talking to sole sourcers!

To keep things even, we've decided to give our wandering customers something they're going to need if they start dealing with a sole source linear maker: A second source. Us. (Just in case the original supplier's factory blows up or they lose the formula or whatever it is that happens when you can't get delivery.)

Starting now, Fairchild is introducing a new line of linears. We call them IT circuits (Invented There). The first two are available today: The LM101 and the MC1495. Soon we'll add the LM101A, MC1496 and the SN7524. Of course, we've given them Fairchild part numbers. Here's a conversion chart:

μA795	Analog Multiplier	MC1495
μA796	Modulator	MC1496
μA748	Operational Amplifier	LM101
μA777	Operational Amplifier	LM101A
μA761	Sense Amplifier	SN7524

There will be other additions to the IT line soon. So be sure you contact your local Fairchild Sales Engineer before you drop a design for lack of a reliable alternate source. Just give him the part number you want and ask him to check the IT line. Farewell NIH.

Reader Service Number 109

Contest

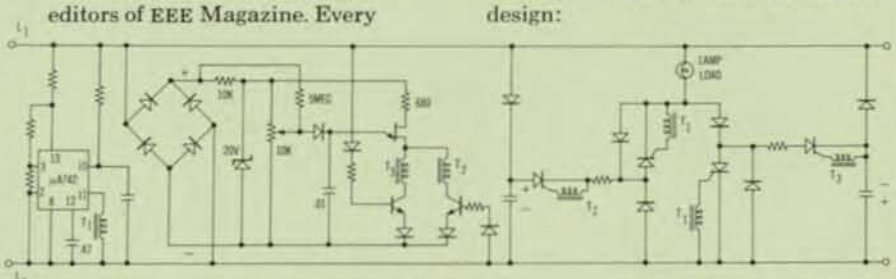
Last year, Fairchild gave a series of seminars on Linear Integrated Circuits in which we introduced 12 new products. One device, the μA742 TRIGAC Zero-Crossing A.C. Trigger, was so significant we offered a free sample to anyone who came up with an original application for it. We got hundreds of replies. The most ingenious was sent in by Richard M. Burkhart, a graduate student at the University of Illinois. We liked Richard's application so much, we decided to give him $100. Then, we liked the $100 idea so much, we decided to make it a contest.

Here's how it works:

1) Get all the facts on a Fairchild Linear IC.
2) Design the world's greatest application for it.
3) Send the application to us.

All entries will be judged by the editors of EEE Magazine. Every month, they will select the most fantastic application and give us the designer's name. We'll publish the winning design here and give the winner $100 upon publication.

To give you an idea of what we're looking for, here's Richard Burkhart's design:



REVERSE PHASE CONTROL CIRCUIT

Send all entries to: Fairchild Linear Contest
P.O. Box 880A, Mountain View, California 94040

LINEAR

One more time:

Fairchild built a reputation on new products, new technology and new applications. Last month we ran the editorial below. It announced another new step for Fairchild. A commitment to do business wherever there's business. First source. Or second. It was a major policy decision for us. So major, in fact, we're repeating the editorial this month.

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μA761	Sense Amplifier	SN7524

There will be other additions to the IT line soon. So be sure you contact your local Fairchild Sales Engineer before you drop a design for lack of a reliable alternate source. Just give him the part number you want and ask him to check the IT line. Farewell NIH.

Introducing the World's First Monolithic J-FET Input Op Amp

Punch-through op amps are obsolete.

Fairchild's new μA740 now offers 150pA (max.) current into either input. While some manufacturers are talking about super beta or punch-through transistors with current gains of 1000, Fairchild technology now makes possible J-FET devices with equivalent betas of over 15,000. And, they're completely compatible with standard monolithic processing.

The μA740 is a simple two-stage design similar to the μA741, but employs J-FET input transistors to obtain extremely low input currents.

μA740 Electrical Performance

Input Current (either input)	150pA max.
Unity Gain Slew Rate	6V/μS
Input Resistance	10^{12} Ohms
Voltage Gain	120dB
Input Offset Current	30pA

The new linear has all the convenience of the μA741: internal frequency compensation for unity gain, input over-voltage protection to either supply, output short circuit protection to ground or either supply, and the absence of "latch-up."

Balanced offset null is easily obtained with a 10KΩ potentiometer and does not affect other parameters.

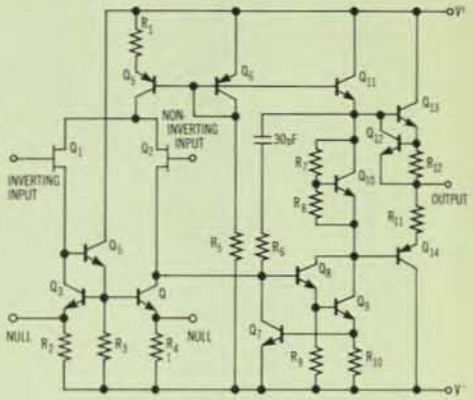
Other μA740 features include a wide common mode range of ± 12 volts, high differential voltage range of ± 30 volts, and wide operating supply range of ± 5V to ± 22V.

The μA740 is directly interchangeable with the μA741, μA748 or μA709.

The new Fairchild device provides circuit designers with superior performance in such applications as active filters, voltage followers, integrators, summing amplifiers, sample and holds, transducer amplifiers and other general-purpose feedback applications.

The μA740 is now available in TO-99 packages (both military and industrial temperature ranges) from any Fairchild Distributor.

Reader Service Number 211



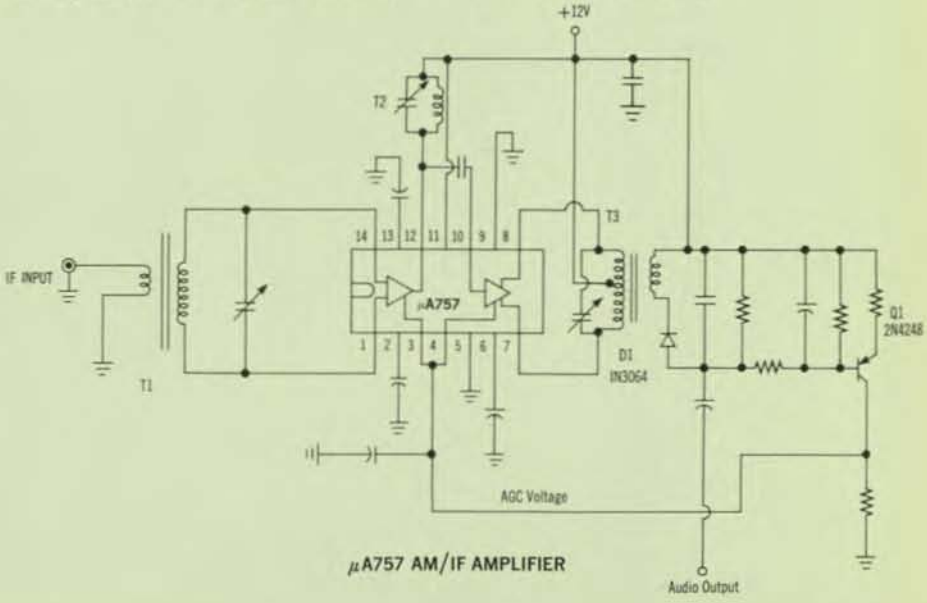
μA740 FET INPUT OP AMP

μA757 Ideal Choice for an AGC-Able AM/IF Amplifier

Fairchild's μA757 can be used very effectively as a high gain, wide AGC range IF amplifier. In this application, the input signal from the generator is matched to the input of the microcircuit with transformer T_1. The output of the 1st section is taken from Pin 12 across a tank circuit which acts as a load impedance. The signal is coupled through a capacitor to the input of the 2nd section, Pin 10. The output of the 2nd section is taken in a push-pull manner with transformer T_3. The secondary of T_3 drives the diode detector from which audio is recovered. Q_1 acts as an AGC signal amplifier to provide gain for the AGC signal from the diode detector.

Voltage gain of the circuit from the input of T_1 to the input of T_3 is typically 80 dB, while the AGC range is typically 70 dB. Input signal handling capability of the microcircuit is typically 300 mV_{RMS} at the input terminals of the microcircuit at full AGC. Stable gain is obtained over a wide temperature range, regardless of AGC setting.

Reader Service Number 212



μA757 AM/IF AMPLIFIER

Application Digest

If you'd like any of the following application literature just write: Fairchild Linear Applications, Box 880A, Mountain View, Calif. 94040. Ask for it by publication number.

Publication Number	Title
138	μA725 Instrumentation Applications
134	The Frequency Division Multiplex Channel Amp with the μA748
131	An Arithmetic Analog Computer using μA735 Logarithmic Amplifier
129	Low-Pass Active Filter for Electronic Imaging using the μA715
125	Applications of the μA749 Dual Operational Amplifier
141	μA742 (TRIGAC) AC Power Control Handbook
164	Applications of the μA722 10-Bit Current Source
136	Low-Drift, Low-Noise Monolithic Operational Amp for Low Level Signal Processing – μA725
133	More Voltage Regulator Applications using the μA723
128	A High Speed Sample and Hold using the μA715
126	The μA749 Dual Operational Amplifier
123	A Micropower Monolithic Op Amp – μA735
99	μA733 Oscillators
140	μA731 High Speed Dual Channel Sense Amplifier
130	μA725 AGC Amplifier
127	A Trapezoidal Deflection Circuit for use with the 3250 Numeric Character Generator using the μA715
111	A High Speed, Zero Input Current Chopper Amp – μA715
119	A High Speed Differential Preamp for Thin Film Memories – μA751
124	The μA746E Color TV Chroma Demodulator IC
183	A Low-Noise Preamplifier – μA741
175	The μA739 – A Low-Noise Dual Operational Amplifier
122	A Monolithic Radiation-Resistant Operational Amp – μA744
171	Applications of the μA739 and μA749 Dual Preamplifier Integrated Circuits in Home Entertainment Equipment

Fairchild Cuts Prices of Ten Popular Linears

Say goodbye to modules.

New prices on Fairchild's most popular Linear ICs now make modules expensive as well as bulky.

The Price Story:

DEVICE TYPE	ORDERING CODE	TEMPERATURE RANGE	OLD PRICE 100-999	NEW PRICE* 100-999
μA715	U5F7715312	−55°C to +125°C	$48.00	$30.00
μA715C	U5F7715393	0°C to +70°C	15.00	7.95
μA722	U3M7722333	−20°C to +85°C	65.00	37.50
μA722B	U3M7722334	0°C to +55°C	50.00	22.50
μA725	U5B7725312	−55°C to +125°C	48.00	37.50
μA725B	U5B7725333	−20°C to +85°C	37.50	25.00
μA725C	U5B7725393	0°C to +70°C	–	15.00
μA735	U5B7735312	−55°C to +125°C	48.00	37.50
μA735B	U5B7735333	−20°C to +85°C	37.50	25.00
μA735C	U5B7735393	0°C to +70°C	–	15.00

*Call your local Fairchild distributor or Field Sales office for even lower volume prices.

The Performance Story:

μA715 – High Speed Op Amp
100V/μS Unity Gain Slew Rate
300nS Settling Time
65MHz Bandwidth
70nA Offset Current
Reader Service Number 213

μA722 – 10 Bit D/A Converter Current Source
±8½ Bit Accuracy
10 Bit Resolution
600nS Switching Speed
Internal Precision Reference
Reader Service Number 214

μA725 – Instrumentation Op Amp
0.5μV/°C Voltage Drift
128dB Voltage Gain
120dB Common Mode Rejection
0.6pA$\sqrt{Hz}$ Input Noise Current
Reader Service Number 215

μA735 – Micropower Op Amp
100μW Power Consumption
0.5nA Offset Current
10MΩ Input Resistance
Wide Supply Voltage Range
Reader Service Number 216

Win $100

We hope you're getting your entries ready for the contest we announced last month.

Just in case you missed the announcement, here's what you have to do to enter:

1. Get all the facts on a Fairchild Linear IC.
2. Design the world's greatest application for it.
3. Send to: Fairchild Linear Contest, P.O. Box 880A, Mountain View, California 94040.

All entries will be judged by the editors of EEE Magazine. Every month, they will select the most imaginative application and give us the designer's name. We'll publish the winning design and give the winner $100 upon publication.

Ready. Set. Design!

FAIRCHILD SEMICONDUCTOR

LINEAR

The best of Linear

For the past several months, we've presented a profusion of facts, specs and applications on Linear Integrated Circuits.

It's time for a recap. Just in case anybody missed something they shouldn't have.

The following two pages contain the most significant product information we've presented in this ad series. Not that everything else wasn't important.

But, if we only had one ad to run this year, this is the ad we'd run.

New Op Amp has Gain of 3,000,000.

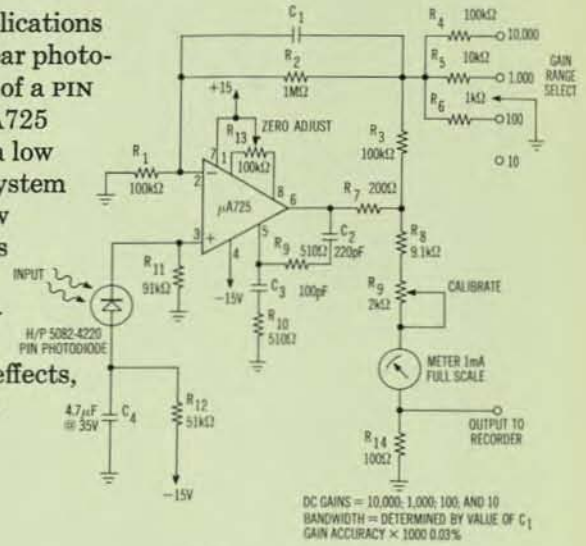
Fairchild's new μA725 Instrumentation Operational Amplifier can do the same jobs that used to require expensive chopper-stabilized or complex discrete component amplifiers. The μA725 is ideally suited for use in Low Level Signal Conditioners, Instrumentation Amplifiers, Precision Measuring Equipment, Process Control Systems and Data Acquisition Equipment.

Electrical Performance/Features

Low Input Noise Current . . . 0.6pA/Hz
High Open Loop Gain 3,000,000
Low Input Offset Current 3nA
Low Input Offset
Voltage Drift. . . . . 0.5μV/°C
High Common Mode Rejection . . 120dB

One of the many applications for the μA725 is in Linear photodetection systems. Use of a PIN Photodiode with the μA725 provides the user with a low noise linear detection system which operates from low voltage supplies and has none of the inherent disadvantages of photomultiplier tubes (high voltage supplies, aging effects, large physical size, high power dissipation).

Reader Service Number 80



μA725 PIN PHOTODIODE AMPLIFIER

Micropower Exists-μA735

Minimizing power drain, weight and space gives design engineers ulcers (how come the system power supply designer is the last one to know you've overrun the allotted system power consumption?).

Here's good news. Relief exists:

The μA735 micropower operational amplifier uses only 100μW at ± 3.0 volts.

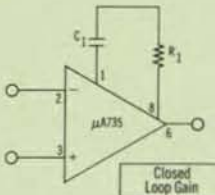
Systems such as space vehicles, aircraft, and portable medical equipment will benefit from the use of the μA735 by shrinking bulky batteries. It gives you low quiescent currents. It also gives you versatile, accurate and cool operation without the customary design tradeoffs.

In addition, the μA735 simplifies design of high impedance instrumentation circuits due to its extremely low input currents.

Here are some typical device specifications:

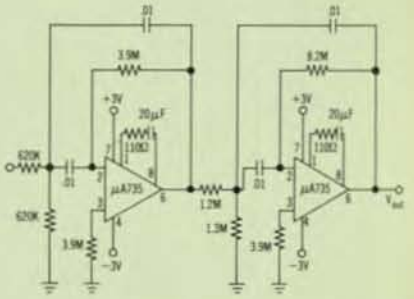
input offset current	500 pA
input bias current	5.0 nA
input offset voltage	1.0 mV
supply voltage range	± 3 volts to ± 18 volts
power consumption	100 μW
open loop voltage gain	20,000
input impedance	10 mΩ
noise	.5 pA / √ Hz

Smart engineers who like to minimize component count can now take advantage of a new simplified frequency compensation scheme that applies over the entire supply voltage range of the μA735.



Closed Loop Gain	C_1	R_1
1	20nF	110Ω
10	2nF	1.1kΩ
100	680pF	11kΩ

Most engineers like to eliminate those large, expensive, hard-to-find capacitors that hog space and dollars. Here's a nifty little application which will avoid large capacitors in low frequency, active filter design. And with very low supply current drain!



This circuit has a center frequency at 10 Hz, 12 dB rolloff with −3 dB points at 6.5 Hz and 14 Hz. The μA735 lets you use small capacitor values and large resistors for frequency shaping at a few Hz, due to the μA735's low input offset current.

The new price is low, too –

μA735 −55°C to +125°C $37.50 @ 100
μA735B −20°C to +85°C $22.50 @ 100
μA735C 0°C to +70°C $15.00 @ 100

See? Micropower does exist; alive and in quantity at your Fairchild distributor.

Reader Service Number 81

Introducing the World's First Monolithic J-FET Input Op Amp

Punch-through op amps are obsolete.

Fairchild's new μA740 now offers 150 pA (max.) current into either input. While some manufacturers are talking about super beta or punch-through transistors with current gains of 1000, Fairchild technology now makes possible J-FET devices with equivalent betas of over 15,000. And, they're completely compatible with standard monolithic processing.

The μA740 is a simple two-stage design similar to the μA741, but employs J-FET input transistors to obtain extremely low input currents.

μA740 Electrical Performance

Input Current (either input)	150pA max.
Unity Gain Slew Rate	6V/μS
Input Resistance	10^{12} Ohms
Voltage Gain	120dB
Input Offset Current	30pA

The new linear has all the convenience of the μA741: internal frequency compensation for unity gain, input over-voltage protection to either supply, output short circuit protection to ground or either supply, and the absence of "latch-up."

Balanced offset null is easily obtained with a 10KΩ potentiometer and does not affect other parameters.

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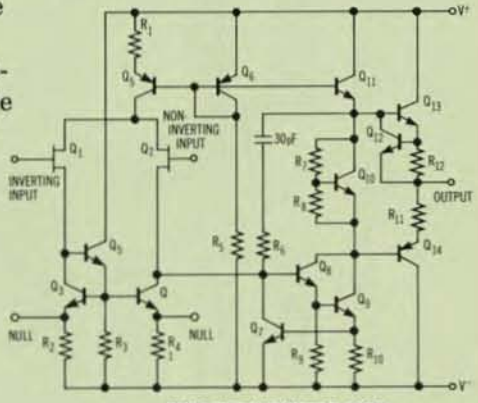
The new Fairchild device provides circuit designers with superior performance in such applications as active filters, voltage followers, integrators, summing amplifiers, sample and holds, transducer amplifiers and other general-purpose feedback applications.

The μA740 is now available in TO-99 packages (both military and industrial temperature ranges) from any Fairchild Distributor.

Reader Service Number 82



μA740 FET INPUT OP AMP

The New μA796:

We Knew It Was Going To Be Versatile, But We Didn't Know How Versatile.

The new low-cost μA796 Doubly Balanced Modulator/Demodulator is finding its way into an amazing variety of systems.

Communications-gear engineers are taking advantage of its great versatility and high carrier suppression in modulators and demodulators for single sideband, suppressed carrier and phase shift key transceivers. It's also being used as a synchronous AM demodulator, a quadrature FM demodulator, and as a phase comparator for phase locked loop receivers.

Digital tape/disc memory designers are utilizing the μA796's unique properties in fast differentiators and phase correcting circuits for NRZ or phase encoding systems, while remote D.C. R-G-B gain controls, color shade and keystone corrections are practical for color TV broadcast equipment use. Other possibilities lie in signal chopping, frequency changing, linear mixing and more.

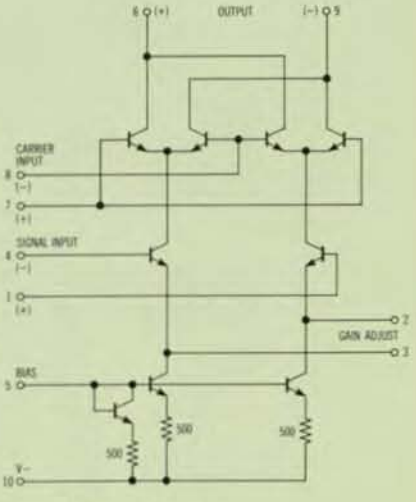
Here Are The Specs:

Carrier Suppression	65dB
Transadmittance Bandwidth	
Carrier Port	300MHz
Signal Port	80MHz
Signal Gain	3.5V/V
Input Impedance (signal port)	200KΩ
Input Offset Current	0.7μA
Differential Output Swing	8.0 volts p-p

Here Are The Prices:

U5F7796312 −55°C to +125°C	$4.80 @ 100 pcs.
U5F7796393 0°C to 70°C	$2.25 @ 100 pcs.

μA796 DOUBLY BALANCED MODULATOR/DEMODULATOR



Reader Service Number 83

FAIRCHILD SEMICONDUCTOR

FAIRCHILD SEMICONDUCTOR A Division of Fairchild Camera and Instrument Corporation Mountain View, California 94040, (415) 962-5011 TWX: 910-379-6435

LINEAR

In case you haven't noticed, Fairchild has modified a long-standing posture against "second sourcing" (last month's editorial "Farewell NIH" pretty well spelled this out).

A one-sentence summary of our new position would read like this:

If a linear circuit — any linear circuit — is worth making, we're going to make it, regardless of its point of origin.

Got the point? Fine. Now hear this:

EDITORIAL

Fairchild doesn't make "The Super" Op Amp. Here's why:

There has never been, isn't now, and probably never will be a *true* ultimate op amp.

Ideal op amps exist only in textbooks. They can't cut the mustard in the real world of systems design where trade-offs like slew rate vs. power consumption or common mode rejection vs. input current make the critical difference.

Then there's dollars. Cost vs. performance. A $60 or a $28 or even a $15 super-beta, or FET, or high-gain, or whatever-you-call-it op amp simply isn't going to make it past an experienced designer very often (except as a tinkerer's toy). Who wants to live with the dual problem of paying too much in order to lose design flexibility?

Smart engineers want options. They want to meet many different system requirements. And there's only one answer to this type of requirement:

A complete family of op amps.

Not just one or two devices which are obsoleted quickly by higher priced "A" versions. Not a "complete line" of three or four circuits. Modern systems can't be built with just a hammer and a saw. It takes a complete tool kit.

We offer a true family of op amps. A tool kit of fifteen separate circuits. At the base of our family is a solid core of low cost general purpose op amps to meet 80% of your system's requirements. On top of these, we have a complete set of complementary special purpose amplifiers designed for various combinations of low input currents, high accuracy, high speed, low power, temperature stability or high CMRR.

It's conceivable, we admit, that some day in the future there will be a true, ultimate, universally useful, supercalifragilistic op amp. We're looking for it inside Fairchild. And outside Fairchild. If we find it, we'll build it. And if we do, you can count on not having to compromise either system design or cost/performance to use it.

TRIGAC PRICE REDUCTIONS THREAT TO MECHANICAL SWITCHES & RELAYS.

New prices on Fairchild's μA742 "TRIGAC" make replacement of troublesome electro-mechanical components a reality. Countless applications are now economical (oven and room temperature controls, ON-OFF motor controls, level detectors, fan controls, etc.).

New μA742 Prices:
@ 100 was $4.95 now $2.35.
Special new 1000 piece price $1.95.
Immediate shipment available from stock.

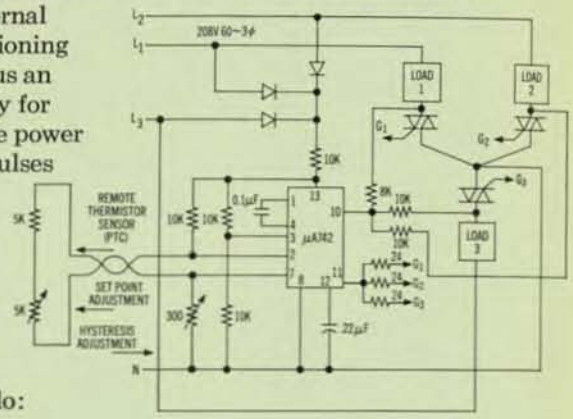
μA742 "TRIGAC"–Powerful Solution to Power Control Problems

Electrical Performance/Features
- Operation directly from DC or AC 50 Hz to 440 Hz (24 VAC to 440 VAC).
- Bridge Sensing with adjustable Hysteresis.
- Minimizes RFI with Resistive or Inductive Loads.
- Large Output Pulses – 1 Ampere Peak.
- Minimum external components required.
- High Noise Immunity.
- No electrolytic capacitors required for most applications.

The μA742 Zero-crossing AC Trigger performs all the signal-processing required to provide precision control of large loads by small sensors, while eliminating RFI problems by switching at the zero-crossings of the load *current*. Additional features are the internal provision for time-proportioning and dead-band control, plus an internally regulated supply for operation directly from the power line. One ampere output pulses trigger even large thyristors directly. Half-cycle firing with resultant DC in the load is prevented by special internal logic design.

Here's an example of what the "TRIGAC" can do:

3 PHASE ZERO-CROSSING DUAL-THRESHOLD TEMPERATURE CONTROLLER 208 V 3φ60~



Micropower Exists–μA735

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Here's good news. Relief exists:

The μA735 micropower operational amplifier uses only 100μW at ± 3.0 volts.

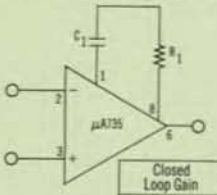
Systems such as space vehicles, aircraft, and portable medical equipment will benefit from the use of the μA735 by shrinking bulky batteries. It gives you low quiescent currents. It also gives you versatile, accurate and cool operation without the customary design tradeoffs.

In addition, the μA735 simplifies design of high impedance instrumentation circuits due to its extremely low input currents.

Here are some typical device specifications:

input offset current	500 pA
input bias current	5.0 nA
input offset voltage	1.0 mV
supply voltage range	± 3 volts to ± 18 volts
power consumption	100 μW
open loop voltage gain	20,000
input impedance	10 mΩ
noise	.5 pA / √Hz

Smart engineers who like to minimize component count, can now take advantage of a new simplified frequency compensation scheme that applies over the entire supply voltage range of the μA735.



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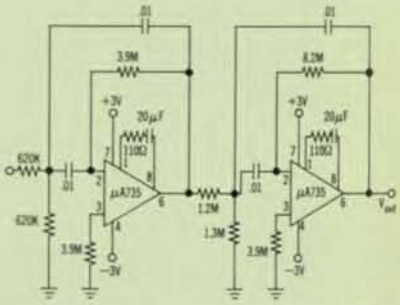

This circuit has a center frequency at 10 Hz, 12 dB rolloff with –3 dB points at 6.5 Hz and 14 Hz. The μA735 lets you use small capacitor values and large resistors for frequency shaping at a few Hz, due to the μA735's low input offset current.

The new price is low, too –

μA735	–55°C to +125°C	$30.00 @ 100
μA735B	–20°C to +85°C	$22.50 @ 100
μA735C	0°C to +70°C	$15.00 @ 100

See? Micropower does exist; alive and in quantity at your Fairchild distributor.

Op Amp Digest

Below you'll find the Fairchild op amp family. A circuit for every application. A trade-off for every system. A price for every parts list. Everything except a "super op amp" (see cover editorial to find out why). You can order additional information via the reader service numbers listed below.

μA715 – High Speed Op Amp
100 V/μS Unity Gain Inv. Slew Rate
300 nS Settling Time
65 mHz Bandwidth
70 nA Offset Current
Reader Service Number 71

μA725 – Instrumentation Op Amp
0.5 μV/°C Voltage Drift
128 dB Voltage Gain
120 dB Common Mode Rejection
0.6 pA/V√Hz Input Noise Current
Reader Service Number 72

μA727 – Temperature Stabilized Preamp
2 pA/°C Offset Current Drift
0.6 μV/°C Offset Voltage Drift
300 MΩ Input Resistance
2 nA Offset Current
Reader Service Number 73

μA735 – Micropower Op Amp
100 μW Power Consumption
500 pA Offset Current
10 MΩ Input Resistance
Wide Supply Voltage Range
Reader Service Number 74

μA739 – Dual Low Noise Op Amp
2.0 dB Noise Figure
86 dB Voltage Gain
±13 V Output Swing
Wide Bandwidth
Reader Service Number 75

μA740 – FET Input Op Amp
10^{12} ohms Input Impedance
80 pA Input Bias Current
6 V/μS Slew Rate
Internal Frequency Compensation
Reader Service Number 76

μA741 – General Purpose Internally Compensated Op Amp
200,000 V/V Voltage Gain
Short Circuit Protected
Latch-up Proof
±30 V Differential Input Voltage
Reader Service Number 77

μA747 – Dual Internally Compensated Op Amp
Short Circuit Protected
Latch-up Proof
±30 V Differential Input Voltage
200,000 V/V Voltage Gain
Reader Service Number 78

μA748 – General Purpose Externally Compensated Op Amp
Short Circuit Protected
Latch-up Proof
±30 V Differential Input Voltage
200,000 V/V Voltage Gain
Reader Service Number 79

μA749 – Dual General Purpose Op Amp
92 dB Voltage Gain
20 mHz Bandwidth
Latch-up Proof
Short Circuit Protected
Reader Service Number 80

μA777 – Precision Op Amp
30 nAInput Bias Current
1.5 nA Input Offset Current
Low Offset Voltage and Current Drift
Short Circuit Protected
Reader Service Number 81

SAVE $6.05

Bargain Corner

SAVE $6.05

Keep your eyes peeled for this space. Almost every month it will carry glad tidings of new prices. Here's one for openers:

Four Quadrant Analog Multiplier
μA795C – was $12.00 now $5.95*

(Don't miss new prices on μA742 TRIGAC – see facing page)

SAVE $6.05

*Price based on 100 pieces.

SAVE $6.05

Hot Off the Press

You can take it with you. We've just published an all-new Fairchild Linear Condensed Catalog. It's pocket sized so that you can lug it around with you. For a free copy, use reader service card number below:

Reader Service Number 82

WIN $100

Win Fame and Fortune

WIN $100

Fill in this box.
(Your circuit here)

By now you ought to be down to the final strokes of preparing your entry in our recently announced Linear Applications Contest. Here are the rules, remember?

1. Get all the facts on a Fairchild Linear IC.
2. Design the world's greatest application for it.
3. Send to: Fairchild Linear Contest, P.O. Box 880A Mountain View, California 94040.

All entries will be judged by the editors of EEE Magazine. Every month, they will select the most imaginative application and give us the designer's name. We'll publish the winning design and give the winner $100 upon publication. Ready. Set. Design!

WIN $100

WIN $100

FAIRCHILD SEMICONDUCTOR

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LINEAR

Last month, we told you why we didn't make the "Super" Op Amp. We said that ideal op amps exist only in textbooks and real applications in the real world need a family of op amps to meet a family of requirements. Which got us into a discussion of our family of fifteen different op amps.

This month, we've got another op amp story. This one has a Moral:

EDITORIAL

You Can't Afford to Wait Until the Price Goes Down

Once upon a time (5 years ago to be exact), Fairchild designed an Op Amp. It was called the μA709. It cost $64.00 and people bought them as fast as we knew how to make them. (Maybe even faster.) Some people didn't buy the μA709. They said the price was too high. And so, they built their systems the old way.

Then, as time passed, the popularity of the new μA709 grew and grew. And the price went down and down. So fast, in fact, that the companies who first used them were surprised. And happy. Their systems performed better and were more profitable than those of their more cautious fellows. Today, these companies are reaping the benefits of their foresighted decisions of those pioneer days.

Today, the μA709 sells for $1.90. MORAL? When you see a new LIC such as the μA725, μA741 or μA796, think of the lesson of the μA709. You can't afford to wait until the price goes down.

The New μA796:

We Knew It Was Going To Be Versatile, But We Didn't Know How Versatile.

The new low-cost μA796 Doubly Balanced Modulator/Demodulator is finding its way into an amazing variety of systems.

Communications-gear engineers are taking advantage of its great versatility and high carrier suppression in modulators and demodulators for single sideband, suppressed carrier and phase shift key transceivers. It's also being used as a synchronous AM demodulator, a quadrature FM demodulator, and as a phase comparator for phase locked loop receivers.

Digital tape/disc memory designers are utilizing the μA796's unique properties in fast differentiators and phase correcting circuits for NRZ or phase encoding systems, while remote D.C. R-G-B gain controls, color shade and keystone corrections are practical for color TV broadcast equipment use. Other possibilities lie in signal chopping, frequency changing, linear mixing and more.

Here Are The Specs:

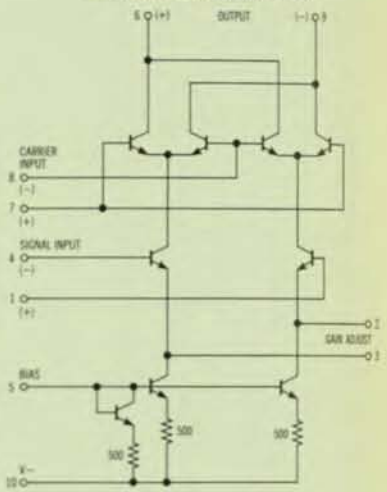
Carrier Suppression	65dB
Transadmittance Bandwidth	
Carrier Port	300MHz
Signal Port	80MHz
Signal Gain	3.5V/V
Input Impedance (signal port)	200KΩ
Input Offset Current	0.7μA
Differential Output Swing	8.0 volts p-p

Here Are The Prices:

U5F7796312
−55°C to +125°C $4.95 @ 100 pcs.

U5F7796393
0°C to +70°C $2.25 @ 100 pcs.

μA 796 DOUBLY BALANCED MODULATOR/DEMODULATOR



Good Old μA723:

Everybody's Favorite Voltage Regulator.

Fairchild's μA723 is the only voltage regulator on the market that can handle just about any power supply application. It works from both positive and negative sources in series, shunt, or as a switching regulator.

If 2 to 37 volt output range isn't enough, it can also be used in a floating mode.

On one chip, you get a temperature-compensated ±3% absolute accuracy zener diode reference, an error amplifier, a 150mA series pass element, short circuit protection and a zener level shifter.

The μA723 was the first monolithic linear circuit to employ a J-FET as a current source for voltage reference. An external series pass element can be added if larger output currents are needed. An internal feature – remote shut-down – may be used to conserve system power when a section of logic is not being used.

The μA723 also features .01% line regulation, .03% load regulation, .003%/°C temperature coefficient and ripple rejection of 74dB.

The most popular applications for the μA723 include laboratory power supplies, isolation regulators for low-level data amplifiers, airborne power supplies and local on-board card regulators.

The μA723 and Foldback Current Limiting

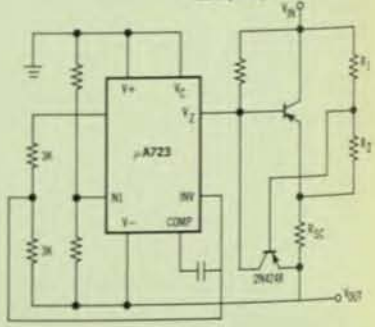
The μA723 includes adjustable current limiting. As an alternative to the standard current limiting techniques, foldback current limiting may be used to advantage in any power supply situation in which the output device power dissipation under short circuit conditions becomes intolerable due to device and/or heat sink limitations. This technique utilizes positive feedback to accomplish the foldback action of reducing both the output voltage and current during overload conditions.

FOLDBACK CURRENT LIMITING NEGATIVE REGULATOR

$$R_1 = \frac{V_{IN}\ MAX}{10^{-3}\ AMP}$$

$$R_2 = 510\Omega$$

$$R_{SC} = \frac{0.51 - \frac{(V_{IN} - V_{OUT})\,510}{R_1}}{I_{LIMIT\ (AMPS)}}$$



Digest

of Communications and Consumer Circuits

Here's a list of the most popular consumer industry LICs from the only major supplier in the world that spends all of its time making circuits and none of its time making television sets. (We don't make radios either.)

μA703 RF-IF Amplifier
Symmetrical Limiting
Internally Biased
Forward Transadmittance – 35mmhos
Best selling IF amp in the business
Reader Service Number 100

μA732 – FM Stereo Multiplex Decoder
Stereo Switching, Audio Muting, Stereo Lamp Driving Capability
45dB Channel Separation with Minimum Component Count
(Replaces MC1304)
Reader Service Number 101

μA739 – Dual Low Noise High Gain Operational Amplifier
Great for Stereo Phono Inputs
1μV RMS Noise Voltage (Audio Band)
High Gain
High Output
Very Low Distortion
Reader Service Number 102

μA742 – "TRIGAC" Zero-Crossing A.C. Trigger
Economical Solid State Power Control for Consumer and Industrial Applications
Minimum External Component Count
2 amp Peak Output
Reader Service Number 103

μA746 – Color TV Chroma Demodulator
The Industry's Best Seller!
Low Output Drift
10V P-P Output Swing
Doubly Balanced Demodulators
Internal NTSC Matrix
Reader Service Number 104

μA749D – Dual Operational Amplifier
Perfect Stereo Tape Recorder Input Amplifier
Very Economical
Compact TO-5 Package
Reader Service Number 105

μA754 – TV/FM Sound Channel System
Gain, Limiting, Detection and Audio Preamplifier
100μV Sensitivity
Can drive output device to 4 watts
High Performance
Low Price!
Reader Service Number 106

μA757 – Gain Controlled I.F. Amplifier
70dB Gain
70dB AGC Range
300mV Signal Handling Capability
Stable Characteristics Despite Supply and Temperature Changes
Reader Service Number 107

μA796 – Modulator – Demodulator
Double-Balanced Modulator Demodulator on a Chip
Use in AM, FM, SSB, Phase Lock Loop, Disc and Tape Systems
(Replaces the MC1596)
Reader Service Number 108

SAVE $1.10

SAVE $1.10

Bargain Corner

Keep your eyes peeled for this space. Almost every month it will carry glad tidings of new prices. For example:

IF/Limiting Amplifier
μA703E – was $2.10 now $1.00*
(U5Z7703394)
*Price based on 100 pieces.

SAVE $1.10

SAVE $1.10

Hot Off the Press

You can take it with you. We've just published an all-new Fairchild Linear Condensed Catalog. It's pocket sized so that you can lug it around with you. For a free copy, use reader service card number below:

Reader Service Number 109

WIN $100

WIN $100

We're About to Announce the *First* Winner

By now you ought to be down to the final strokes of preparing your entry in our recently announced Linear Applications Contest. Here are the rules, remember?

1. Get all the facts on a Fairchild Linear IC.
2. Design the world's greatest application for it.
3. Send to: Fairchild Linear Contest, P.O. Box 880 A, Mountain View, California 94040.

All entries will be judged by the editors of EEE Magazine. They will select the most imaginative application and give us the designer's name. We'll publish the winning design and give the winner $100 upon publication. Ready. Set. Design!

WIN $100

WIN $100

FAIRCHILD SEMICONDUCTOR

FAIRCHILD SEMICONDUCTOR A Division of Fairchild Camera and Instrument Corporation Mountain View, California 94040, (415) 962-5011 TWX: 910-379-6435

LINEAR

We deliver the goods

For the last six months, in this column, we've been running on about what we're going to do for you: We'll give you LIC this. LIC that. LIC to make the mind boggle.

Promises, promises?

Nay. Realities, realities!

Specifically, we've made three basic commitments in LIC:

1. Technological leadership. We took the crown in 1965 when we introduced the μA709 Op Amp, which essentially "opened" the LIC market. We intend to keep that LIC crown. By giving you more of the same.

2. Second sourcing. A stable high-volume second source for those linears we didn't invent but which have found a place in the market. That's us. We'll duplicate them. Sure. But more than that, where we can, we'll improve their performance without raising the price.

3. Price leadership. We'll give you LIC devices at prices so low you'll be able to use them in new applications, where it would have been prohibitive before. Pragmatic pricing, as it were.

Not blue sky. Terra firma.

We deliver on our promises. To see how, read on.

Fairchild price leadership means big big *big* savings for you!

Prices shown are for industrial/commercial products. Similar savings apply to military grade products (see your local distributor).

Save 31% on μA723
Precision Voltage Regulator consists of temperature-compensated reference amplifier, error amplifier. power pass transistor, current limiting circuitry.
TO-5 or DIP 0 to +70°C. Now $2.25/100 pc. You save $1.00.
Reader Service Number 211

Save 50% on μA725
Instrumentation Op Amp for precise low-level signal processing where low-noise, low-drift, accurate closed-loop gain is required.
TO-5. 0 to +70°C. Now $7.50/100 pc. You save $7.50.
Reader Service Number 212

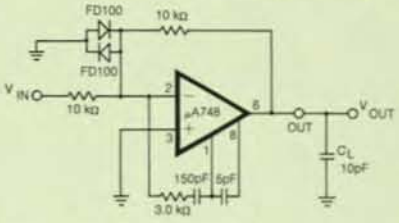
Save 33% on μA735
Micropower Op Amp. High gain with low standby power consumption. For applications where battery life, system heating, input current are important.
TO-5. 0 to +70°C. Now $9.95/100 pc. You save $5.05.
Reader Service Number 213

Save 35% on μA740
FET Input Amplifier. World's first totally monolithic J-FET input high-performance operational amplifier. Ideal for active filters, long time constant integrators, summing amplifiers, sample and holds, bridge amplifiers.
TO-5. 0 to +70°C. Now $15.00/100 pc. You save $7.50.
Reader Service Number 214

Save 31% on μA741
Internally Compensated Op Amp. Low cost, high gain. Has replaced μA709 as industry standard.
TO-5, DIP or Mini DIP. 0 to +70°C. Now $2.25/100 pc.
You save $1.00.
Reader Service Number 215

Save 62% on μA748
High Performance Op Amp designed for applications requiring individual tailoring of open loop frequency responses. Ideal for feedback applications where flexibility is required. Unity gain frequency compensation achieved by single 30 pF capacitor. Slewing rates of 6V/μS achieved by feed forward compensation.
Same pin configuration as μA741. Easy to use. Increases system performance. Lowers component count.
- High voltage gain: 200,000 V/V
- Short circuit protected
- Large common mode and differential voltage ranges
- No latch-up

TO-5, DIP or Mini DIP. 0 to +70°C. Now $1.25/100 pc.
You save $2.00. Available now.
Off the Fairchild distributor shelf.
Reader Service Number 216



Save 59% on μA749
General purpose dual monolithic op amp. Each amplifier useful at frequencies up to 20 MHz.
Output stage uses external load resistor, which makes circuit ideal for matching special output loads, allows tailoring of open loop gain.
- 20 MHz bandwidth
- No latch-up
- 140dB channel separation at 10KHz
- Voltage gain: 50,000 V/V
- 2V/μS slew rate at unity gain

DIP. 0 to +70°C. Now $1.90/100 pc.
You save $1.59. Available now off the Fairchild Distributor shelf.
Reader Service Number 217

Fairchild retains technol with integrated entertai

(at a practical price, too!)

Perhaps there are others who might have the talent to partition a complete system into functional blocks. Perhaps. But who else could have done it and *kept the cost practical?*

Aha, no one!

Another proof of leadership, right?

The result of *this* coup is a TV in which all the signal processing is performed with 4 to 7 LIC devices.

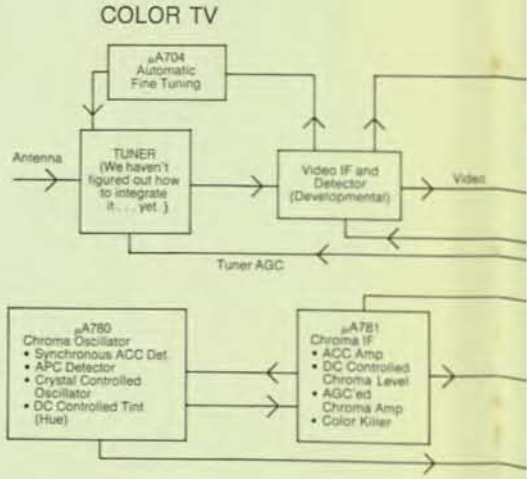
Beats the stuffing out of vacuum tubes in cost and performance.

Even includes such consumer convenience functions as automatic interstation muting and automatic color control.

Our new manufacturing facility is designed to produce torrents of these low-cost devices for consumer industries. As well as low-cost linears for the military and industrial equipment manufacturers. Our commitment: to be all things linear, to all people.

Incidentally, if you're interested in playing with the μA780 Chroma Oscillator and the μA781 Chroma IF, let us know, on your company letterhead, here at the factory.

We'll get you samples, data sheets, application information.



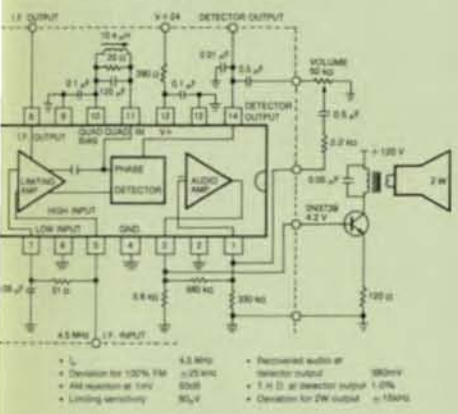
380-0011(60)
PREPARED BY CARSON/ROBERTS/INC.
EDN, August 15

logical crown nment devices

We make promises into realities like the μA754C TV/FM Sound System

It's just beautiful! What we did was put a four-stage differential limiting amplifier, a double-balanced quadrature demodulator, an audio driver stage, and a regulated power supply all on one chip. Wow!

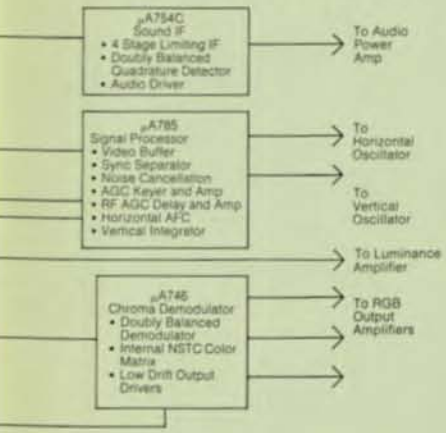
That's the smashing new μA754C: 80 μV sensitivity. 50dB AM rejection. 3V RMS output. All at low harmonic distortion plus a low impedance IF output compatible with ceramic filters.



Use 'em in TV, mobile receivers, line-operated and automobile FM and as synchronous AM detectors.

Available now in dual-in-line $1.40 at 1 K pieces and TO-100 $1.50 at 1 K pieces

Reader Service Number 218

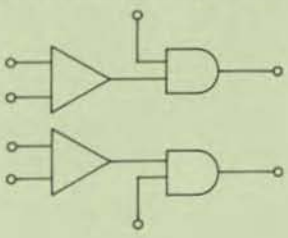


Fairchild becomes 1st rate 2nd source for linear IT (invented there) devices

As No. 1 in 2nd sources, we give you not only pin-for-pin duplicates, but even better performers, if we can find a way of making 'em better without adding to the cost.
Now here's one of our *MH* (Made Here) but *IT* (Invented There *HD* (Highly Distinguished) *LIC* devices: The –are you ready for this? –

MHITHDLIC μA761 Two Channel Core Memory Sense Amplifier!

We promised to build the industry standard core memory sense amplifier, SN7524/25. So we did. Then, because we are who we are, we improved it by some tighter threshold matching for greater signal-to-noise performance and less pattern sensitivity. Our μA761 can be used by commercial and military computer manufacturers in small and large memories. It has greater speed for faster system cycle times. AC characteristics for simulated core input signals are guaranteed. Each channel has independent T^2L compatible outputs and inputs, but they share common threshold and power supplies.
The μA761 is an exact pin-for-pin replacement for the SN7524/25, but if you need the same specifications as the SN7524/25, specify the μA7524 and μA7525 Two Channel Core Memory Sense Amplifier.



Electrical Performance

- Threshold uncertainty ±2mV
- Differential input bias current 30 μA
- Input to output delay 20nS
- Propagation delay 15nS
- Recovery 20nS

Guaranteed AC min ONE and max ZERO tests
The μA761 is available: In fully hermetic ceramic DIP. Now. Off the shelf from your friendly Fairchild distributor. At prices that are the lowest in the industry!

Reader Service Number 219

And two more MHITHDLIC products from Fairchild μA729/μA732 Stereo Multiplex Decoders

The industry's standard FM Stereo Multiplex Decoders, now available for immediate delivery from Fairchild. And made even more Highly Distinguished by Fairchild by improved sensitivity, higher channel separation, and lamp drive capability increased to 100mA. The μA732 is a pin-for-pin replacement for the MC1304 and the μA729 is a pin-for-pin replacement for the MC1305. Both are available now. Off the shelf.

Reader Service Number 220

FAIRCHILD SEMICONDUCTOR

FAIRCHILD SEMICONDUCTOR. A Division of Fairchild Camera and Instrument Corporation, Mountain View, California 94040. (415) 962-5011. TWX: 910-379-6435.

MADE IN FAIRCHILD 1971

In the last quarter of 1971, new products were introduced at the rate of about five every week. All "MADE IN FAIRCHILD."

Our "MADE IN FAIRCHILD" program is in high gear. We are introducing an array of new processes, new services and new high-technology products that are significant and available.

After the first of the year, we will resume our "MADE IN FAIRCHILD" program. We'll introduce, on a regular basis, other new and significant processes, services and products designed for swift delivery in production quantities.

You can find all the new "MADE IN FAIRCHILD" products—as well as established products, available on a new, accelerated delivery schedule—at your friendly Fairchild distributor.

MADE IN FAIRCHILD

FAIRCHILD SEMICONDUCTOR, A Division of Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415) 962-5011. TWX: 910-379-6435

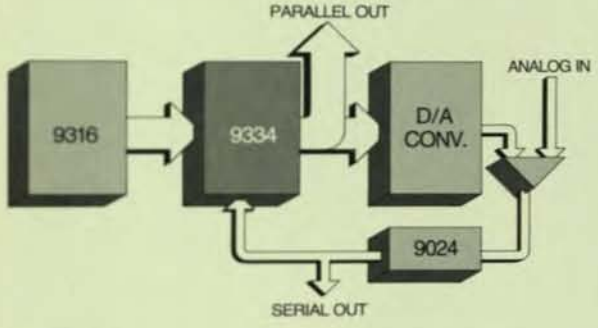
NEW TTL/MSI PROBLEM SOLVERS

From our TTL Family Tree, simple new solutions for A/D converters, minicomputers, high speed systems.

Four new high quality members have been added to the Fairchild family of 96 TTL/MSI circuits. Each can be used in a variety of designs—alone, or combined with other members of our TTL and/or MOS families—for simple solutions to complex systems problems: For example:

9334 8-Bit Addressable Latch for general purpose storage in high speed digital systems. Combined with other MSI devices, it can be easily expanded to form large storage arrays. By itself, the 9334 can serve as an 8-bit addressable latch memory, one-of-eight decoder or one-of-eight demultiplexer.

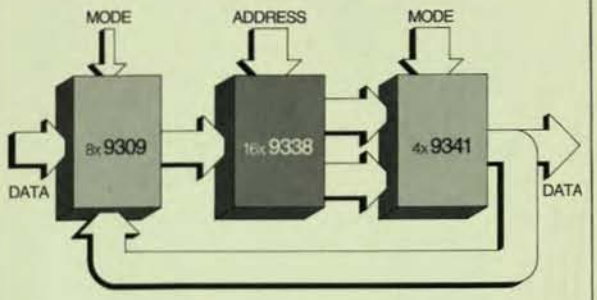
SUCCESSIVE APPROXIMATION A/D CONVERTER



In an A/D Converter, the 9334, combined with a 9316 Binary Counter and standard linear devices, provides a successive approximation analog-to-digital conversion. Send for our Appl. Note 294.

9338 8-Bit Multiple Port Register for high speed storage in an arithmetic logic unit is probably the most significant new function yet designed for minicomputer memories. Uniquely, it eliminates any addressing restrictions by permitting simultaneous read/write without race problems and by allowing data to be written into any one of the 8 storage locations and read out of any two of the locations *simultaneously*

16-BIT ALU WITH 8 ACCUMULATORS



Used as a one-bit slice of eight registers/accumulators, it combines with either the 9340 or 9341/74181 ALU device to become the powerful heart of a minicomputer central processing unit. It's equivalent to a 9301 decoder, a 9308 latch, two 9312 multiplexers and a dual flip-flop. Send for our Appl. Note 220.

93H00 and 93H72 High Speed 4-Bit Shift Registers improve system performance up to 300% over a wide range of design applications that are based on the 9300 industry standard shift register.

The 93H00 has the same pin configuration as 9300 but has improved minimum shift rate by a factor of 3 (to 45MHz). This high-speed 4-bit shift register is a multi-functional sequential logic block, useful in a wide variety of register and counter applications.

The 93H72 has a minimum shift frequency of 45MHz and typical 58MHz. It uses the same basic 4-bit shift register configuration as the 9300 but with additional logic flexibility. 9300 J and K inputs are replaced by single D type input and a clock enable input E, providing a HOLD ("do-nothing") state. This eliminates the need for external clock gating.

These MSI devices are indicative of the problem-solving power of the Fairchild TTL Family Tree, most comprehensive TTL line in the industry. They are available, along with product and application information, from your friendly Fairchild Distributor.

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FAIRCHILD SEMICONDUCTOR, A Division of Fairchild Camera and Instrument Corporation, Mountain View, California 94040. (415) 962-5011. TWX: 910-379-6435

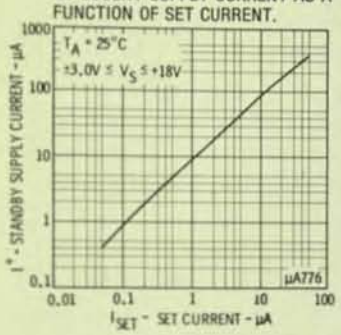
NOW: THE OP AMP YOU CAN PROGRAM

Our new µA776: Closest thing to a universal op amp yet devised.

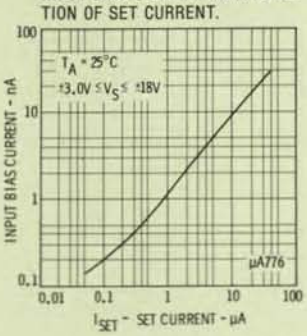
We call the µA776 our "do-everything" op amp. It probably is the next industry standard: one high quality device that, with the addition of a simple external resistor, can be tailored for optimum performance over an enormous span of applications. From the world's linear leader.

µA776 Typical Performance

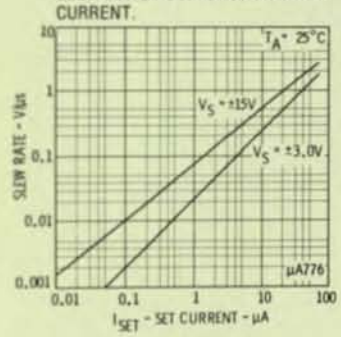
QUIESCENT SUPPLY CURRENT AS A FUNCTION OF SET CURRENT.



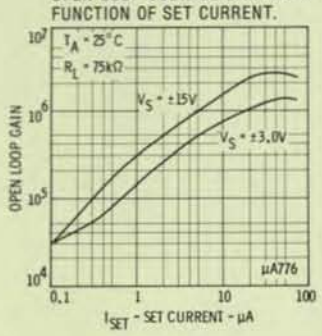
INPUT BIAS CURRENT AS A FUNCTION OF SET CURRENT.



SLEW RATE AS A FUNCTION OF SET CURRENT.



OPEN LOOP VOLTAGE GAIN AS A FUNCTION OF SET CURRENT.



The wide range of available characteristics makes it extremely versatile. And useful. It is adjustable for either standard or micropower application. It can be biased to have any of a number of fixed characteristics; or biased so that the characteristics of the amplifier can be varied in response to an input signal. And it can be turned on or off externally.

The µA776 offers superior operation at levels similar to standard general purpose op amps. In fact, when biased with a 15µA set current, it has approximately the same gain, slew rate and bandwidth as a µA741. But with an *order of magnitude improvement* in input bias current, input offset current, noise current and power dissipation.

Or you can operate it from a supply voltage of only ±1.2V. This means the device can be run off of two battery cells and with the proper set resistor the total power drain of the op amp will be lower than the battery leakage.

The broad versatility of the µA776 means it is ideal for micropower applications, battery powered systems, medical electronics, long-time integrators, high-accuracy sample and hold, frequency processors and active filters. For many uses, it becomes the only op amp you need specify on your standard parts list.

Available with complete data package, from your friendly Fairchild distributor.

New LIC Data Book

The µA776 is the newest of 17 general and specific purpose op amps. All fully described in our new LIC Data Book: 320 pages covering 84 quality LIC devices. Available now by writing to the address below.

MADE IN FAIRCHILD

FAIRCHILD SEMICONDUCTOR, A Division of Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415)*962-5011. TWX: 910-379-6435

TEN MILLION DIODES SHIPPABLE IN 24 HOURS.

Instant Diodes: 10,000,000 inexpensive, reliable, deliverable products always in our pipeline.

High volume production of silicon switching diodes pays off for you in lowest cost, highest quality. And immediately deliverable products. And because we use many of the same procedures and controls for our commercial diodes that we do for our Safeguard missile hi-rel program, you get additional reliability assurance.

Fairchild Diodes are immediately available in all popular packages: DO-7, DO-34, DO-35, DO-41.

Number one in production

We are the world's largest supplier of silicon switching diodes (we are working on our second billion).

We are the world's largest volume supplier of Schottky diodes.

We have the largest range of matched assemblies (pairs, quads, bridges, etc.) as well as a complete custom capability that provides fast turnaround for custom diodes, rectifier assemblies and custom packaging.

Number one in diode technology

- Nitride Passivation on entire product line.
- Ion Implantation on Monolithic Air-Isolated Diode Arrays.
- Hermetic Mono Air-Isolated Diode Array Chip.
- World's fastest switches (less than 0.7nS) – 1N4376
- World's lowest leakage diode (1pA) – FJT1100

In addition, Fairchild is deeply involved in

- Full Band RF Technology – VHF/UHF.
- P-I-N Diode Technology.

Number One in State-of-the-Art Devices

Memory & Logic (switches)	
Mono Core Driver array	FSA2510M
Ultra High Speed Switching Diodes	1N4376
Instrumentation	
P-I-N diode	RF300
Schottky diode	FH1100 (1N5390)
Pico Amp Leakage diode	FJT1100
Communication	
Band Switch	RF100
Attenuator	RF300
VHF Tuning Diode	RF400
Mixer	FH1100 (1N5390)
Industrial Control & Power Supplies	
400 mW Zener Diodes	

Number one in delivery

Our distributors and our factory warehouses are fully stocked. Smaller quantities are available right from your Fairchild distributor's shelves. For larger quantities, if your distributor calls us by 2 P.M., we'll ship the order the same day. So volume delivery is as close to instant as you're liable to find anywhere. Try us.

MADE IN FAIRCHILD

FAIRCHILD SEMICONDUCTOR, A Division of Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415) 962-5011. TWX: 910-379-6435

EASY ECL EVEN EASIER WITH 12 NEW DEVICES

9500 Easy ECL Family offers designers lower power, higher speed, lower cost systems.

The addition of 4 new MSI circuits – along with 8 new SSI devices – gives our *temperature compensated* ECL family the breadth, depth, variety and flexibility that makes designing with ECL/MSI functions easy as using TTL/MSI.

Since MSI is even more significant in ECL systems design than in TTL, our Easy ECL 9500 series is essentially an MSI family. That's why we now offer 7 key MSI functions – 22 circuits in all. Why all 9500 Series devices are fully temperature compensated for adequate noise immunity to allow problem-free SSI-to-MSI interfacing. Why MSI design in ECL systems is practical for the first time.

ECL/MSI ASSURES LOWEST SYSTEM POWER DISSIPATION

Comparison of unloaded and system power dissipation per gate of 9500 Easy ECL functions. With an MSI function, the termination power is amortized over many gates thereby assuring lowest system power dissipation.

Device	Description	Gates/ Function*	Power Dissipation (mW/Gate) 0 15 30 45 60 75 90 105 120
SSI – Gates			
9502	General Purpose Dual OR-NOR	2	
95H02	High Speed Dual OR-NOR	2	
95L22	Low Power, High Speed Dual OR-NOR	2	
9503	General Purpose Triple OR-NOR	3	
95H03	High Speed Triple OR-NOR	3	
95L23	Low Power, High Speed Triple OR-NOR	3	
9582	Triple Line Receiver/Amplifier	3	
9504	General Purpose Quad NOR	4	
95H04	High Speed Quad NOR	4	
95L24	Low Power, High Speed Quad NOR	4	
9505	Four Wide OR-AND	5	
9507	Quad AND-NAND	5	
9595	Dual ECL-TTL Converter	2	not applicable
SSI – Flip-Flops			
95H29	250MHz J-K	9	
9528	Dual 160MHz D-Type	12	
MSI Elements			
9538	1-of-8 Decoder	12	
9581	8-Input Multiplexer	12	
9578	Quad EX-OR/Comparator	16	
9579	Quad 2-Input Multiplexer	16	
9534	Quad Latch	24	
95H84	High Speed Adder/Subtractor	29	
95H90	250MHz VHF Prescaler	29	

*Number of on-chip ECL Gates not discrete TTL equivalents.

Typical Device Dissipation Additional Dissipation in system due to termination scheme.

MSI + SSI = EASIEST ECL.

Key to easiest ECL design is the lower power dissipation afforded by maximum use of MSI functions – with ancillary SSI low power gates and flip-flops. That way you get the speed and performance of ECL with economic and reliability advantages of MSI design. You get the most favorable speed/power trade-offs.

For example, basic ECL/SSI gates are approximately two times faster than TTL; but with the design advantages of ECL, the MSI functions are four to eight times faster at similar power dissipation.

NOW NEW IN EASY ECL.

Four new MSI Circuits:

95H84 adder-subtracter with full on-chip carry lookahead that permits addition or subtraction of two 64-bit words in 22nS. Fastest adder function on smallest board area available.

9534 quad latch with gated input and output enable features. Buffering of outputs insures glitch-free operation with approximately 4nS delay. Applications: register, ALU, parallel-serial conversion.

9578 quad exclusive-OR function also for use as 4-bit comparator or dual differential line driver. 3nS delay.

9579 quad 2-input multiplexer with 2.6nS delay. Common select line reduces external wiring for variety of function-generation and multiplexing applications.

Low-Power SSI

New 95L22, 23, 24 low-power gates are pin-identical with standard and high-speed gates. 20mW power dissipation (20% lower than any other available ECL gates), and 2nS propagation delay at no price premium. 60K ohm on-chip pulldown resistors.

For use in an area of high-power density (e.g., memory arrays), and as receiving element at end of long data bus lines.

High-Speed SSI

Three new high-speed gates and a new high-speed flip-flop:

95H02, 03, 04 gates, pin-identical with standard and low-power gates. 1.6nS delays at similar power as standards. For clock-driving with flip-flops, registers, large synchronous arrays, where maximum speed required. Also as high-speed logic function where multiple gate decisions must be made within short clock period (e.g., loading a universal shift register within a narrow clock pulse).

95H29 $\overline{J}$-$\overline{K}$ flip-flop with 250 MHz toggle frequency features non-ones catching master-slave circuit with multiple gating on inputs. For high-speed counting, register, data storage.

Low-Cost Standard SSI

9507 quad and 2-input AND, 8-input NAND gate. Eliminates a number of external connections in computing and general logic applications. 2.3nS delays without deterioration in rise-and-fall performance under heavy loading conditions.

AVAILABLE NOW

All 12 new members (and their 10 older relatives, of course) of our Easy ECL family are now available in production quantities from your friendly Fairchild distributor. Additional sources: N. V. Philips/Amperex and Raytheon.

MADE IN FAIRCHILD

FAIRCHILD SEMICONDUCTOR, A Division of Fairchild Camera and Instrument Corporation, Mountain View, California 94040. (415) 962-5011. TWX: 910-379-6435

AIR-ISOLATED MONOLITHIC DIODE ARRAYS

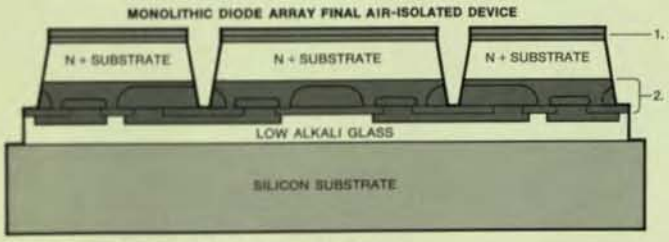
Only from Fairchild: High-performance Air-isolated Monolithic Diode Arrays at less than 5c/inserted junction.

Wherever there's a high current logic requirement there's an important place for our high quality monolithic diode arrays.

The FSA2510M 16-diode array, for example, replaces 16 discrete steering diodes in a core memory, does a better job (see benefits and specs below), at considerably less cost than either discretes or hybrids: less than a nickel per inserted junction in production quantities. Easy to use: one uniform monolithic structure means one insertion instead of 16. And deposited metal interconnects eliminate up to 30 wire bonds.

BENEFITS

- Less cost per inserted junction than discretes or hybrids.
- Higher performance from more uniform junction capacitance.
- Higher reliability from fewer wire bonds.
- Lower power requirements from reduced forward voltage drop.



1. BONDING AREA 2. ACTIVE AREA WITH METALIZATION

SPECIFICATIONS

- Low capacitance: 5 pF max.
- Low forward voltage: 1.3V max at I_F=500 mA
- Matched forward voltage: ±15mV
- Low leakage I_R max: 100 nA @ 40V
- Fast recovery time: t_{RR} max=50nS @ I_F 500 mA

AVAILABILITY

Small quantities are available immediately from distributor stock. Or send us your application requirements—attention Ray Gouldsberry, Mail Stop 4-280—we'll send you free samples along with some application information and detailed specs.

Production quantities (orders up to 100K) will be filled within 6 to 8 weeks.

FAIRCHILD AIR-ISOLATED MONOLITHIC DIODE ARRAYS

This is a partial list. There are 23 standard devices from which to choose.

TYPE	PACKAGE
16 Diode Array	
FSA2510M	14 Lead Plastic Dip
FSA2501M	14 Lead Ceramic Dip
FSA2500M	10 Lead Ceramic FP
FSA2502M	10 Lead Metal
Dual 8 Diode Array	
FSA2509M	14 Lead Plastic Dip
FSA2503M	14 Lead Ceramic Dip
FSA2504M	14 Lead Ceramic FP
Quad 4 Diode Array	
FSA2508M	16 Lead Plastic Dip

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NEW APPROACH TO MOS STANDARDS.

In old-fangled MOS, the goal is high-density real estate. Jam as many bits on a chip as possible, and let the chips fall where they may. That is, let the systems designer worry about how to put the devices to practical use in his circuit design.

In new-fangled MOS from Fairchild, our standard devices are designed to optimize your system by reducing problems, complexities—and costs. We call it OPTI-MOS.

By including, on the same chip, some of the required ancillary circuitry the other guys have not, we can give you optimum MOS: easier to use, costs less function-for-function, smaller and simpler. All our MOS Standards are optimized.

OPTI-MOS minimizes costs. Our MOS minimizes these critical systems cost factors: ▪ Labor and material costs associated with each IC printed circuit board, (often many times the cost of the IC itself). ▪ Package and assembly costs, which still dominate MOS/LSI manufacturing costs (lead count reduction is as important to MOS/LSI device costs as package count is to IC systems cost).

For example: 3258 OPTI-MOS Horizontal Scan Character Generator. This kind of generator usually requires an external row counter/decoder. This penalizes you and us: you need several ICs and we have to add 3 to 7 leads on the chip to accept the counter/decoder signals. Also, most character generators require a two-phase clock.

The 3258 OPTI-MOS changes all that. First, it's a static character generator. That saves 2 leads because it requires no clocks. Second, we've put the row counter/decoder right on the chip. Which saves an additional 2 to 6 leads (1 strobe input is still necessary). End result? Optimization: a 16-lead device that replaces a 24/28-lead device plus several ICs. Our costs are reduced. And so are yours.

3329 OPTI-MOS Silicon Gate Shift Register minimizes your clock power requirements: 1/6 the clock power per bit is all that's needed. That's because of our inherently lower clock capacitance and lower voltage swing requirement. You can use simpler—and fewer—clock drivers. And it simplifies solutions to the ringing problems found in any high-speed shift register operation.

3513 OPTI-MOS ROM is truly TTL-compatible. You no longer need input pullup resistors to "directly" drive the MOS device. Which means you can get rated TTL fanout without additional TTL devices. Because we've put a special Schmitt trigger buffer right on the chip, it acts essentially like an open circuit to the TTL driver. Fanout remains as rated, circuits are simplified, TTL-compatibility is real.

How to OPTI-MOS your system (and save yourself a lot of aggravation): Call or write. We have a data package on our OPTI-MOS. And a variety of MOS Standards available. Like these:

OPTI-MOS SILICON GATE PRODUCT LINE

All products in this family operate from +5, Ground, and −12 volt supplies. Using the inherent speed and density improvements of Silicon Gate, all devices have been designed for 2MHz operation, elevating MOS system speeds into the realm of DTL.

Character Generators (All are Static Devices):	
3255	16 Characters, 5 x 7 font, vertical scan, single space, 16-pin DIP.
3256	16 Characters, 5 x 7 font, vertical scan, double space, 16-pin DIP.
3257	64 Characters, 5 x 7 font, vertical scan, 24-pin DIP.
3258	64 Characters, 5 x 7 font, horizontal scan, 16-pin DIP.
ROM's (All are Static Devices):	
3512	2048 Bits (256 x 8), TTL I/O.
3513	2560 Bits (256 x 10), TTL I/O.
3514	4096 Bits (512 x 8), TTL I/O.
Shift Registers:	
3325	Quad 64-Bit, multiplexed I/O.
3329	512 Bit dynamic 2 MHz register; only 0.09 pf per bit clock capacitance, TTL I/O.
3330	480 Bit . . . (same as 3329)
3331	500 Bit . . . (same as 3329)
3383	256 Bit register with on-chip recirculate gating, 2MHz, TTL I/O.
RAM's	
3532	512 Bit fully decoded static RAM.

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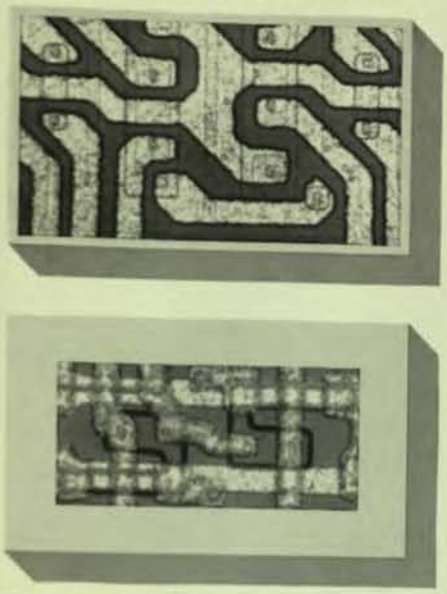
"ISOPLANAR IS HERE, AND IT WORKS"

For openers, a 256-bit TTL RAM that's dense as MOS but fast as bipolar. Debugged and deliverable now.



Comparison of one bit of memory in conventional bi-polar design (top) and new isoplanar technique (bottom).

There Were Times We Had Doubts.

In March, when we announced the isoplanar process, we also announced that we weren't really sure it was commercially feasible.

We had had a lot of experience in production LSI bipolar memory components and systems (last year we shipped more than 8 million bits to Illiac IV alone). So we went ahead—antsy but optimistic.

We selected a fully-decoded 256-bit RAM to prove we could produce a device of that complexity quickly, efficiently, and profitably, using the isoplanar process.

We could. And did.

Presenting—debugged and deliverable—our new isoplanar 93410 256-bit RAM. Fast, small, dense.

As Les Hogan, our President, said: "Isoplanar is here, and it works." Beyond our expectations.

And, looking ahead, isoplanar is where it is going to happen.

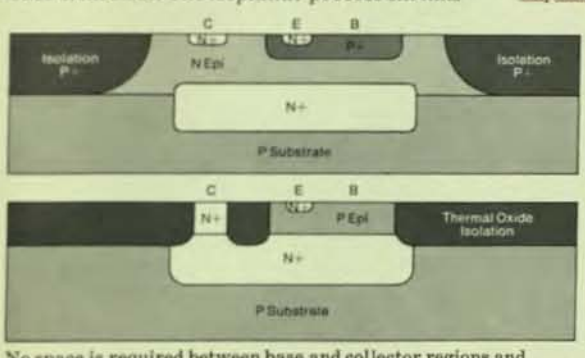
Isoplanar Technology. Briefly.

The old-fashioned planar process required a large region for p+ isolation and isolation-to-base clearance. The isoplanar process shrinks this region and fills it with thick insulating silicon oxide that needs no separation from base and collector regions.

Selective etching of silicon nitride, without harming the oxide, provides simpler masking rules and a self-aligning base. Transistor geometries are smaller and parasitic capacitance is reduced. The structures are less sensitive to defects in manufacturing (reduction of the active isolation area, for example, eliminates failures due to oxide pinholes). The surface of the chip is flat, so the traditional metal-over-oxide step problems are eliminated; metallization is simpler and more reliable.

We got smaller, denser, more reliable products with higher yield. At a low cost to our customers. Plus a reasonable profit for us.

What we hoped for, we got.



No space is required between base and collector regions and isolation in isoplanar bi-polar (bottom) compared to conventional planar bi-polar (top).

Isoplanar Is Good for You.

What do you get?

- More electronics for your dollar.
- MOS density.
- Speed of bipolar.
- Higher reliability from an essentially coplanar structure.
- Devices that are compatible with voltage and logic levels of standard ECL and TTL families.
- Wider choice of speed/power trade-offs—isoplanar design uses energy more efficiently.
- Smaller chip real estate, which reduces costs no matter how you look at it.
- Low-cost advantages from our higher yields.
- Devices that are available now.

The First Isoplanar Production IC in the World.

The 93410 high-speed TTL RAM is designed for scratchpad memory, buffer, and distributed main memory application.

- Operates from 0 to 75°C.
- Three chip select lines.
- Uncommitted collector outputs.
- Chip select access time: 20 Nsec.
- Read access time: 50 Nsec.
- Power dissipation: 2 mW/bit.

The 93410 is built on a 96 x 126 mil chip. It uses conventional, high-volume, reproducible metal widths and clearances. (For comparison, our own 256-bit 93400 bipolar memory for Illiac IV occupies a 110 x 140 mil chip, has only partial decoding, and typical access time of 50 Nsec.) It is available now in sample quantities (100-up) at $21.50 each in 16-pin ceramic DIP.

The 93410 is a superior product, per se. More important, it proves the economic feasibility of the isoplanar process. Today, for production of low cost TTL or ECL read/write memories. Soon, hopefully, for a host of other semiconductor devices.

Tomorrow's Memories.

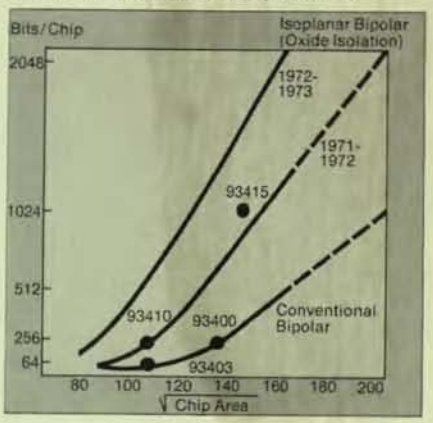
With the 256-bit isoplanar RAM a current reality, let's look at what isoplanar holds for tomorrow's memories.

We have in the works a temperature-compensated 9500 Series ECL-compatible 256-bit RAM.

We are in the development cycle of a 1024-bit fully-decoded TTL bipolar memory chip (93415) that's only slightly larger than our 256-bit isoplanar chip. The great potential in the isoplanar process will begin to be realized in this device. The 93415 is designed for high-speed buffer and main frame applications.

- Address access time: less than 100 Nsec.
- Chip select access time: less than 50 Nsec.
- Uncommitted collector outputs.
- Power dissipation: 0.5 mW/bit.
- 16-pin hermetic ceramic DIP package.

Both the ECL 256-bit RAM and the 1024-bit RAM will be available early in 1972.



The graph gives you some idea of where we've been and where we're going with bipolar memories and isoplanar. It indicates the feasibility of 2048 and 4096-bit read/write memories for 1973. By then we fully expect isoplanar to dominate memories in high-performance and small systems. Memory designers please note that our estimates of packing density and time scale are at least as conservative as our original announcement of the process.

Beyond Memory.

But isoplanar doesn't stop with memories.

The process, we feel, will profoundly effect the architecture of future generations of computers. Ultimately isoplanar technology will be used to fabricate together, on the same chip, combinations of logic and memory of much greater complexity than have been considered to date. Examples are content-addressable memories and multi-port registers. What we have learned thus far indicates that, in the long run, isoplanar will prove valuable in *all* complex bipolar circuits. The process will also bring about significant improvements in high-frequency low-noise transistors, diodes, linear devices, in low-cost realization of monolithic complementary MOS devices, in radiation-resistant circuits —in the universe of semiconductor devices.

For More Information.

We've put together a package of information about the isoplanar process, products and prognosis. It's available for the asking.

Fairchild makes advanced products to uniform standards throughout the world.

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NEW ECL 1024-BIT RAM ISOPLANAR DID IT AGAIN

The 95415: 1024x1 bit. ECL. 45ns access time at 0.5mW per bit.

For designers of very high speed ECL systems, here's a 1024-bit RAM that can operate at speeds compatible with those of their system's logic. The 95415 features 15ns chip select time, full ECL compatibility, emitter follower outputs for ease of memory expansion, and *decreasing* power dissipation with rising temperature.

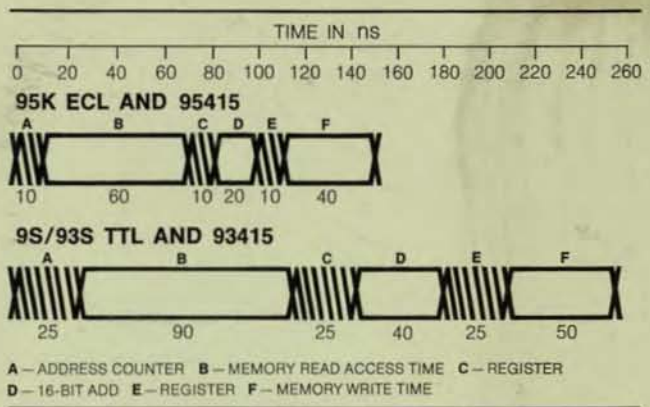
Because the 95415 is static, it's simple to use and requires no peripheral electronics. And because of its functional density, designers can save significant costs by reducing package count, circuit board number and size, number of connections and by increasing system reliability.

This fastest of all 1K RAMs is available now in limited quantity – in 16-pin hermetic DIP – from your friendly Fairchild distributor. The cost: $109 (1-24) or $100 (25-99).

New Applications

The isoplanar process introduces very high speed operation at near MOS densities, opening up exciting new applications such as:

- Fast writeable control store for microprogramming, adding flexibility and eliminating the need for fixed ROMs.
- Large high-speed scratchpad to make multiprocessing more feasible.
- Simulation of long high-speed shift registers.
- Improvements of buffer or cache memory performance by increasing capacity without any power or size trade-off.
- Building cost-effective high-speed mainframe memories.



COMPARISON OF ECL AND SCHOTTKY TTL READ-MODIFY-WRITE SYSTEM PERFORMANCE

Note that the ECL system is 105ns faster than the Schottky TTL design. In practice, ECL is even faster because of superior high frequency interconnection characteristics. And use of more complex multiphase clocking can give still better performance.

In the above ECL system, 95K Series MSI functions are used with the 95415 ECL memory. For even faster speed (at increased package count and power) use our 95410, the fastest 256 RAM available.

Isoplanar Memory Line-up

DEVICE	TYPE	ORGANIZATION	TYPICAL ACCESS TIME (ns)	TYP. CHIP SELECT TIME (ns)	POWER (mW/bit)	INPUT LOADING
93410	TTL	256 X 1	45	25	1.8	0.50 U.L.
93410A	TTL	256 X 1	25	20	1.8	0.50 U.L.
93415	TTL	1024 X 1	60	30	0.5	0.25 U.L.
95410	ECL	256 X 1	25	7	1.8	50KΩ Typ.
95415	ECL	1024 X 1	45	15	0.5	60KΩ Typ.

Whatever your memory needs, you could well find the answer among these devices. Call your Fairchild distributor or the factory for prices and availabilities.

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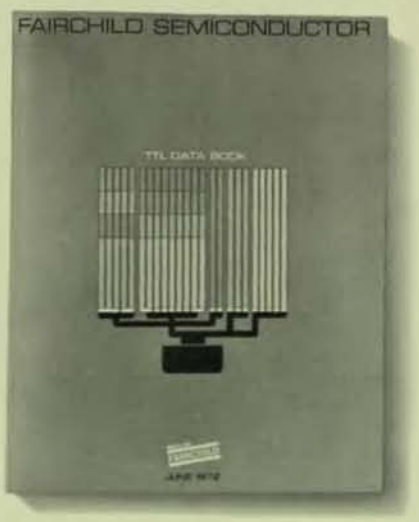
NEW 650-PAGE TTL BIBLE

The most usable TTL Data Book for the most usable TTL Family. 250 circuit functions in plastic or ceramic packages.

Our new TTL data book is like our TTL Family: most comprehensive, practical, easiest to use by far.

The TTL bible is structured to provide the designer with precise data on our TTL family in the most accessible form. He can find what he's looking for quickly and easily, whether he starts with a device number in any well-known series (9300, 5400/7400, etc.) or simply the device functional nomenclature. The indices and selection guides will direct him instantly to those devices suitable for his application, and complete specifications from which he can determine his best choice. A comprehensive industry cross-reference provides an overview of all major sources of TTL devices and their Fairchild equivalents.

The Fairchild TTL Family is a mix of more than 1,000 proprietary and second source device and package combinations selected to give the designer the broadest choice of performance/cost trade-offs to optimize his system design. Over 100 new devices have been added to the family in the last year alone. There are logic, memory and interface functions in plastic, ceramic or flatpak, commercial or military temperature grade. Together, they provide a comprehensive line of standard off-the-shelf building blocks that can be interfaced directly with each other in the same system for maximum speed/power efficiency.



We offer more than 100 MSI devices, both proprietary and second source, that are widely accepted as the keys to optimum TTL system design.

For example: Our proprietary devices include the most complete range of TTL memories available anywhere—from 8-bit scratchpad registers to our new 93415 1024 x 1 bit RAM (made by Isoplanar) that has 60ns access time at 0.5mW/bit.

Our 9344 parallel multiplier eliminates a lot of hardware and software.

For simple solutions for A/D converters, minicomputers and high-speed systems, our 9334 8-bit addressable latch for general purpose storage, our 9338 8-bit multiple port register for high-speed storage in ALUs, and our 93H00 and 93H72 high-speed 4-bit shift registers. Our list of design-time and cost-saving proprietary devices is long and impressive.

250 proprietary and second source circuit functions:

- 54/74 & 9000 Standard SSI
- 74H00 High Speed SSI
- 74S00 Schottky SSI
- 9300 and 54/74 Standard MSI
- 9600 Monostable & Interface devices
- 93400 Memory devices

Book and family are designed for practical use. To get a copy of the former, about the latter, please write us on your company letterhead, giving us your name and title.

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5 LINEAR MONOLITHIC SUBSYSTEMS

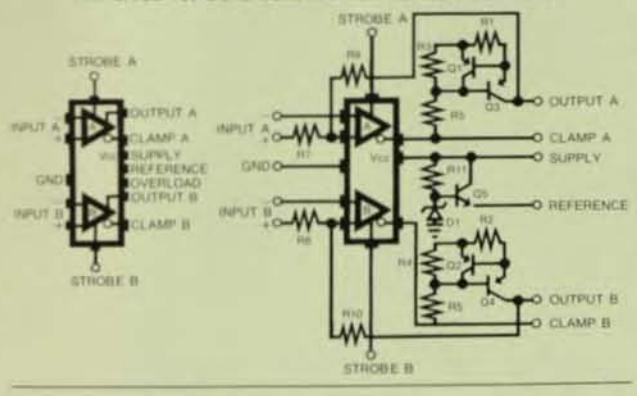
Subsystems: highly complex functions on a single chip. That's where it's happening in linear today. Where Fairchild is. In op amps, voltage regulators and interface.

Look at the facts. In the last 6 months alone 5 new Fairchild monolithic linear subsystems were introduced and are now in volume production.

New 791 High power op amp
Our latest monolithic op amp subsystem has 1 amp output at ±12 volts and automatic circuit protection. Everything is on one chip, so installation's easier. Fewer external connections, testing's easier, less external electronics. Naturally, system costs go down, system reliability goes up. Internally protected against short circuits, power and thermal overloads. 100-piece price: $12.50.

750 Dual comparator

FAIRCHILD 750 DUAL COMPARATOR VS. NEXT BEST WAY.



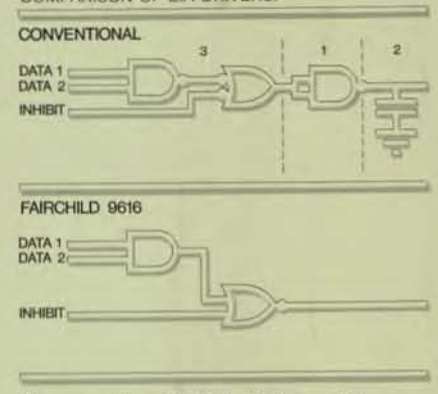
The world's first monolithic comparator subsystem. Eliminates up to 17 discrete components other comparators require for equivalent function and drive capability. A totally-self-contained subsystem consisting of two high-output current, independent comparators on a single chip. Eliminates the external components, board space, and virtually all the engineering calculations necessary to make other comparators function reliably and safely in complex control applications. 100-piece price: $5.95.

776 Programmable op amp
This subsystem is the closest thing to a universal op amp yet devised. Already an industry standard, it's a high quality device that, with the addition of a simple external resistor, can be tailored for optimum performance over an enormous span of applications. The wide range of programmable characteristics make it one of the most versatile and useful op amps to appear in years. Applications range from a nanowatt amplifier to a high-accuracy sample and hold amplifier. 100-piece price: $3.00.

7800 3-terminal voltage regulator
Seven members (5V, 6V, 8V, 12V, 15V, 18V, 24V) compose this family – the first with complete voltage regulation on one chip. The first high quality, sophisticated, versatile, yet simple way of solving VR design problems. At a price so low they can be inventoried in quantity, for use as required. Complete and self-contained in one TO-220 or TO-3 package. And fully self-protected: internal current limiting, thermal shut-down, safe area compensation protect device from current, power, temperature fluctuations. Typical 100-piece price: $1.75.

9616 EIA line driver (& 9617 receiver)
Our 9616 triple line driver subsystem has both internal inhibit and slew rate control. And it's all on one chip. Our 9617 EIA triple line receiver completes the set. They meet all EIA RS-232-C specs. And more. Together, they provide the simplest low-cost solution to problems at the interface in data terminal equipment and data communications. 100-piece price is $4.50 for the 9616; and $3.50 for the 9617.

COMPARISON OF EIA DRIVERS.



Conventional EIA Driver (1) requires external slew rate control capacitor (2) and external gating for inhibit function (3). 9616 EIA Driver requires neither.

93 Linear products in all
Can any other linear-maker make that claim? No way. Whatever your linear needs, the answers are MADE IN FAIRCHILD.

- Industrial controls: 1-Amp op amp; high current comparator, AC control.
- Op amps: general purpose; low input current; high speed; low drift.
- Voltage regulators: general purpose; high current; high and low voltage.
- Interface: drivers/receivers; comparators; D/A conversion; memory.
- Consumer: TV systems; entertainment systems; communications.
- Custom: automotive; consumer; military.

Check us or your friendly Fairchild distributor for products and literature.

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1103 RAMS IN 4 SPEEDS WITHOUT CRITICAL TIMING

Our 3534 1024x1 OPTIMOS RAM is now available in 4 speeds: 150ns, 180ns, 220ns and 300ns access time. At lowest prices in the industry.

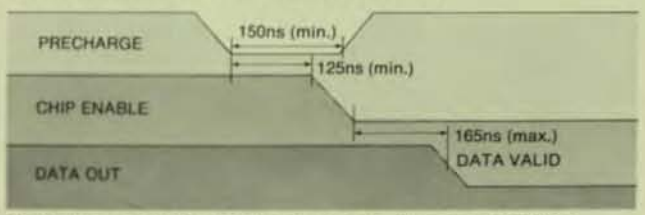
Our new dynamic silicon gate RAM is a vastly simplified, *pin for pin replacement* for the 1103. Not only have timing margin problems been eliminated and stand-by power dissipation been reduced 97%, but now there are four standard versions: each with its own standard specs, each with its own speed, each at lowest industry prices. All available off-the-shelf in production quantities.

We've optimized the design of 3534 in five important areas. Important to those who would use it as a plug-in replacement for the 1103 in an existing system. Equally important to those who would design our device into new systems. Important to both because these innovations solve the major problems of the existing 1103.

No Precharge and Chip Enable overlap requirement. Result: Better and less critical timing margin on control of Chip Enable-Precharge overlap. Less drift problem. Less adjusting. Less maintenance. No critical window to stew about. Greater design margins (other 1103's have no margin, worst case).

Data Out referenced to the leading edge of the Chip Enable. Unlike other 1103's, which have as many as five critical times affecting access, ours has only two; the 3534 array access time is dependent on the timing of only one critical edge relative to Precharge and only one delay relative to Chip Enable. No timing margin problems to create system malfunctions,

Fairchild 3534/1103 (300ns version)



No Precharge and Chip Enable overlap requirements. The 3534 requires only that the Precharge pulse stays low for a minimum of 150ns and that at least 125ns delay occur from the start of Precharge to the start of Chip Enable. The Data Out is valid 165ns after the Chip Enable goes low but is independent of Precharge.

There are no other restrictions on the Precharge pulse. It can go high immediately or it can stay low throughout the entire cycle. Or it can remain low for successive cycles.

board rework, acceptance tests, downtime, and other virulent forms of field aggravation.

Maximum standby power dissipation reduced 97%. From 70mW for the other 1103's to 2mW for our 3534. Result: significantly lower power supply costs.

Equal Read and Write cycle time. The system can now operate at a higher data rate. You don't need to Read before Writing. By a simple pre-selection the 3534 can go either way. The system can operate at a higher data rate without additional timing and control circuitry.

Read/Write specified as a voltage level rather than a pulse. Since the Read/Write input may remain low indefinitely (assuming continuous Write cycles), Read/Write timing is no longer critical. And system Read and Write cycle times are sharply reduced.

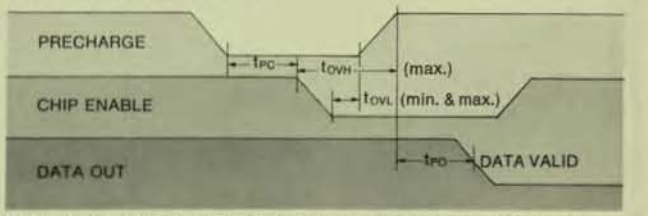
The 3534 is another example of Fairchild OPTIMOS: *practical* MOS devices that optimize your system. Easy to use. Simple to produce. At less cost / function.

The 3534/1103 is available now—in ceramic DIP—from your friendly Fairchild distributor.

PART #	GUARANTEED MAX. ACCESS TIME	PRICES 100-999	1000-4999
35342 DC (1103)	300ns	$8.00	$5.00
35343 DC (1103S146)	220ns	$9.60	$6.00
35344 DC (1103-1)	180ns	$12.80	$8.00
35345 DC (1103-1)	150ns	$18.40	$11.50

24-page applications guide free. Detailed, comprehensive applications guide (and composite data sheet on each of the 4 versions of 3534) are available on request.

Other Standard 1103's



With other 1103's, the Precharge pulse not only must stay low for a precise Precharge interval but its transition from low to high must occur within a time interval which has a *minimum* as well as a *maximum* limit. As a result, the designer must stay within very tight boundaries of these maximum and minimum values. All control circuitry must be extraordinarily precise, and system costs rise sharply.

MADE IN FAIRCHILD

FAIRCHILD SEMICONDUCTOR, A Division of Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415) 962-5011. TWX: 910-379-6435

7 COMPLETE 3-TERMINAL IC VOLTAGE REGULATORS

New 7800 family now available in high volume.

We got swamped.

To meet the overwhelming demand for the 7800—the new industry standard voltage regulator workhorse—we've now increased production capacity considerably. You can get immediate delivery in volume quantities from the factory or your Fairchild distributor.

First with complete voltage regulation on a single chip.

Now you can virtually forget about your VR design problems and get on with the rest of your system. Our new 7800 series is the first high quality, sophisticated, versatile, yet simple way of regulating voltage in the 5V to 24V range. At a price low enough to inventory in quantity, so you can use them as you need them. Here's why:

Simple to use: Complete and self-contained—one chip in one package. Connect 3 terminals, bolt in place and add the normal line decoupling capacitor. Requires no other external components. You get optimum performance with no calculations.

Superior performance: Output voltage tolerance better than ±5%; line regulation of 0.01%/volt; output impedance of 0.03Ω. Output current rated at 1 Amp (usable to 1.5 Amps depending on input voltage and heat sinking considerations).

Self-protecting: Internal current limiting, thermal shut-down and safe area compensation protect device and circuit from current, power, temperature fluctuations. Resets automatically.

Versatile & compact: Use locally, at the power source, on a remote chassis, on PC cards, wherever is most convenient and efficient. Compact, you can miniaturize your design. Result: simpler, smaller, cheaper, easier-to-use power supply and circuitry.

Low cost: 1-24 @ $2.20. 25-99 @ $2.00. 100-999 @ $1.75*
(About ½ the cost of the elements required in a commonly accepted voltage regulator—and virtually no design cost.)

Available: In production quantities from distributor or factory stock. TO-220 or TO-3 package. 7 versions (last 2 digits indicate voltage): 7805, 7806, 7808, 7812, 7815, 7818, 7824.

Write for Data Sheets and application information.

*Prices in TO-220 package. TO-3 package prices slightly higher.

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FAIRCHILD SEMICONDUCTOR, A Division of Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415) 962-5011. TWX: 910-379-6435

THE 1024-BIT TTL RAM IS HERE

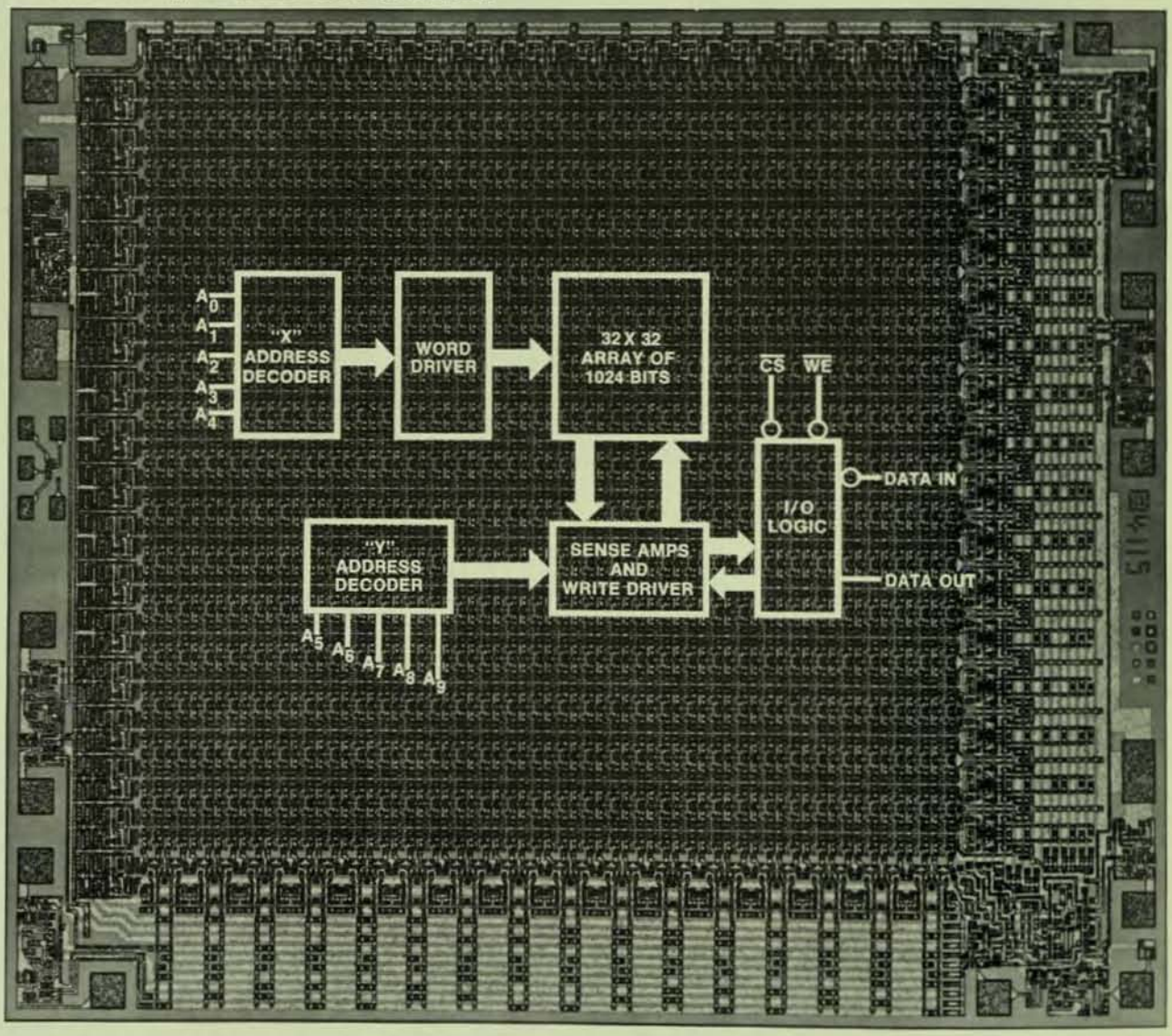
Our new 93415 RAM: 1024x1 bit. TTL. 60ns access time at 0.5 mW/bit. And Isoplanar did it.

The 93415 RAM is the most complex monolithic bipolar read/write memory ever made.

This self-contained subsystem also features 30ns chip select access time, open collector (expandable) output, static TTL operation and decreasing power dissipation with rising temperature. Available now in prototype quantities in 16-pin hermetic DIP.

What this means to designers of high-speed digital systems is that for the first time they have available a major TTL memory building block that can operate at speeds compatible with those of their systems' logic. Because it's static, the 93415 is simple to use, requires no complicated peripheral electronics. And because of its functional density and capability, the 93415 gives the designer a fine opportunity to realize significant cost savings by 1) reducing package count, 2) reducing circuit board number and size, 3) reducing number of connections, 4) increasing system reliability.

Functional diagram of the 93415 TTL RAM



Significant Memory Applications
Some of the more exciting applications of 93415 are: as a fast writeable control store for microprogramming, eliminating many present needs for fixed ROMs; as a large high-speed scratchpad to make multiprocessing more feasible; for simulation of long high-speed shift registers; for improvement of buffer or cache memory performance by increasing capacity without any power or size trade-off; and obviously for building cost-effective high-speed main-frame memories.

Isoplanar did it. Again
Our 93415 is the most recent, and most important, product of our isoplanar technology. Isoplanar proved itself last year with the successful introduction, and volume production, of our 93410 256-bit TTL RAM and our 95410, world's first 256-bit ECL RAM.

The introduction of the 93415, another industry first, is just one more demonstration of what isoplanar can do. Soon, isoplanar will do it again, with even more complex TTL and ECL memories.

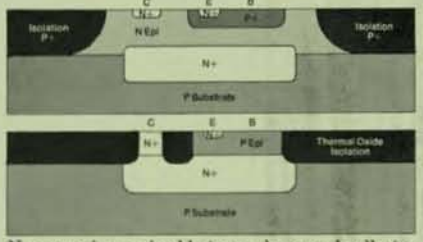
Fairchild Bipolar Memories

BIPOLAR READ/WRITE MEMORY APPLICATIONS SUMMARY

ORGANIZATION	REGISTERS SYSTEM SPEED 5-30ns	SCRATCHPAD SYSTEM SPEED 15-60ns	CONTROL SYSTEM SPEED 20-70ns	BUFFER SYSTEM SPEED 50-80ns	MAIN SYSTEM SPEED > 75ns
8 x 1	(TTL) 9338,93S39* (ECL) 9539*				
16 x 1		(TTL) 93407,93433 (ECL) 95401			
16 x 4			(TTL) 93403 (ECL) 95400		
256 x 1				(TTL) 93410‡ (ECL) 95410‡	
1024 x 1					(TTL) 93415‡ (ECL) 95415‡*

*IN DEVELOPMENT ‡ISOPLANAR DEVICES.

What is Isoplanar? It's a bipolar fabrication process that replaces conventional planar P+ isolation diffusion with an insulating oxide. Result: High density. High yield. Low cost. Improved speed/power performance (from lower parasitic capacitance). Improved reliability (from planar surface). Isoplanar is the designer's assurance of proven reproducibility and deliverability.



No space is required between base and collector regions and isolation in isoplanar bi-polar (bottom) compared to conventional planar bi-polar (top).

Availability
Some 93415 RAMS are already out in the field in evaluation quantities. Prototype quantities are available now from your friendly Fairchild distributor at the following prices:

1-24	25-99	100-999
$87.50	$80.50	$70.00

Volume shipments available during 4th quarter.

MADE IN FAIRCHILD

FAIRCHILD SEMICONDUCTOR, A Division of Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415) 962-5011. TWX: 910-379-6435

FIFO: FIRST ASYNCHRONOUS SUBSYSTEM FOR DATA RATE TRANSLATION.

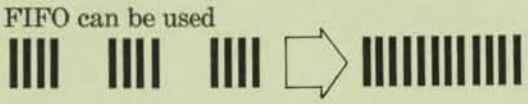
FIFO: Our 3341 OPTIMOS 4x64-Bit Buffer Memory. Most cost effective way to interface two systems with different data rates.

Instead of designing your own special subsystem, use our new FIFO. For example:

1. Irregular data can be collected from a telemetry system and stored in FIFO for use when it's convenient.

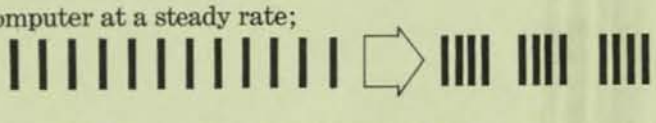
2. Data for printout can be loaded into FIFO, freeing the CPU, and allowing the printer to proceed at its own slower pace.

3. Inserted between an A/D and a D/A Converter, FIFO can be used to stretch or contract the time base or change the frequency of acoustic or sensing signals.



4. Information input at keyboard rate can be stored and transferred at high speed on demand from a CPU.

5. From peripheral equipment, you can input to a computer at a steady rate; FIFO stores information and re-formats it in even bursts for efficient off-line use.



FIFO is an asynchronous buffer subsystem designed specifically to solve the kind of handshaking problems that occur between a computer and its peripheral equipment. Input and output operate completely independent of each other – without common clocking – translating two dissimilar data rates simultaneously, and giving the system designer more freedom.

Now the faster part of your system doesn't have to wait for the slower part to catch up. Instead, FIFO translates the data rates, and the CPU can move on to more important things.

FIFO, as its name implies, operates in a first-in first-out mode. Four bits of input data are clocked into the FIFO device and 'bubble' automatically to the last unoccupied location. Special on-chip input pullup circuits and bipolar compatible output buffers provide direct compatibility with TTL and DTL, without any external components. Control signals make vertical and horizontal expansion easy. 1MHz input/output rate guaranteed.

FIFO is available now from your friendly Fairchild distributor in 16-lead ceramic DIP.

FIFO: Another example of OPTIMOS practical problem solving.

MADE IN FAIRCHILD

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FASTEST 256-BIT RAM. ISOPLANAR DID IT.

Our new Isoplanar-made 95410 is the first 256-bit ECL RAM: Twice the capacity at little more than half the cost of any other ECL memory.

Here it is: A fully decoded 256 x 1 bit Easy ECL read/write RAM. A high-speed, low-power, low-cost answer to your memory problems. No more compromising your ECL system for lack of speed/cost compatible memory functions.

95410: 256-bit high speed ECL RAM

Here's what you get:

- 25 ns typical read access time.
- 7 ns typical chip select access time.
- 2mW/bit power dissipation.
- Wire-OR able outputs.
- 16-pin hermetic dual in-line package.
- Corner power pins.
- Logic levels fully compatible with 9500, 95100 and other ECL families.

Most important, the 95410 now gives you a 256-bit RAM for any scratchpad, control or buffer memory application in any ECL system – without any interfacing circuitry. And at higher speed than functionally equivalent TTL devices. You save time and money no matter how you figure it: per-bit, per-component, or per-system. As a result you can build ECL systems that are more than twice as fast as TTL. This is of critical importance in new-generation peripheral controllers, mini-computers and large EDP systems.

Isoplanar did it

As we noted last Fall when we announced our 256-bit 93410, fastest TTL RAM, and first isoplanar production IC made, our isoplanar process is here to stay. Fairchild isoplanar technology greatly reduces the cost and improves the reproducibility of high speed bipolar memories. It also improves speed/power performance by reducing parasitic capacitance.

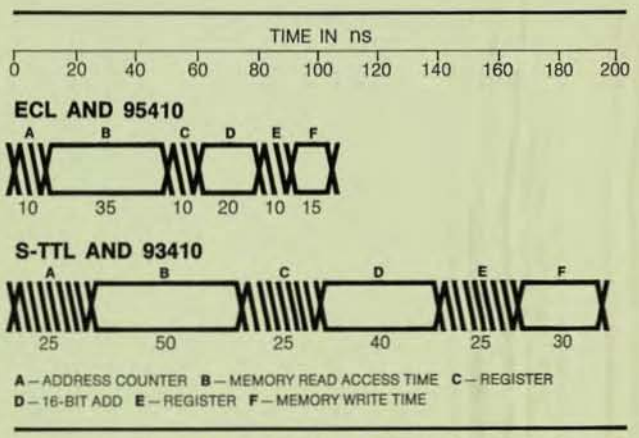
With isoplanar you get: More function for your dollar than with conventional bipolar devices. Near MOS density with bipolar speed. Wide choice of speed/power trade-offs in both ECL and TTL families.

9500-Compatible

The new 95410 is fully compatible with all the other members of the Fairchild series 9500 and 95100 ECL compensated devices, certainly the most comprehensive and easy-to-use ECL family on the market today.

95410 is available now in production quantities from your friendly Fairchild distributor at these prices.

1-24	25-99	100-999
$46.80	$43.10	$37.50



COMPARISON OF ECL AND TTL READ-MODIFY-WRITE SYSTEM PERFORMANCE

These timing diagrams compare the worst case component delays through the critical timing paths of comparable ECL and TTL read-modify-write memory cycles.

Note that the ECL system is twice the speed of the TTL design. In practice ECL will show further improvement due to superior high frequency interconnection characteristics. Generally a more complex multiphase clock scheme will be used to provide further 50% improvement in performance.

As shown in the ECL system above, 9500 MSI functions are used in association with the 95410 ECL memory. In the TTL system, Schottky TTL/MSI is used together with our 93410 Isoplanar RAM. At 50 ns (max.) the 93410 is the fastest 256-bit TTL/RAM in production today.

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FAIRCHILD SEMICONDUCTOR, A Division of Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415) 962-5011. TWX: 910-379-6435

WORLD'S FIRST MONOLITHIC COMPARATOR SUBSYSTEM

Our new μA750 is news: A complete dual comparator subsystem that eliminates up to 17 discrete components other comparators require for equivalent function and drive capability.

Our μA750 is important news for system designers. Because it's a totally self-contained subsystem consisting of two high-current independent comparators on a single chip. Because it eliminates the external components, the board space and virtually all the engineering calculations necessary to make other comparators function safely and reliably in complex control applications. And because it saves money.

The μA750 uniquely provides all these features:

- 125mA per side minimum current handling capability, higher than any other comparator.
- Internal protection against short circuit and thermal overload, so it can directly drive a wide range of relays and other heavy loads.
- Subsystem voltage reference.
- Positive switching is assured by built-in hysteresis. (If hysteresis expansion is required for an especially noisy environment, an in-phase comparator output is available.)
- Independent input inhibit reduces package count.
- Operates from single power supply.

Wide Applications

The μA750 comparator subsystem (instead of a comparator-plus-plenty-of-external-components) can save significant cost and time for the system designer in environmental controls, status indicators with priority override, go-no-go testers, phase meters, minimum frequency detectors. These applications are detailed in a comprehensive Application Note.

The Fairchild Family of Comparators

The Fairchild Comparator family is the largest available. In addition to the μA750, it also includes:

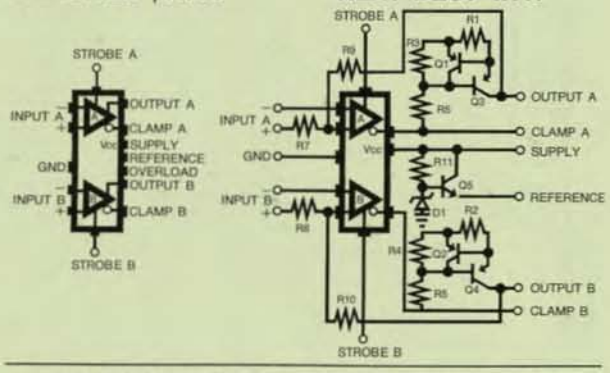
Super High Speed μA760 Differential Comparator with 16ns typical response time. Complementary TTL-compatible and matched t_{pd} outputs. Fanout of 2 TTL gate loads. Designed for use in phase encoding, tape readout systems, this is the most cost-effective, super-fast comparator on the market.

Precision μA734 Voltage Comparator offers maximum resolution through high gain, low input offset current and voltages. Ideal for high-accuracy low-level sensing and measurement in A/D converters and precision level detectors.

Economical μA710 and μA711 High Speed Differential Comparators. Single and Dual industry standards. Ideal for lowering system costs.

Your friendly Fairchild distributor has product on his shelf.

FAIRCHILD μA750 **NEXT BEST WAY**



μA750 MONOLITHIC COMPARATOR SUBSYSTEM VS. COMPARATOR-PLUS-COMPONENTS

The best case competitive dual comparator we could find, even with the addition of 17 external components (to provide short circuit protection, hysteresis, high drive current and reference voltage), is still not the equivalent to the μA750 in functional capability or reliability. And, to provide the other comparator with the μA750's current overload indication output and thermal shutdown safety features, it would cost so much more in external components, board space, and design effort, it would be economically unsound.

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AT LAST: AN 1103 RAM WITHOUT CRITICAL TIMING

Our 3534 1024 x 1 Dynamic Silicon Gate MOS RAM: Plug-in replacement for the 1103. But without its timing margin problems and with 97% lower stand-by power dissipation.

Our new 3534 1024-bit RAM is a vastly simplified *pin-for-pin replacement* for the 1103. We've optimized the design in five important areas. Important to those who would use our 3534 as a plug-in replacement for the 1103 in an existing system. Equally important to those who would design our device into new systems. Important to both because these innovations solve the major problems of the existing 1103.

No Precharge and Chip Enable overlap requirement. Result: Better and less critical timing margin on control of Chip Enable-Precharge overlap. Less drift problem. Less adjusting. Less maintenance. No critical window to stew about. Greater design margins (other 1103's have no margin, worst case).

Data Out referenced to the leading edge of the Chip Enable. Unlike other 1103's, which have as many as 5 critical times affecting access time, ours has only 2; the 3534 array access time is dependent on the timing of only one critical edge relative to Precharge and only one delay relative to Chip Enable. No timing margin problems to create system malfunctions, board rework, acceptance tests, downtime, and other virulent forms of field aggravation.

Maximum standby power dissipation reduced 97%. From 70mW for the other 1103's to 2mW for our 3534. Result: significantly lower power supply costs.

Equal Read and Write cycle time (480ns). The system can now operate at a higher data rate. You don't need to Read before Writing. By a simple pre-selection the 3534 can go either way. The system can operate at a higher data rate without additional timing and control circuitry.

Read/Write specified as a voltage level rather than a pulse. Since the Read/Write input may remain low indefinitely (assuming continuous Write cycles), Read/Write timing is no longer critical. And system Read and Write cycle times are sharply reduced.

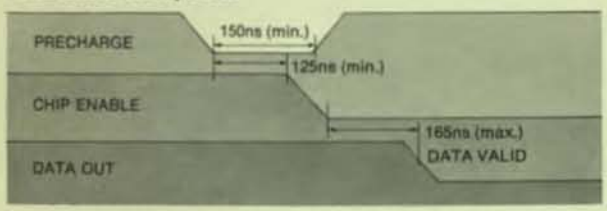
The 3534 is another example of Fairchild OPTI-MOS: *practical* MOS devices that optimize your system. Easy to use. Simple to produce. At less cost / function.

The 3534/1103 is available now – in ceramic DIP – from your friendly Fairchild distributor.

1-24	25-99	100-999
$21.70	$18.40	$14.00

A data sheet and detailed application note are available on demand. Demand.

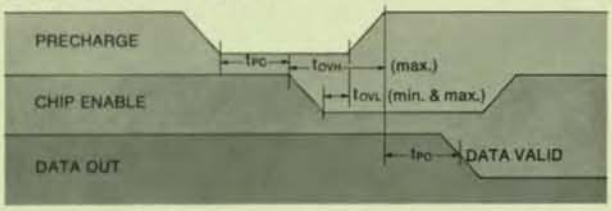
Fairchild 3534/1103



No Precharge and Chip Enable overlap requirements. The 3534 requires only that the Precharge pulse stays low for a minimum of 150ns and that at least 125ns delay occur from the start of Precharge to the start of Chip Enable. The Data Out is valid 165ns after the Chip Enable goes low but is independent of Precharge.

There are no other restrictions on the Precharge pulse. It can go high immediately or it can stay low throughout the entire cycle. Or it can remain low for successive cycles.

Other Standard 1103's



With other 1103's, the Precharge pulse not only must stay low for a precise Precharge interval but its transition from low to high must occur within a time interval which has a *minimum* as well as a *maximum* limit. As a result, the designer must stay within very tight boundaries of these maximum and minimum values. All control circuitry must be extraordinarily precise, and system costs rise sharply.

MADE IN FAIRCHILD

FAIRCHILD SEMICONDUCTOR, A Division of Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415) 962-5011. TWX: 910-379-6435

BREAKTHROUGH: NEW VOLTAGE COMPENSATED ECL 95100

New ECL series has internal temperature and voltage compensation to maximize noise margins, minimize power supply problems.

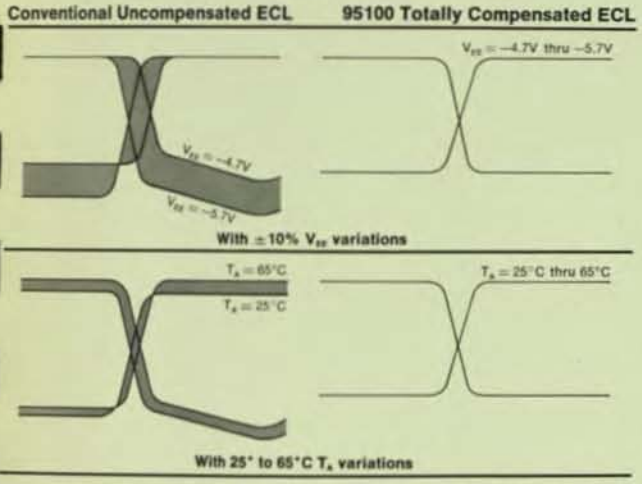
We've simplified power supply cost and distribution design problems of large mainframe systems by making logic levels virtually independent of power supply variations.

Our new 95100 series adds on-chip power supply voltage compensation to the industry's lowest power, high speed ECL gates. This feature obviates the need for tightly regulated supplies; useful noise margin is guaranteed with differential supply voltages from −4.7V to −8.0V. Combined with the original temperature compensation feature of the 9500 series, the new 95100 series offers the mainframe system designer the easiest ECL of all to use.

Net result: far lower cost techniques can be applied for cooling, power supply design and board design in a system using the relaxed design rules of the totally compensated 95100 ECL devices.

Noise Margin Comparison

V_{IN} and V_{OUT} transfer characteristics



These diagrams indicate the effect on ECL logic levels of variations in power supply and temperature.

The V_{IN} and V_{OUT} transfer characteristics show how Fairchild's 95100 Series voltage and temperature compensation maintains stable logic levels despite variations in power supply voltage and/or ambient temperature. The constant — and higher — noise margins gained with 95100 permit significant cost savings in the design of power supplies, distribution networks and cooling techniques.

95100 ECL Features

- Broad line of low power SSI and MSI functions
  —Unloaded Gates less than 25mW/gate.
- Voltage supply compensation
  —Noise margin guaranteed over greater than 3.0V power supply differential.
- Temperature Compensation
  —Constant noise margin between devices at greater than 50°C differential.
- High Input Impedance
  —To allow external 50Ω series terminations.
- Corner power supply pins
  For compatibility with standard multilayer boards and CAD placement programs.

95100 ECL Devices and Availability

Device	Description	Available
95102	Dual OR/NOR Gate	Now
95103	Triple OR/NOR Gate	"
95104	Quad OR/NOR Gate	"
95101	Dual 2 Wide OR-AND/NAND Gate	2nd Qtr. '72
95105	4 Wide OR-AND/NAND Gate	"
95106	Dual 3 i/p, 3 o/p OR Gate	"
95108	Quad 1 i/p OR/NOR Gate	"
95109	Dual 3 i/p, 3 o/p NOR Gate	"
95110	Synchronous Decade Counter	"
95116	Synchronous Hexadecimal Counter	"
95128	Dual D Flip Flop	"
95141	4 Bit ALU/Function Generator	"
95134	Quad Latch	2nd Half '72
95138	One-of-8 Decoder	"
95178	Quad Exclusive OR	"
95179	Quad 2 i/p Multiplexer	"
95180	Triple 2 i/p Multiplexer	"
95196	Quad ECL-TTL Level Converter	"
95197	Quad TTL-ECL Level Converter	"

The 95100 series functions are based on the 9500 series, which will also incorporate voltage compensation in future products. Both families will be made from the same basic chip, the only difference being the input impedance and pin configuration options. 95100 functions may be mixed with 9500 elements.

Both 9500 and 95100 EASY ECL devices are available in production quantities immediately from your friendly Fairchild distributor. For data sheets and application information, please call this special 95100 Hot Line number: (415) 962-3333.

MADE IN FAIRCHILD

FAIRCHILD SEMICONDUCTOR, A Division of Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415) 962-5011. TWX: 910-379-6435

SCHOTTKY TTL DEVICES DELIVERABLE IMMEDIATELY

Our TTL Family Tree has a vigorous new Schottky branch: SSI devices now. Proprietary MSI (and more SSI) devices soon.

Our TTL Family Tree continues to grow. Now a new Schottky branch: SSI in volume now. MSI coming up. To give you new ways to solve your very-high-speed digital systems design problems.

Schottky TTL Devices are pin-for-pin replacements for slower, functionally equivalent elements in existing TTL systems. An example of the speed improvement achieved is shown in the table below. These Schottky functions can be used to selectively replace devices in critical speed limiting paths within the system.

TTL SWITCHING TIME COMPARISON
EXAMPLE: HEX INVERTER

	T_{PLH} (turn-off delay)		T_{PHL} (turn-on delay)	
	Typ.	Max.	Typ.	Max.
9N04/7404	12.0	22.0	8.0	15.0
9H04/74H04	6.5	10.0	9.0	13.0
9S04/74S04	3.0	4.5	3.0	5.0
9S04A/74S04A	2.5	4.0	2.5	3.5

Note: All speeds listed in nanoseconds.

Important areas where speed limiting occurs are: decoder and multiplexer expansion; memory addressing and selection; general arithmetic and control functions; prescalers and counters; and elimination of skew problems in clock distribution. System speed improvements of 20 to 50% can be expected in these situations without any major redesign. Power requirements, logic levels and noise margins remain compatible with the slower, lower cost standard TTL devices which can be retained when speed is not important.

For your Schottky needs we now have 13 TTL/SSI functions, making us the only major supplier to second source these devices. And we can deliver them immediately. Our 9S and 93S series are completely interchangeable with the 54/74S series.

Just as important, these are but the first of the new Fairchild Schottky TTL family. Soon other SSI elements. Soon also, our first 93S series of proprietary MSI functions.

FAIRCHILD TTL/SSI DEVICES AND AVAILABILITY

Device	Description	Available
9S00/54S00, 74S00	Quad 2-Input NAND Gate	Now
9S03/54S03, 74S03	Quad 2-Input NAND (O.C.) Gate	Now
9S04/54S04, 74S04	Hex Inverter	Now
9S05/54S05, 74S05	Hex Inverter (O.C.)	Now
9S20/54S20, 74S20	Dual 4-Input NAND Gate	Now
9S22/54S22, 74S22	Dual 4-Input NAND (O.C.) Gate	Now
9S40/54S40, 74S40	Dual 4-Input NAND Buffer	Now
9S74/54S74, 74S74	Dual D Flip-Flop	Now
9S04A	Fast Hex Inverter	Now
9S05A	Fast Hex Inverter (O.C.)	Now
9S64/54S64, 74S64	AND-OR-Invert	Now
9S65/54S65, 74S65	AND-OR-Invert (O.C.)	Now
9S140/54S140, 74S140	Dual 4-Input NAND Line Driver	Now
9S109	Dual J-K Flip-Flop	2nd Qtr.
9S112/54S112, 74S112	Dual J-K Flip-Flop	2nd Qtr.
9S113/54S113, 74S113	Dual J-K Flip-Flop	2nd Qtr.
9S114/54S114, 74S114	Dual J-K Flip-Flop	2nd Qtr.

FAIRCHILD TTL/MSI FUNCTIONS AND AVAILABILITY

Device	Description	Available
93S41	4 Bit ALU/Function Generator	2nd Qtr.
93S05	Variable Modulo Counter	2nd Qtr.
93S39	Multiple Port Register	3rd Qtr.
93S10	Synchronous Decade Counter	3rd Qtr.
93S16	Synchronous Hexadecimal Counter	3rd Qtr.
93S12	Eight Input Multiplexer	3rd Qtr.
93S42	Carry Look Ahead Unit	3rd Qtr.
93S00	4 Bit Universal Shift Register	3rd Qtr.

Other MSI functions in development include high speed decoders and parity checkers.

Whatever your High Speed needs we have the answer. Schottky TTL for retrofitting existing systems, or our temperature compensated Easy ECL 9500 family for new high-speed systems.

Your Friendly Fairchild distributor has both our Schottky TTL and Easy ECL devices in stock, deliverable immediately. Or for more information, we have data sheets and application notes on both.

MADE IN FAIRCHILD

FAIRCHILD SEMICONDUCTOR, A Division of Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415) 962-5011. TWX: 910-379-6435

EIA DRIVER HAS INTERNAL INHIBIT AND SLEW RATE CONTROL

Our new 9616 EIA triple line driver provides simple, low-cost solutions to EIA applications. Our new 9617 EIA triple line receiver completes the set.

Our new 9616 Driver and 9617 Receiver meet all EIA-232-C/CCITT V.24 specs. And more. Together they provide the simplest low-cost solution to problems at the interface in data terminal equipment and data communications.

Unlike conventional EIA drivers, which are implemented by a positive NAND function, our 9616 is implemented by an And/Or/Invert function. With this logic configuration, you can perform the inhibit function without any external gating.

In addition, the 9616 incorporates internal slew rate control. No need for an external capacitor for each driver. Result: significant savings on board space, components, assembly.

In meeting RS-232-C recommendations our 9616/9617 feature:

9616 EIA Line Driver

- All inputs TTL compatible
- Each driver is output protected
- Symmetrical driver output voltage levels and current limits
- Supplies are +12V and −12V @ ±10% regulation

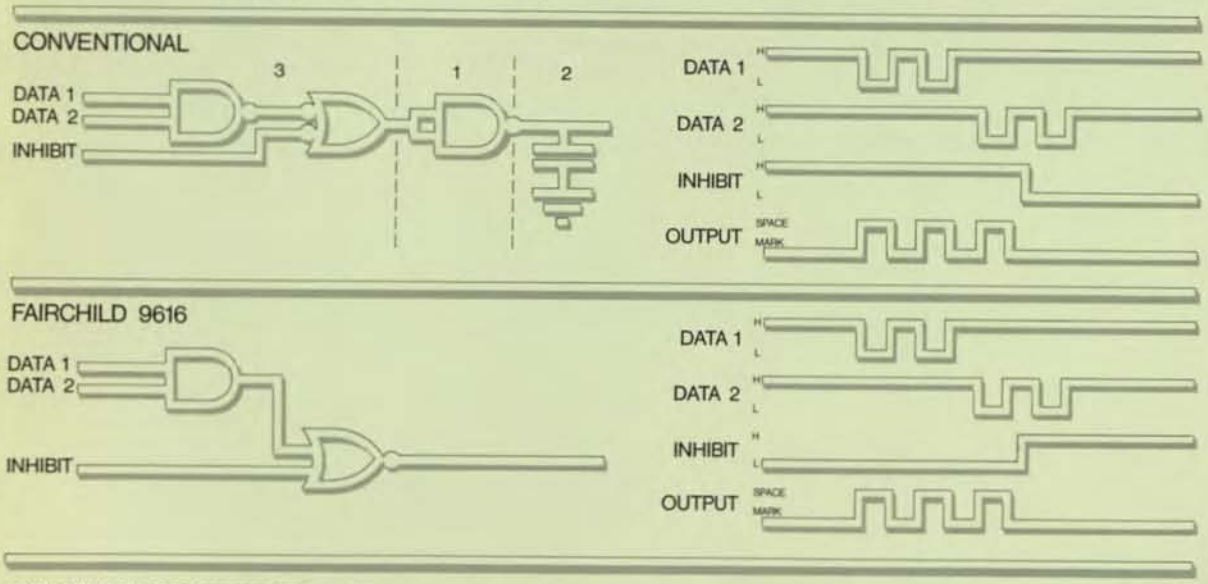
9617 EIA Line Receiver

- 3 to 7K Ω input resistance
- Inputs protected to ±25V
- Each Receiver operates in fail-safe mode
- Controllable slicing or hysteresis operation
- Individual response pins to increase AC noise immunity
- Outputs TTL/DTL compatible
- +5V supply operation, ±5% regulation

Both the 9616 Driver and the 9617 Receiver are available from distributor stock. Design-in quantities available now; production quantities in late March. The 9616 @ $4.50 and the 9617 @ $3.50 in quantities of 100-999.

Other Fairchild Drivers & Receivers

9614	Dual Differential Line Driver
9615	Dual Differential Line Receiver
9620	Dual Differential Line Receiver
9621	Dual Line Driver
9622	Dual Differential Line Receiver
SN75107-108	Dual Line Receivers
SN75109-110	Dual Line Drivers



COMPARISON OF CONVENTIONAL AND 9616 EIA DRIVERS
Conventional EIA Driver (1) requires external slew rate control capacitor (2) and external gating for inhibit function (3). Fairchild 9616 EIA Driver requires neither.

MADE IN FAIRCHILD

FAIRCHILD SEMICONDUCTOR, A Division of Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415) 962-5011. TWX: 910-379-6435

9344: A FASTER LOW-COST WAY TO MULTIPLY

From our TTL Family Tree: A new MSI Parallel Multiplier that offers high-speed multiplication without using a lot of hardware and software.

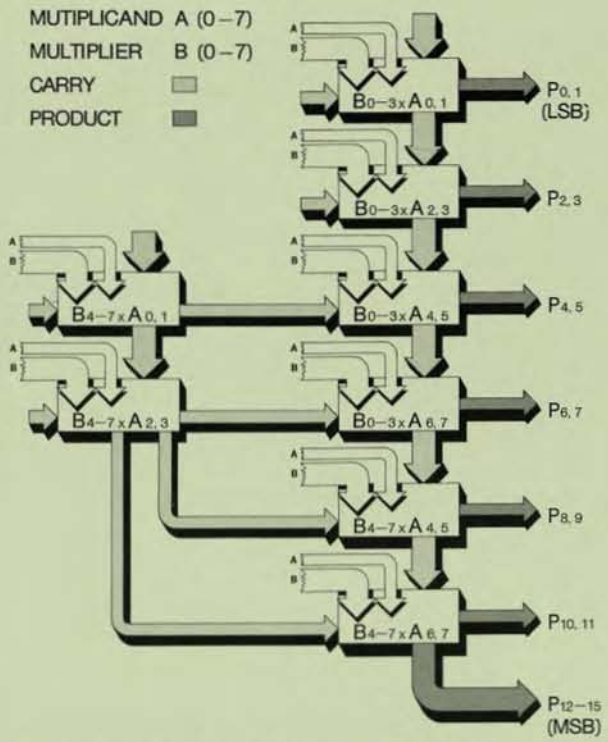
Now there's a better way to perform fast multiplication: our 9344 2 x 4 special purpose multiplier.

This TTL/MSI device speeds up multiplication by using iterative logic cells in parallel, each cell generating eight partial products and summing up carries from the adjacent cells. This contrasts with the time and space-consuming add-and-shift sequencing of conventional designs. Thus, you can include the specific multiplication function in your system with minimum hardware and programming. And compared to conventional, multi-package methods, you can do it faster, at lower cost/function, with less space required and lower overall system cost.

The 9344 is designed for hardware multiplication in both general and special-purpose computers. Its main applications are in digital filter circuits, Fast Fourier Transform processors, arithmetic function generators, minicomputers, wherever there are problems created by extensive multiplications that so greedily consume valuable time in real-time computers.

Since we announced the 9344 more than a year ago, we've been improving its performance and reducing its cost. Now it's in volume production, deliverable immediately from your friendly Fairchild distributor at these exceptionally modest prices:

9344	1-24	25-99	100-999
Flatpak Mil	$47.50	$42.00	$38.00
Flatpack Ind.	26.50	23.10	21.00
DIP Mil	41.25	36.25	32.00
DIP Ind.	21.80	19.25	17.50



8 x 8 MULTIPLIER USING EIGHT 9344 DEVICES

The 9344 is a 2 x 4 bit combinatorial multiplier. It uses internal carry lookahead and has sufficient carry inputs to combine all equal weight outputs. This permits the design of iterative multiplication arrays without using any other components. The diagram shows the use of the 9344 to perform an 8 x 8 multiplication in 150 ns. This same basic modular approach can be used for arrays ranging from 4 x 4 to 64 x 64 bits and larger.

For data sheets, applications information and samples, please call this special 9344 Hot Line number: (415) 962-3333.

MADE IN FAIRCHILD

FAIRCHILD SEMICONDUCTOR, A Division of Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415) 962-5011. TWX: 910-379-6435

WORLD'S FIRST PRODUCTION CCD AREA IMAGE SENSOR

New 100 x 100 CCD solid state area image sensor for low resolution applications.

Our new CCD201: Small. Low voltage. Metrically accurate. Long Life. Wide dynamic range. 10,000 elements on a single chip. Price: $965.00.

THE CCD201 solid state 2-phase self-scanning device is the first CCD area imager in production. The device uses charge-coupled and buried N-channel implanted barrier technology to create an electronic image. It's the second Fairchild CCD device to go into production (our 500-element linear image sensor was introduced earlier this year).

CCD advantages over vacuum tube imaging devices

- smaller size
- longer life
- lower power (50mw typically)
- lower operating voltages (20V max)
- solid state ruggedness and reliability
- on-chip video preamp and compensating circuit
- inherent spatial accuracy to 1 part in 10,000
- low impedance output
- excellent dynamic range
- highly sensitive to both visible and near-infra-red radiation

CCD201 format size is compatible with low cost lenses, which represents considerably lower system cost. This makes the device attractive in existing low-resolution CCTV applications for example, where there can be a dramatic reduction in camera size and voltage requirements (20V instead of 2KV). Plus the elimination of sensor replacement because of tube aging.

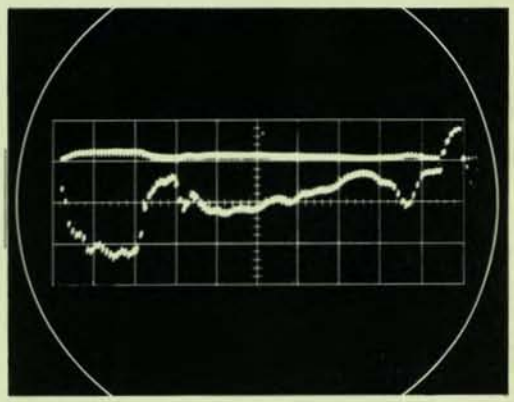
AREA UNDER VIEW

The availability of both our linear and our area image sensors takes CCD out of the R&D lab and into a proven Fairchild production technology. (Example: the CCD101 linear image sensor has already been reduced from $1200 to $800).

For more information ask for data sheets and technical papers on the physics and applications of charge coupled devices.

TV MONITOR

CCD CAMERA



A-SCOPE

COMPUTER

CCD outputs can go to a TV Monitor for area display, to an A-Scope for line-by-line analysis of the signal, or to a computer for signal processing. The CCD201, because of its small size, lower power consumption, and reliable operation over a broad range of conditions, is ideal for surveillance, medical instrumentation, and process control. This CCD image sensor opens up a world of new applications, particularly where extremely precise image analysis is important.

The sensor region consists of 100 columns of 100 1.2 mil x 0.8 mil light-sensitive elements, on 1.2 x 1.6 mil centers, arranged in a standard 4 x 3 aspect ratio. The entire device is contained in a 24-lead, dual-in-line package with an optical glass window.

MADE IN FAIRCHILD

SEMICONDUCTOR COMPONENTS GROUP, Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94042. (415) 962-5011. TWX: 910-379-6435.

INSTANT COMPLEMENTARY POWER

We now have complementary power devices for every amplifier socket. Order by the system for total savings.

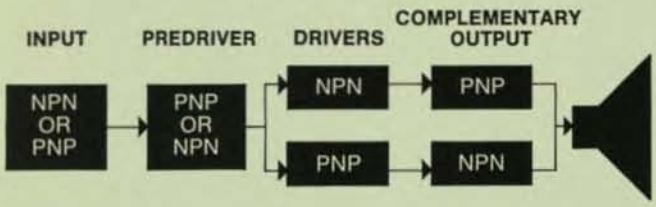
We have in stock all the complementary power components for every socket in a stereo or monaural amplifier system. From 10 to 80 watts. And all the small signal devices that may be needed for the front end.

Fairchild's broad packaging experience provides the flexibility for all conditions of use. Aluminum TO-3 where low cost is important, copper heat-sinking where heat dissipation is the prime factor. And our Bimesar technology provides wide safe area operation.

Total Stereo Power Before you order analyze your system in terms of *total* needs. Then buy the system, instead of socket-by-socket. Get a total system mix from us – everything from power devices down to small signal devices. It's the most powerful way to buy because it gives you the leverage for Total Power Savings.

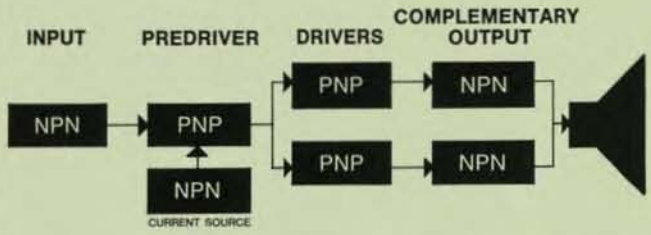
For more information about Fairchild Power, send for our new Power Transistor Short Form Catalog, which includes comprehensive selection guides and industry cross references for more than 100 Fairchild power transistors. And if you're interested in Small Signal devices as well, write on your company letterhead for our complete Discrete Device Catalog which includes all Power and Small Signal information.

TYPICAL 6 TRANSISTOR 10-30 WATT AUDIO AMPLIFIERS AND AVAILABLE DEVICES



NPN	NPN	NPN	**NPN**	WATTS
2N5961	MPSA20	MPSA05	**2N6121**	10
2N5961	MPSA20	2N5321	**2N6130**	15
2N5961	PN3565	MPSA05	**2N6130**	20
2N5961	PN3565	2N5321	**2N4914**	25
2N5961	PN3565	2N5321	**2N4914**	30
PNP	PNP	PNP	**PNP**	
PN4250	MPSA70	MPSA55	**2N6124**	10
PN4250	MPSA70	2N5234	**2N6133**	15
PN4250	PN4250	MPSA56	**2N6133**	20
PN4250	PN4250	2N5323	**2N4905**	25
PN4250	PN4250	2N5323	**2N4905**	30

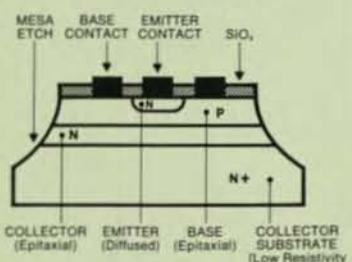
TYPICAL 7 TRANSISTOR 40-80 WATT AUDIO AMPLIFIERS AND AVAILABLE DEVICES



NPN	NPN	NPN	**NPN**	WATTS
2N5961	PN3565	2N5321	**2N5877**	40
2N5961	MPSA05	2N5321	**2N5881**	50
2N5961	MPSA06	2N5681	**2N5886**	70
2N5961	MPSA06	2N5681	**2N5886**	80
	PNP	PNP	**PNP**	
	PN4250	2N5323	**2N5875**	40
	MPSA55	2N5323	**2N5879**	50
	MPSA56	2N5679	**2N5884**	70
	MPSA56	2N5679	**2N5884**	80

For immediate delivery call your friendly Fairchild Distributor. He's got full stock on the shelf.

BIMESAR POWER STRUCTURE



We developed Bimesar technology to produce low-cost, high-current, rugged, wide safe-area power transistors. It uses two epitaxial layers to form the collector and base regions, a mesa etch to define the collector-base junction, and Planar processing to terminate the emitter-base junction.

MADE IN FAIRCHILD

SEMICONDUCTOR COMPONENTS GROUP, Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94042. (415) 962-5011. TWX: 910-379-6435.

NEW 1/2-AMP IC VOLTAGE REGULATORS AVAILABLE IN VOLUME.

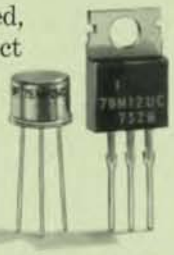
New 78M Series: 0.5 Amp Monolithic 3-Terminal Positive Voltage Regulators. Now available in production quantities.

We've got new 78M medium current voltage regulators. And we've got lots of them.

The 78M series is available in 7 fixed output voltages: 5,6,8,12,15,20,24 Volts. It's a pin-for-pin replacement for all popular 3-terminal voltage regulators (including our own 7800 series). It's available in TO-220 and TO-5 packages.

Improved system design. The 78M reduces system design time, eliminates outboard transistors and resistors, reduces board space, protects on-card circuitry, increases reliability.

Simple to use: Complete, self-contained, one chip in one package. Insert, connect 3 terminals, and add the normal line decoupling capacitor. Requires no other external components. Optimum operation with no design time.



Superior performance: In addition to improved temperature coefficient and ripple rejection, the 78M series provides output voltage tolerance better than ±5%. Line regulation 0.01%/Volt. Output impedance 0.03Ω. Output current rated at 0.5 Amp (usable to 0.75 Amp, depending on input voltage and heat sinking considerations).

Self protecting: Internal current limiting thermal shut-down and safe area compensation protect device and circuit from current, power, and temperature fluctuations. Resets automatically.

Versatile & compact: Use locally, at the power source, on a remote chassis, on PC cards, whatever is most convenient and efficient. Because it's compact, you can miniaturize your design. Result: simpler, smaller, cheaper, easier-to-use power supply and circuitry.

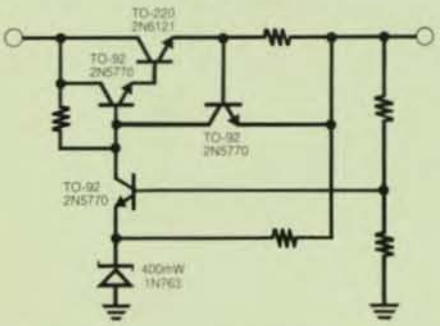
LOW COST: In time and money, less than any other alternative. The 78M series is the lowest cost 3-terminal voltage regulator available today.

1 Amp version: For those systems that require 1.0 Amp output, our improved 7800 series (usable to 1.5 Amps with proper heat sinking) is now in volume production. It offers all the features of the 78M at slightly higher prices.

Write for: Complete data package and new 80-page voltage regulator handbook.

PERFORMANCE COMPARISON: DISCRETES VS. NEW 78M

DISCRETES



15V PERFORMANCE DATA

LINE REG.	LOAD REG.	T.C. (%/°C)	$V_{in}-V_{out}$
.01%	.03%	.03%	8
.01%	.16%	.007%	8

NEW 78M

MADE IN FAIRCHILD

SEMICONDUCTOR COMPONENTS GROUP, Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415) 962-5011. TWX: 910-379-6435.

THE MOS 1K 4 MHz STATIC SHIFT REGISTER: ISOPLANAR DID IT

Our new 3355: 4 MHz guaranteed minimum speed. Zero data hold time. First MOS device made by Isoplanar. And available now.

Our new 3355 is a single 4 MHz 1024-bit static shift register with on-chip clock generator, multiplexer, pull-up circuit. This is a high speed, high reliability, instantly deliverable device for designers working in low-cost sequential access memories, low-cost static buffer memories, CRT refresh (line and page), delay lines, or drum memory replacements.

And our isoplanar process did it. As applied to MOS, it provides a smaller, faster device geometry with improved reliability and performance.

Features:

- 4 MHz guaranteed minimum speed
- Zero data hold time (see Fig. 2)
- Total insensitivity to clock rise and fall time
- On-chip pull-up device permits direct interface with TTL without external components (see Fig. 3)
- Single-phase TTL clock drives on-chip generator
- Low clock capacitance
- Input multiplexer selects from 2 input sources
- 8-pin ceramic mini-DIP

Available now: 3355 data sheets and parts for new high speed designs.

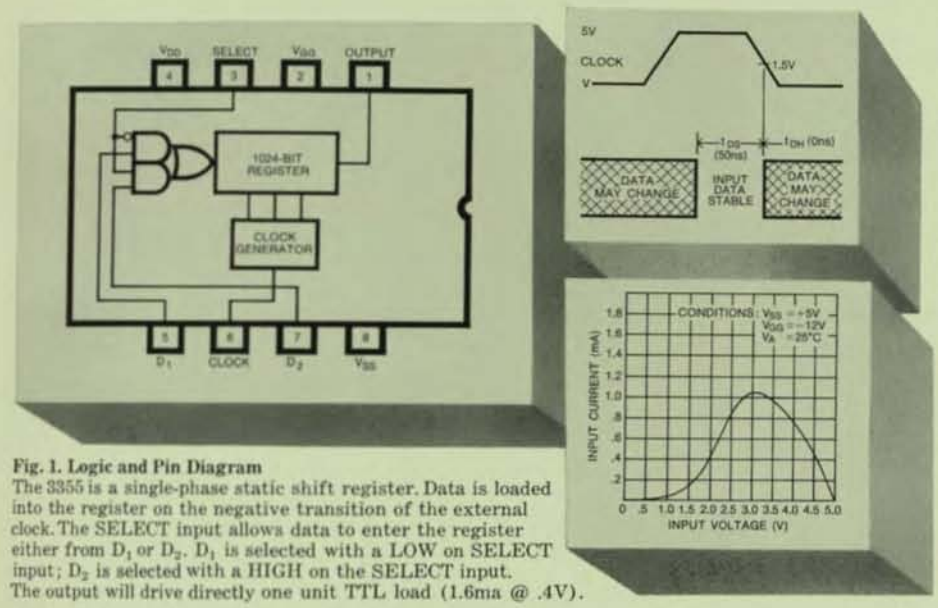


Fig. 1. Logic and Pin Diagram
The 3355 is a single-phase static shift register. Data is loaded into the register on the negative transition of the external clock. The SELECT input allows data to enter the register either from D_1 or D_2. D_1 is selected with a LOW on SELECT input; D_2 is selected with a HIGH on the SELECT input. The output will drive directly one unit TTL load (1.6ma @ .4V).

Fig. 2. Timing Diagram for Data Hold (t_{DH})
Note that because $t_{DH}=0$, data can be changed *immediately* after clock goes LOW. This permits any combination of TTL devices and 3355's to be clocked on the *same* negative-going edge. Multiplexing 3355's to achieve higher data rates requires no elaborate timing considerations. Cascadability is guaranteed without the need to specify a minimum output delay. Built-in hysteresis in the clock circuit permits the use of clock edges with long rise and fall times.

Fig 3. Typical Input Characteristics
The above V/I curve is characteristic of the pull-up device on all 3355 inputs, including the clock. Demonstrably, this device presents no load to a TTL LOW state (.4V), but turns on when a TTL output goes HIGH (2.4V) to pull the TTL output above the minimum required input HIGH voltage for 3355 (V_{SS} minus 1.0V).

MADE IN FAIRCHILD

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MADE IN FAIRCHILD

A CIRCUIT FOR EVERY RADIO/AUDIO FUNCTION

A circuit for every socket: All the building blocks for any Radio/Audio System. Ask for a desk top demonstration.

AM

µA720 AM RADIO SUBSYSTEM

µA706 AUDIO AMPLIFIER

FM

3075 FM DETECTOR AMPLIFIER

µA706 AUDIO AMPLIFIER

HIGH GAIN FM

µA753 FM GAIN BLOCK

3075 FM DETECTOR AMPLIFIER

µA706 AUDIO AMPLIFIER

FM STEREO

3075 FM DETECTOR AMPLIFIER

µA758 PLL STEREO

µA706 AUDIO AMPLIFIER

µA706 AUDIO AMPLIFIER

HIGH GAIN FM STEREO

µA753 FM GAIN BLOCK

3075 FM DETECTOR AMPLIFIER

µA758 PLL STEREO

µA706 AUDIO AMPLIFIER

µA706 AUDIO AMPLIFIER

Each working module (above) contains a Fairchild radio/audio circuit in combination with several passive components. Using these Fairchild LIC Demonstration Blocks, you can have an actual working demonstration of how to build similar systems. We'll plug them together instantly at your desk. Just call any of these Fairchild sales offices (at the right) and one of our applications engineers will arrive, pronto, demonstration kit in hand.

Boston 617-237-3400

Cleveland 216-461-8

Chicago 312-671-4660

Dallas 214-234-3391

SEMICONDUCTOR COMPONENTS GROUP, Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415) 962-5011. TWX: 910-379-6435.

AM/FM STEREO WITH PHONO/TAPE

µA753 FM GAIN BLOCK

3075 FM DETECTOR AMPLIFIER

µA758 PLL STEREO

µA720 AM RADIO AMPLIFIER

µA739 DUAL PRE-AMPLIFIER

µA706 AUDIO AMPLIFIER

µA706 AUDIO AMPLIFIER

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Los Angeles 714-558-1881 | Orlando 305-834-7000 | San Francisco 415-941-3150

Ours is the most complete line of consumer analog circuits available anywhere.

µA720	AM Radio Subsystem	DIP
µA703	Gain Block	CAN
µA757	Gain Block	DIP
µA753	FM Gain Block	MINI-DIP
3076	FM Gain Block	CAN
3075	FM Detector Amplifier	DIP
2136	FM Detector Amplifier	DIP
µA758	PLL Stereo Decoder	DIP
µA767	Stereo Decoder	DIP
µA732	Stereo Decoder	DIP
µA768	Stereo Decoder	DIP
µA769	Stereo Decoder	DIP
µA739	Dual Pre-Amplifier	DIP
µA749	Dual Pre-Amplifier	CAN
µA706	5W Audio Amplifier	DIPP

We have a comprehensive family of the most used, and the most useful, radio/audio IC's for AM and FM radio, tape and phonograph applications. High in performance and low in cost, they answer all the LIC needs of any radio/audio system designer. A circuit for every socket. In many cases, even, a choice of circuits for a given socket.

We invented the first consumer industry LIC standard, the µA703, today one of the largest selling IC's in the world. We added 7 more. Then, in the last year, an additional 7, including these new industry standards:

µA758 Phase Locked Loop Stereo Decoder. A complex subsystem that consists of pilot subcarrier regenerator, multiplex decoder circuit, audio output stage, and stereo function switch, all on one chip. Designed to satisfy performance and reliability requirements of premium high fidelity stereo components. Plus the tough economic requirements of low-cost FM receivers. Features minimization of parts count (no coils required), 40dB power supply rejection, 45dB channel separation, and alignments eliminated.

µA720 AM Radio Subsystem. Combines RF amplifier, IF amplifier, RF oscillator-converter, voltage regulator and AGC detector. Features overvoltage protection, regulated power supply, separately accessible amplifiers.

µA706 5 Watt Audio Amplifier. Up to 5.5 watts continuous output into a 4 Ohm speaker, using single 14V power supply. Operates over a 6-18V range. Features high peak output current, self-centering bias, direct coupling input, low quiescent current, low distortion. Few external components and high ability to withstand AC shorts make it ideal for automotive applications.

µA753 Gain Block. Input and output designed for use with ceramic filters, minimizing external parts count (filter equalization components are on the chip). Full temperature compensation provides excellent gain/temperature stability. Built-in short circuit protection. Low-level output pin for AGC. Excellent noise performance and power supply ripple rejection.

FOR MORE INFORMATION write for our new IC Radio/Audio Design Kit (including application notes and product data).

MADE IN FAIRCHILD

WORLD'S FIRST PRODUCTION CCD

Our 500-Element Linear Image Sensor: World's First Production CCD.

New CCD101. High sensitivity, wide dynamic range, self-scanning device. Available now for prototyping at $1200.

The CCD101 Linear Image Sensor uses charge-coupled technology and a buried-channel structure to create a rugged, monolithic, self-scanned, 500-element sensor designed for high sensitivity conversion of images to analog signals. For slow-scan TV, facsimile, and other high-resolution linear imaging applications.

The impact of CCD on imaging is analogous to that of the transistor on vacuum tubes. It has been called by one high level government scientist "the most important breakthrough in semiconductors since the development of MOS."

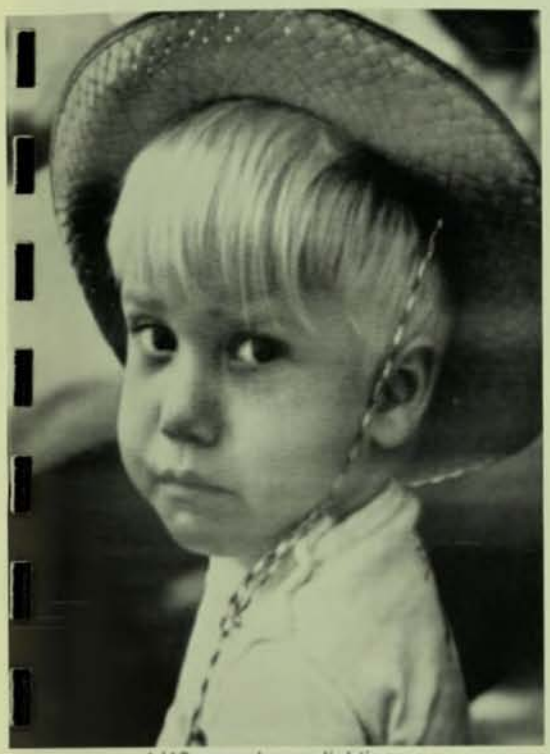
CCD101 Linear Image Sensor
The array is a 500-element photo-sensing chip, 60 x 635 mils. It includes, in addition, charge transfer gates, two 250-element CCD analog shift registers, a 2-element output register, and a preamplifier. The device allows sequential reading of the 500 imaging elements with a typical dynamic range of 1000:1 at 1 MHz. Sensitivity is typically 15×10^{-6} footcandle-seconds. Operating voltages are under 20V. On-chip preamplifier allows a low-impedance interface. The 24-lead dual in-line ceramic package—1¼" long x ½" wide x 5/16" high—has a sealed anti-reflectance glass window and non-reflective interior.

Normal incandescent room lighting. (No filtration. Peak incident illumination around 30 footcandles.)

1/100 normal room lighting.

99.999% Transfer Efficiency
Key to CCD101 high sensitivity imaging is the buried channel structure which reduces charge-transfer loss, thus permitting greater image element density. The result is demonstrated above.

The 4 photos illustrate the device's capacity for generating a clear video picture *of a single frame* at



1/10 normal room lighting.

1/1000 normal room lighting.

...idely varying levels of illumination. The photos ...how the face of a CRT displaying the output of a ...CD101 sensor clocked at 1 MHz scanning a black-and-white photo on a rotating drum. Increasingly ...ense filters were inserted between the sensor and ...he scanned photo. The intensity dropped, but the ...mage remained usable.

CCD Imaging Advantages

CCD technology provides the first high-performance method for solid state imaging. The CCD101 is the first CCD product, and thus the first to clearly demonstrate its high performance advantages, high reliability and dimensional accuracy, with lower noise video, low-voltage operation and self-scanning that eliminates much external control circuitry. All made possible by our CCD buried N-channel technology.

CCD advantages over other types of imaging devices are manifest:

As Compared To Vacuum Tube Imaging Devices	As Compared To Non-CCD Solid State Imaging Systems or Devices
• Small size	• Low clock interference
• Long Life	• No pattern noise
• Lower power	• Low, uniform dark current
• Lower operating voltages (none greater than 20V)	• Better detectivity
• Solid state ruggedness	• On-chip preamp
• Inherent metric accuracy	• Lower power
• Low impedance interface	
• Greater dynamic range	

For more information.

Call our Hot Line number – (415) 962-3333 – for a complete information package: data sheets, application notes, and a technical paper on the physics and applications of charge-coupled devices.

MADE IN FAIRCHILD

EMICONDUCTOR COMPONENTS GROUP, Fairchild Camera & Instrument Corp., 464 Ellis St., Mountain View, Ca. 94040. (415) 962-5011. TWX: 910-379-6435.

HOW TO SELECT LED LAMPS SHREWDLY

From your Fairchild Distributor: LED Lamp Selector makes instant comparison easy. Immediate delivery in quantity at factory prices as low as 17¢ makes procurement easier.

How to select an LED lamp? You know what you need: type, size, lens, lead configuration. But how do you know which to buy?

Appearance is the first test. Call your Fairchild distributor. He'll have our LED Lamp Selector at your office tomorrow. Plug in the lamps you're considering. Ours. Anybody else's. Compare them side by side under identical test conditions. See for yourself which does your job best.

Price. In addition to large-quantity pricing as low as 17¢, will other distributors quote prices and quantities like this? Ours will. New high off-the-shelf quantities. New low factory prices.

NO.	TYPE	1-99	100	1,000	10,000
FLV100	Point Source	.80	.60	.52	.47
FLV102	Indicator	.74	.55	.48	.44
FLV103	Backlight	.60	.45	.39	.35
FLV104	Narrow Beam	2.00	1.50	1.30	1.18
FLV108	Indicator	.74	.56	.48	.44
FLV110	Indicator	.50	.37	.33	.30*
FLV111	Backlight	.60	.45	.39	.35
FLV112	Indicator	.60	.45	.39	.35

*Larger quantities as low as 17¢.

Availability? Again, check ours vs. theirs. Not promises. Not futures. Or a nice smile. What's available now? Ours can be delivered, from distributor stock, in quantities to 10K, more if you want them. Today.

Variety. What kind of lamp do you need? We've got it: point source, indicator, backlight, narrow beam, subminiature (plus our SUPER DIGIT ¼" LED display that's supersmall and supervisible).

To select LED lamps shrewdly, call your friendly Fairchild distributor. He'll be around with his LED Lamp Selector. Immediately.

LED Lamp Selector.
For instant visual evaluation of ours. Or theirs. Displays and compares 24 lamps simultaneously. ⅛" and ¼" display. Helps you select different types; point sources, wide angle light sources, diffused and non-diffused backlighting lamps, etc. Easy. Efficient. Convenient.

MADE IN FAIRCHILD

DISTRIBUTORS:

ALLIED ELECTRONICS • ARROW ELECTRONICS INC. • AVNET ELECTRONICS • CENTURY ELECTRONICS • ELMAR ELECTRONICS
HALL MARK ELECTRONICS • HAMILTON/AVNET ELECTRONICS • HAMILTON ELECTRO SALES • KIERULFF ELECTRONICS CORP.
LIBERTY ELECTRONICS • G. S. MARSHALL CO. • NORVALL ELECTRONICS • PIONEER WASHINGTON ELECTRONICS • POWELL ELECTRONICS
SCHWEBER ELECTRONICS • SEMICONDUCTOR SPECIALISTS • SHERIDAN SALES • SUMMIT DISTR. • WESTERN RADIO
ELECTRO SONIC IND. SALES • RAE IND. ELECTRONICS

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OFF-THE-SHELF LOW-POWER TTL

93L: The complete line of Low-Power SSI and MSI 9300 Functions. Immediately deliverable. And 3 new functions available 1st quarter.

To optimize your TTL system: 14 93L series low-power logic functions deliverable now. Including all the most-used 9300 MSI functions. All plug-in compatible with 9300 TTL pinouts, functions, and power supply. Plus 5 SSI building blocks. Plus three new functions available in early '73.

Yet another branch of our spreading TTL family tree. Largest and most comprehensive on earth.

Optimizing means judicious mixing. We have the TTL ingredients. All with improved speed power product. The variety and quality of our 93L low-power functions give you the opportunity to mix wisely and well. For example in a system where power consumption takes precedence over speed, look to our 93L series which reduces power consumption by 75% relative to conventional TTL. The system designer can use standard high speed circuits where they're required, low power circuits for the sections of the system where speed isn't needed. Flexibility.

Power supplies are smaller and cheaper. Also, the effective input loading of 93L is one-fourth that of conventional TTL, which makes it ideal for MOS-to-TTL interface. Properly mixed fast and slow circuits can eliminate clock skew, glitch and race problems. Naturally, there's less heat and noise generation, and less noise sensitivity.

Use 93L as required for simpler, cooler, cheaper, more efficient system design.

TTL Switching Time and Power Comparison

	Typical Gate Delay	Typical Gate Dissipation
93L Series LPTTL	20ns	2mW
9N/74 Series TTL	10ns	10mW
9H/74H Series HSTTL	6ns	22mW
9S/74S Series STTL	3ns	22mW

Fairchild Low-Power MSI and SSI TTL Logic Functions

COUNTERS	
93L10	Low Power Decade Counter
93L16	Low Power Binary Counter
REGISTERS	
93L00	Low Power 4-Bit Shift Register
93L28	Low Power Dual 8-Bit Shift Register
93L38	Low Power 8-Bit Multiple Port Register*
DECODERS	
93L01	Low Power One-of-Ten Decoder
93L11	Low Power One-of-Sixteen Decoder
93L21	Low Power Dual One-of-Four Decoder
MULTIPLEXERS	
93L09	Low Power Dual 4-Input Multiplexer
93L12	Low Power 8-Input Multiplexer
93L22	Low Power Quad 2-Input Multiplexer
LATCHES	
93L08	Low Power Dual 4-Bit Latch
93L14	Low Power 4-Bit Latch
93L34	Low Power 8-Bit Latch*
ENCODERS	
93L18	Low Power 8-Input Priority Encoder
OPERATORS	
93L24	Low Power 5-Bit Comparator
93L41	Low Power 4-Bit Arithmetic Logic Unit*
GATES & FLIP FLOPS	
9L00	Low Power Quad 2-Input NAND Gate
9L04	Low Power Hex Inverter
9L24	Low Power Dual JK Flip-Flop
9L54	Low Power 4-Wide, 2-Input AOI
MONOSTABLES	
96L02	Dual Retriggerable Multivibrator

*Available 1st Quarter 1973

You can get 93L low-power TTL parts in quantity in a hurry by getting in touch with your friendly Fairchild distributor. You can get application information about 93L low-power TTL by getting in touch with any of our local offices, or call us on the Hot Line: (415) 962-3333.

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SAVE UP TO 49% ON HI-VOLTAGE POWER TRANSISTORS.

Fairchild's hi-voltage power transistors are just about the same as the ones you're using now in every way.

Or at least every way except one.

Price.

Good news if you design auto ignition systems, DC converters, horizontal deflection circuits, oscilloscope deflection circuits, switching regulators or series pass regulators.

Compare the power transistor you're using now and the Fairchild pin-for-pin equivalent, and it's pretty clear that buying Fairchild instead of Brand X from now on can really do wonders for your image of fiscal responsibility.

OUR PRICES VS. THEIRS.
(100 & UP)

UNIT	FAIRCHILD	DELCO	MOTOROLA	RCA
FT401	2.60	2.85	—	—
FT402	3.70	4.27	—	—
FT410	1.85	2.12	2.12	1.91
FT411	2.05	2.50	2.50	2.16
FT413	2.55	2.85	2.85	3.00
FT423	3.06	4.27	4.27	3.24
FT430	4.30	5.73	—	—
FT431	3.95	7.78	7.78	4.08

Is price the only difference?

While the specs on most power transistors are deliberately about the same, Fairchild transistors are also different in one other significant way.

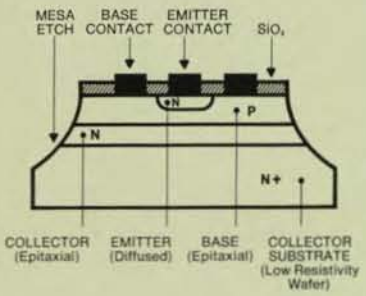
They're Bimesar.™

Now, some of the advantages of using Bimesar fabricating technology compared with single diffusion processes include:

1. higher voltage capabilities.
2. lower saturation voltages.
3. better beta linearity.

(Check our transistors against the ones you've been using for the exact differences.)

BIMESAR POWER STRUCTURE



We developed Bimesar technology to produce low-cost, high-current, rugged, wide safe-area power transistors. It uses two epitaxial layers to form the collector and base regions, a mesa etch to define the collector-base junction, and Planar processing to terminate the emitter-base junction.

But the real difference Bimesar makes is in performance on the job. Because tough, uniform Bimesar devices are known for their extra ruggedness and dependability.

Pin-for-pin replacements.

Check this list for the power transistor you've been using. For most applications, there's a compatible Fairchild device to replace it.

FAIRCHILD	DELCO	MOTOROLA	RCA
FT401	DTS401	MJ3026 MJ3027	
FT402	DTS402 2N3902	MJ3028 MJ3030 2N3788 2N3902	
FT410	DTS410	MJ410	RCA410
FT411	DTS411	MJ411 MJ1800 MJ3029 MJ3430	RCA411 2N5838 2N5839
FT413	DTS413	MJ413 MJ424 MJ425	RCA413 2N5840
FT423	DTS423	MJ423 MJ424 MJ425	RCA423 2N5839 2N5840
FT430	DTS430		2N5239 2N5420
FT431	DTS431	MJ431 2N5241	RCA431 2N5420 40852

We're ready when you are.

Fairchild power transistors currently available include V_{ceo} to 400V and P_D to 125W.

And what's just as nice, they're available in quantity for *immediate* delivery.

For samples or data sheets, contact your friendly Fairchild Distributor today.

MADE IN FAIRCHILD

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BIPOLAR MEMORIES, 1974 UPDATE.

Basically, what the chart on the right tells you is that Fairchild makes an awful lot of RAMs, ROMs and even PROMs.

That, and a lot more.

We're No. 1. And then some.

The chart tells you, for example, that Fairchild offers immediate 256-Bit ECL and TTL RAM availability.

What's more, we offer the only 256-Bit and 1024-Bit ECL RAMs available in quantity today. Also our first F10K ECL RAM, the 15ns 128-Bit F10405. Priced lower than many 64-Bit ECL RAMs.

We also offer the only 1024-Bit TTL RAMs available in substantial quantity.

And latest devices from Fairchild include our new full MIL 1024x1 RAM, listed as 93415DM, and our new 256x1 3-state RAM, listed as 93421DC.

In all, Fairchild offers the broadest line of bipolar RAMs available *period.*

And just for the record, we've shipped more RAM bits than all other bipolar RAM makers put together.

The Isoplanar difference.

Another thing to remember, only Fairchild RAMs are Isoplanar.

And in memories, Isoplanar fabrication can mean more compact devices with better performance.

Increased availability at reasonable prices.

And better dependability on the job.

First ROMs and now PROMs.

In addition to our existing Planar ROMs we now offer Planar TTL programmable ROMs, listed as 93416DC (open collector) and 93426DC (3-state).

FAIRCHILD BIPOLAR MEMORY FAMILY

Device Type ‡	Output †	Max. Read Cycle (ns)	Max. Write Cycle (ns)	100 to 999 Price	Availability
TTL RAMs					
256X1					
93410DC	OC	60	60	13.10	In Stock
93410PC	OC	60	60	11.20	In Stock
93410ADC	OC	45	45	14.60	In Stock
93410DM	OC	70	70	26.20	In Stock
93410FM	OC	70	70	35.00	In Stock
93411DC	OC	55	55	15.00	In Stock
93411DM	OC	75	75	33.00	In Stock
93421DC	3S	50	50	15.00	In Stock
93421DM	3S	70	70	33.00	In Stock
1024X1					
93415DC	OC	90	90	56.00	Contact Fairchild Locally
93415DM	OC	110	110	135.00	Contact Fairchild Locally
ECL RAMs					
128X1					
F10405DC	—	15	15	15.00	In Stock
256X1					
95410DC	—	40	40	21.00	In Stock
1024X1					
95415DC	—	65	65	90.00	Contact Fairchild Locally
TTL PROMs					
256X4					
93416DC	OC	60	—	22.00	In Stock
93426DC	3S	60	—	22.00	Contact Fairchild Locally
TTL ROMs					
32X8					
93434DC	OC	50	—	10.00*	8 wks. ARO (1st. 100 pcs).
256X4					
93406DC	OC	50	—	14.00*	8 wks. ARO (1st. 100 pcs).
93406PC	OC	50	—	13.20*	8 wks. ARO (1st. 100 pcs).

* Plus 600.00 mask charge — Minimum order 100 pcs. per mask.
† OC — Open Collector; 3S — Three State
‡ D — Ceramic DIP; P — Plastic DIP; C — Commercial Grade; M — Military Grade
For more information call your nearest Fairchild Sales Office or Distributor.

What next? Here's your chance to tell us.

If you'd like a sample of our new devices, we'd like to send you one.

All we ask you to do is something you'd probably like to do anyway. Simply write us a note on your company letterhead telling us about your memory needs. And where you think we should go from here.

Future product requirements? More emphasis on RAMs, ROMs or PROMs? TTL or ECL logic? Number of words by bits? Read and write cycle times? New applications under consideration? Quantities required? And anything else you may wish to mention.

In return we will send you a free sample of any one of the following three devices:

93410DC (256x1 TTL RAM)
95410DC (256x1 ECL RAM)
F10405DC (128x1 ECL RAM)

Send your letter to Bipolar Memories, M.S. 20-1066, at the Fairchild address below. And of course, don't forget to indicate your free sample preference.

Along with your sample, we'd like to send you a special portfolio of information on Isoplanar memories.

It's yours free, too.

So write today.

MADE IN FAIRCHILD

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NEW ISOPLANAR CMOS. IT DOES WHAT COMMON CMOS CAN'T.

Fairchild's new high-density Isoplanar CMOS costs about the same as ordinary CMOS.

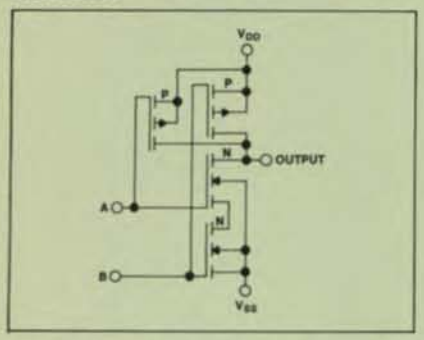
And uses the same popular 4000 series pinouts for direct plug-in replacement.

After that, Fairchild CMOS leaves common CMOS far behind.

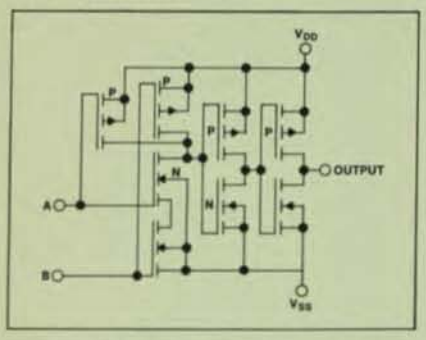
"Isoplanar." It makes a difference.

In the first place, Isoplanar fabrication reduces chip area substantially. Which means Fairchild CMOS designers have had plenty of room to include full buffer circuitry with *every* CMOS device. Even SSI.

Conventional CMOS utilizes buffered outputs only on MSI and driver devices. So a conventional *unbuffered* CMOS 2-input NAND Gate, for example, is organized like this:



A Fairchild *fully-buffered* NAND Gate, on the other hand, looks like this:



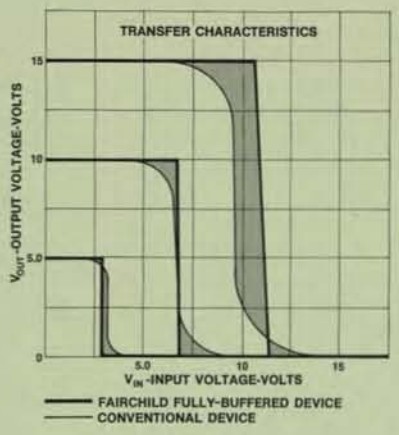
The device utilizes small geometry input and logic transistors to generate the required logic function, then utilizes low impedance output buffers.

For the system designer, there are several benefits:

1.

Highest guaranteed noise immunity.

Because buffering permits an increase in voltage gain, transfer characteristics are almost ideal.



As a result, guaranteed noise immunity limits for Fairchild CMOS Gates are the *highest in the industry.*

2.

At last, standardized outputs.

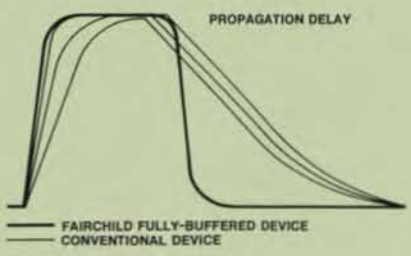
Full buffering also means that output drive characteristics are finally standardized across all part types. And every husky Fairchild CMOS device drives a guaranteed 400 uA at 5 volt power supply.

Which means it can drive low power TTL and low power Schottky TTL directly.

3.

Increased system speeds.

With the buffers in service, output impedance and propagation delay in CMOS Gates become independent of the input pattern. Just look at the typical propagation delay for a Fairchild fully-buffered 34012 4-input NAND Gate vs. a conventional 4012 4-input NAND Gate at 15pF output capacitance.



With 1, 2, or 3 simultaneous logic changes, conventional CMOS Gates exhibit differing propagation delays with input pattern. Fairchild CMOS doesn't.

System speeds using fully-buffered CMOS are sharply improved.

Add to that the inherent speed advantages of Isoplanar manufacture – including silicon gate self-alignment and reduced sidewall capacitance – and you've got CMOS that beats all others.

Fairchild CMOS. Think of it like TTL, only not so hungry for power.

If you really want to see what CMOS can do for you, maybe you should think of it like TTL. Only in some ways, better.

Because instead of burning up 10mW per gate, Fairchild CMOS requires only 10nW at static conditions. That's only *one-millionth* of the power needed for TTL.

Fairchild CMOS also works over a broad 3V to 15V power supply range.

It's more immune to noise. (And makes less noise itself.)

It operates from −40°C to +85°C, commercial. And from −55°C to +125°C, military.

And instead of a dc fanout of 10 like TTL, Fairchild CMOS fanout is almost unlimited.

Just tell us what you want. We deliver.

Right now, a variety of Fairchild CMOS devices are in-stock and available for sampling, with more devices on the way.

Available now.

34001	Quad 2-Input NOR Gate
34002	Dual 4-Input NOR Gate
34011	Quad 2-Input NAND Gate
34012	Dual 4-Input NAND Gate
34023	Triple 3-Input NAND Gate
34025	Triple 3-Input NOR Gate
34027	Dual JK Flip-Flop
34028	One-of-Ten Decoder
34030	Quad Exclusive-OR Gate
34811	Quad Exclusive-NOR Gate

Available soon.

34019	Quad AND/OR Select Gate
34049	Hex Inverter
34050	Hex Buffer
34512	Digital 8-Chn. Multiplexer

Just check the devices that interest you, and call your Fairchild Sales Office or Distributor.

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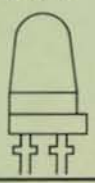
How to select

Lamp Size		< T-¾	T-1	T-1¾
Packages		Point Sources	Wide Viewing Angle	Wide Viewing Angle
				
Lens Diameter		.050 x .100	.120	.200
Construction		Cup	Cup	Cup
Lens Height		.090	.130	.215
Color	**Mat'l.**	Diff. Clr.	Diff. Clr.	Diff. Clr.
Red	**GasP**	●107	●199 ●198	●102 ● ●108 ● ●101 ●115 ●116
Green	**GaP**			
Yellow	**GaP**			
Red	**GaP**			

To order a lamp, add FLV to number. Example: FLV350.

Solid state lamps.

T-1¾	T-1¾	T-1¾	T-1¾	T-1¾	T-1¾
Angle	Cartridge Lamp	Short Profile	Medium Profile	Tall Profile	.025 x .025 Leads
					
.200	.200	.200	.200	.200	.200
Lead Frame	Lead Frame	Lead Frame	Lead Frame	Lead Frame	Lead Frame
.350	.235	.230	.285	.340	.340
Diff. Clr.	Diff. Clr.	Diff. Clr.	Diff. Clr.	Diff. Clr.	Diff. Clr.
●104	●130 ●131	●103 ●141 ●140	●110 ●111 ●112 ●118 ●117 ●119	●150 ●152 ●151	●160 ●162 ●161
	●331 ●336	●341 ●346	●310 ●315	●350 ●356 355 ●352 ●351	●360 ●365
		●440 ●445		●450 ●455	●460 ●465
		●240		●250 ●252 ●251	

We make solid state lamps. Lots of them.

On the Quick Selection Guide you can easily find the lamps that fit your needs.

- Production quantities of red GasP.
- Growing volume of GaP in red, green and yellow.
- High intensity point sources, indicators, backlighters, narrow or wide beams.
- Low and high profiles.
- Clear and diffusing lenses.
- With or without flanges.
- With or without molded headers.
- All standard lead thicknesses.
- T-1¾ and smaller packages.
- Easily retrofits incandescent lamps.
- Luminous intensity to 15.0 mcd.
- Priced from 9¢.

We're a major manufacturer, a world leader, in discrete solid state devices. Our production capability is vast. Right now, today. It's being used to make a line of lamps as broad as anyone's: *Every major kind of lamp.* And special types built to your own specs. At the most competitive prices. If you need it we've got it. In volume. Try us. You'll see.

But before you make your final selection, you should actually *see the lamps* and compare them to others, any others. There's no other way to be sure. So call your friendly Fairchild distributor for a demonstration at your desk. It'll only take a minute.

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Fairchild Ads

Geri Hadley

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