

BENCH BRIEFS

SERVICE INFORMATION FROM HEWLETT-PACKARD

MAY-JULY 1979

Group Delay

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As a microwave technician involved in the repair and calibration of Hewlett-Packard's microwave test equipment, there have been many occasions when customers touring HP's repair center have asked me, "What does that instrument do?" Their look of curiosity turns to one of confusion when I respond, "It measures IF flatness, power, and group delay." We are talking about an HP 3710A or 3790A Microwave Link Analyzer System.

But this article is not about the MLA, it's about one function of the MLA and that's measure group delay. And what is group delay? It is synonymous with envelope delay, phase delay, or differential phase. Basically, they all mean the same thing. Some may argue that there are differences, but they are minimal. Most engineering texts refer to group delay with a lot of mathematical formulas. The IEEE Dictionary refers to group delay as "the derivative of radian phase with respect to radian frequency, $d\phi/dw$. It is equal to the phase delay for an ideal non-dispersive delay device, but may differ greatly in actual devices where there is ripple in the phase vs. frequency characteristic."

The Telecommunication Transmission Handbook by Roger L. Freeman defines group delay as envelope delay distortion and goes on to say that it's the derivative of radian phase characteristics with respect to radian frequency characteristics. And, since group delay is defined as the incremental change in phase caused by an incremental change in angular frequency, where the increment approaches zero in both cases, group delay is expressed as

$$GD = \frac{d\phi}{df}$$

where d indicates the derivative of; ϕ is the angular phase (radians), and f is the angular frequency (radians/sec.).

$d\phi$ and df can be further defined as

$$\frac{d\phi}{df} = \lim_{\Delta 0} \frac{\Delta\phi}{\Delta f}$$

which means that $\Delta\phi$ (change in phase) and Δf (change in frequency) must approach zero. By definition, the amount of change in phase and frequency as shown in Figure 1 must be infinitely small (approaching zero) for it to be group delay.

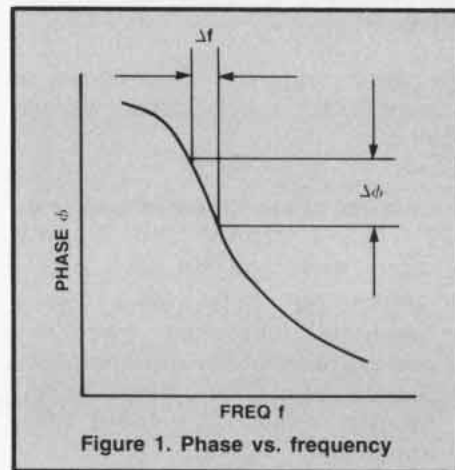


Figure 1. Phase vs. frequency

Actually, group delay is a theoretical concept and in practice cannot be measured at all. What is actually measured, referring back to the IEEE definition, is differential (radian) phase and differential (radian) frequency which, if measured correctly, can be assumed to approximate group delay. It is the variations in delay at different frequencies that causes the problems and is referred to as group delay distortion.

What is Delay Distortion?

Electromagnetic waves travel 186,000 miles per second in free space. Electrical signals, however, do not travel this fast through communications channels. In fact, signals may travel over certain types of circuits as slowly as 15,000 miles per second, and will rarely travel faster

than about 100,000 miles per second over a microwave radio path. These lower velocities result from the nature of the communications equipment or the transmission path.

A telephone line behaves like a low pass filter, particularly if inductive loading is used to reduce attenuation. Multiplex systems use very sharp filters to separate one channel from another, and the tuned circuits in a radio receiver serve the same purpose. All these filters and filter-like elements introduce delay.

The slowing down of a signal in its passage through a communications channel is of little importance. Delay becomes a problem only when it interferes with the ability of the receiver to understand the message. In the case of speech, delay distortion causes little interference since the ear is relatively insensitive to phase variations. Facsimile, telegraph, and data signals, however, are quite vulnerable to delay distortion.

Usually, only relative delay — the maximum range or difference in delay values in a channel — is of importance, since only the delay difference causes distortion in the received signal. Absolute delay — the total delay experienced by signal elements — is usually not important except where signals, or parts of a signal, are transmitted from one point to another over different routes and must arrive at the same time.

IN THIS ISSUE

GROUP DELAY

A QUICK GUIDE TO BATTERIES

SPARE PARTS KIT

INTEGRATED CIRCUIT

CROSS REFERENCE

SERVICE NOTES

READERS CORNER

For example, if two tones, such as 1200 and 2200 cycles per second, are used to transmit binary data (shifting from one frequency to the other), it is important that these two tones experience approximately the same transmission delay in going from one end of the circuit to the other. If the data is being transmitted at 1000 bits per second, each bit will be one millisecond long. If these transmissions consist of alternate 1's and 0's, the signal will be alternately shifting between 1200 and 2200 cps. The transmission propagation time for those two tones between the two ends of a given circuit can vary considerably. For example, 60 miles of loaded telephone cable may introduce a delay to the 2200 cycle tone of 6.1 milliseconds as compared to 5.1 milliseconds for the 1200 cycle tone, a difference of 1 millisecond. If the 2200 cycle tone is transmitted first followed by the 1200 cycle tone (each transmitted for 1 millisecond), it can be seen that they will both be received at the same time, rather than one following the other. In 120 miles, they would be received in the reverse order!

Delay Distortion At Higher Frequencies

In high speed data transmission, the problem of delay distortion becomes more serious and troublesome as the transmission rate increases. Data bits usually originate as rectangular-shaped pulses which are used to modulate a carrier at a particular keying rate for transmission over a communications circuit. The pulses resulting from this modulation process are composed of many frequencies whose amplitudes and phases have a fixed relationship in time. The energy of the fundamental and harmonic frequencies are vectorially added together to form the envelope of the composite signal. If the pulses are processed through circuit components such as band-pass filters or amplifiers, which because of reactive (imaginary) components within the circuitry do not offer equal transit time to all frequencies, the signal shape (envelope) is seriously distorted. As shown in Figure 2, if the third harmonic is delayed by

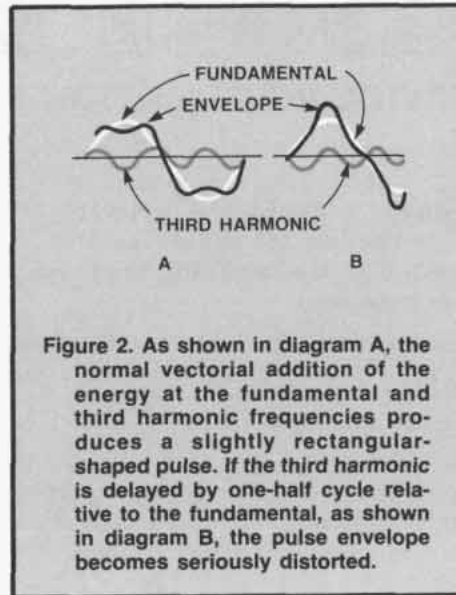


Figure 2. As shown in diagram A, the normal vectorial addition of the energy at the fundamental and third harmonic frequencies produces a slightly rectangular-shaped pulse. If the third harmonic is delayed by one-half cycle relative to the fundamental, as shown in diagram B, the pulse envelope becomes seriously distorted.

one-half cycle relative to the fundamental, the pulse shape is severely distorted.

To demonstrate the effect shown in Figure 2, try the following experiment:

- Connect two audio oscillators (e.g., HP Model 3325A's) to the A and B inputs of an oscilloscope.
- Set A for x frequency at y amplitude (the exact frequency and amplitude are unimportant). Set oscillator B for 3 times the frequency and one-third the amplitude.
- Set up the oscillators so that they are phase locked together with zero phase shift between them (Figure 2A).
- Now shift the third harmonic oscillator so that it is delayed by one-half cycle (180 degrees).
- If the two composites shown in Figure 2B were fed into a speaker, you would note a drastic difference in sound even though the frequencies haven't changed.

Phase Shift

The phase and frequency of a signal are, by definition, inseparable. In fact, a good definition of frequency is the rate of change of phase with respect to time, or $d\phi/dt$, where ϕ is the phase shift (usually in radians; π radians equal 180°, 2π radians equal one cycle) and t is time in seconds.

Thus, it follows that the more the phase of a signal is shifted in passing through a channel, the more time is required for it to get through the channel. Where phase shift is known, the phase delay of a single frequency is

$$\text{delay (time)} = \frac{\text{phase shift (radians)}}{\text{frequency (radians per sec.)}}$$

This is usually expressed as

$$t = \frac{\phi}{\omega}$$

It is important to note that in practical systems, phase delay, as expressed above, is applicable *only to single, steady-state frequencies*.

In an ideal system, phase shift would be linear and all signals passing through such a system would be delayed equal amounts, regardless of their frequency. Unfortunately, phase shift in a communication channel is never linear. In a high quality system, the overall phase shift characteristic may look like that shown in Figure 3.

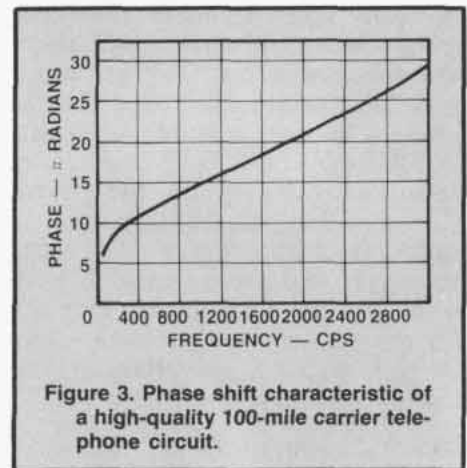


Figure 3. Phase shift characteristic of a high-quality 100-mile carrier telephone circuit.

Measuring Group and Envelope Delay

Whenever a complex signal (such as a modulated or keyed carrier frequency) is transmitted, the relationship between frequency and phase shift described above no longer holds true unless the system is perfectly distortion-free. Since phase shift is always non-linear in actual systems, some of the component frequencies undergo more phase shift than other frequency components.

For simplicity, assume that the complex signal consists of only two component frequencies. Added together, the two frequencies form a beat-frequency or modulation envelope. Because of non-linear phase shift, the two component frequencies and modulation envelope travel at different velocities through the channel with the relationship between them constantly changing. If phase shift were linear, all the frequencies would travel at the same velocity; and there would be no displacement of one frequency with respect to the other and no independent delay of the modulation envelope or envelope delay.

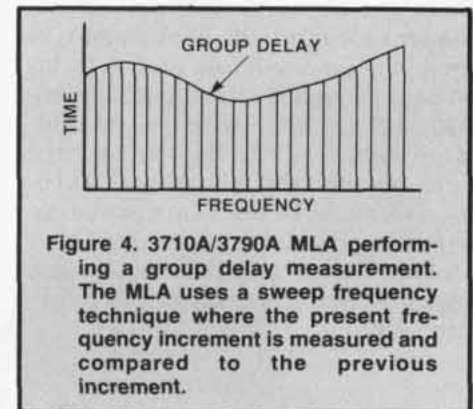
The more non-linear the phase shift, the greater the envelope delay. In other words, the greater the rate of

change of phase shift, the more envelope delay will result.

Since virtually all forms of electrical communication use signals which require a band of frequencies for successful transmission, both envelope and group delay are the forms of delay of greatest general importance. Hewlett-Packard measures relative delay (and other parameters) in microwave radio applications with the HP 3710A/3790A Microwave Link Analyzer System. Audio data line delay distortion measurements to CCITT standards are performed by the 3770A/3770B Analyzers.

Figure 4 shows the basic principal used in making group delay measurements with the 3710A/3790A

MLA. A frequency range is selected and the MLA sweeps that range with its transmitter. Time required (delay) for increments of the swept signal to reach the receiver is measured with the composite of all increments forming the group delay picture displayed on the CRT.



Group Delay and the Phase Lock Loop

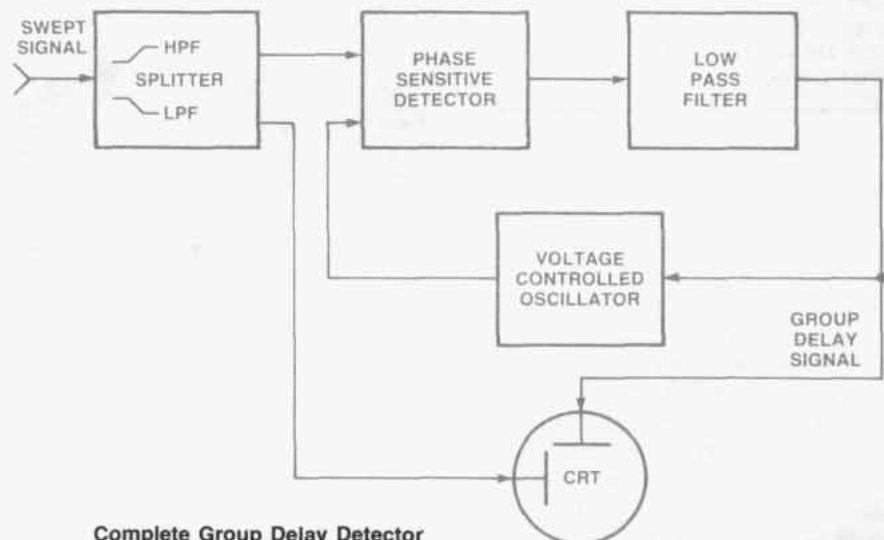
The method used in the HP Microwave Link Analyzer (MLA) to measure group delay distortion is a special application of a phase lock loop as described in a previous issue of Bench Briefs (October 1978).

Generally speaking, a phase lock loop (PLL) is used to produce an accurate signal (or some multiple) from a stable reference. In the case of the MLA, however, the object is to measure group delay distortion. As the main article pointed out, group delay distortion is merely fluctuations in phase per frequency. And since the phase and frequency of a signal are, by definition, inseparable, it follows that if we plot the small changes in phase that occur due to absolute delay, we should be able to convert that to group delay distortion.

As shown in the accompanying figure, the swept signal is applied

to the PLL as the reference signal. An internal voltage controlled oscillator is phase locked to the incoming signal, and it is the PLL error voltage that is the detected phase error or group delay signal. The swept signal is applied to the horizontal plates, and the group delay signal is applied to the vertical plates of a CRT. The key to the group delay

detector is a special low pass filter designed to pass only frequencies lower than 10 Hz. If frequencies higher than 10 Hz were allowed to pass through, the error voltage would completely correct all phase fluctuations so rapidly it would appear there was no group delay distortion at all.



Complete Group Delay Detector

Figure 5 shows the basic principal used in making envelope delay measurements with the 3770A/B Analyzers. The transmitter part of the instrument generates a carrier signal that is alternately modulated with a reference signal and then a test signal. The test signal frequency starts out at the lowest end of the frequency range the instrument is capable of transmitting and steps up to the high end start, stop and reference signals are switch-selectable. For example, 300 Hz to 3.4 kHz could be the test range, and 1kHz the reference. Delay is measured by comparing the delay of the envelopes recovered at each of the various test frequencies to the delay of the reference signal.

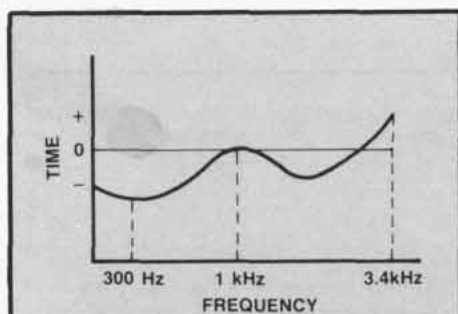


Figure 5. 3770A/B Analyzer performing an envelope delay measurement. A carrier signal is alternately modulated with a reference signal and then a swept series of test signals. Each separate test signal is compared back to the reference signal. The relative group delay of the channel at the two frequencies is measured by comparing the delay of the envelope recovered during the measuring period with that recovered during the reference period.

Delay Compensation Networks

Where amplitude response of a circuit is unsatisfactory, a filter is used to introduce a controlled amount of loss at certain frequencies to obtain the desired performance. In a carrier system, the channel bandpass filters which isolate individual channels from each other are the principal sources of delay distortion. These filters should have uniform amplitude response within a desired band of frequencies, but must exhibit a very

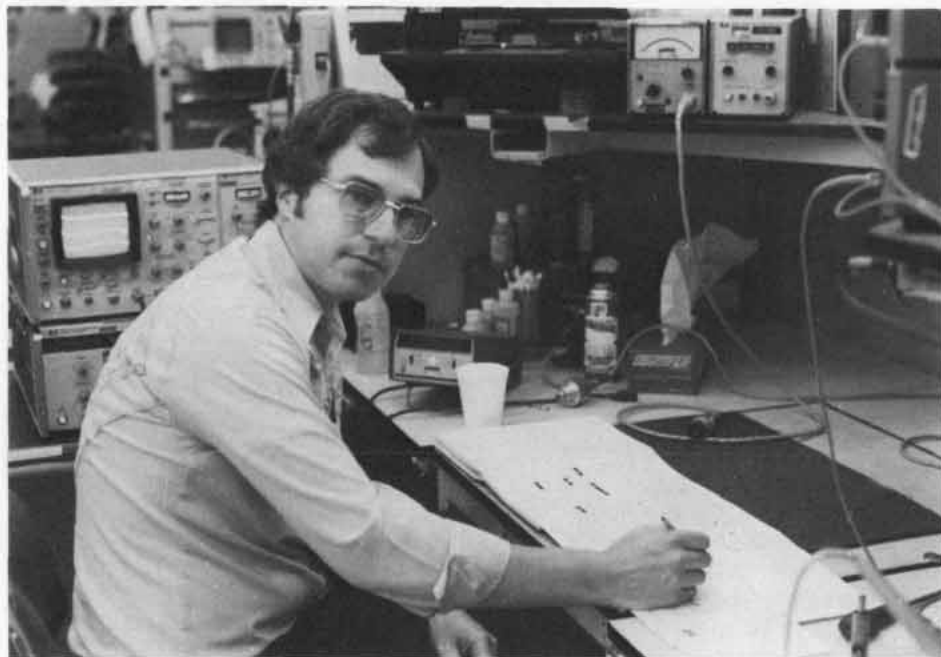
rapid attenuation of all frequencies outside the desired band. Unfortunately, such rapid change in the attenuation characteristic of a filter is also accompanied by rapid changes in the phase shift.

In the case of excessive relative delay, a network which would correct the phase shift characteristics of the communications channel might very well neutralize the desired attenuation of the filters responsible for the delay. Special delay equalizers called elliptical all-pass filters are required to overcome this problem. Without getting into filter theory, it will suffice to say that these filters are complex and their component values are usually calculated by computer. In typical applications, these filter networks generally contain several adjustable components so that the group delay response can be adjusted for flatness

while being observed on the CRT of a group delay detector.

Summary

In conclusion, there are several important points to remember. Group delay is a transit time phenomena. Group delay distortion causes audio distortion in communication links. This cannot be eliminated, but it can be compensated for by special filters. Relative group delay can be measured by a unique application of a phase lock loop and displayed graphically on a CRT. Group delay distortion is not an absolute measurement, but a relative measurement. The actual transit time of a signal through a communication link is not important. It is the changes or fluctuations in the transit time from one frequency to another expressed as group delay distortion that is important.



Dan Braun, who has been with Hewlett-Packard 5 years, is an instrument service technician at the HP Customer Service Center in Mt. View, California. As you can probably tell from the nature of the article, Dan's primary responsibilities are the repair and calibration of HP's microwave test equipment.

Born and raised in the San Francisco Bay Area, Dan attended College of San Mateo where he obtained his AA degree. He furthered his electronic background in Class A school while serving 6 years in the Navy. Dan and his wife, Frieda, live in San Jose, California.

A Quick Guide to Batteries

(Editor's Note: The following article appeared in the Electronic Buyers' News and is reproduced with permission of CMP Publications Inc.)

Even though the electrochemical fabrication of the most commonly used batteries has been known for more than a century, new and improved batteries are providing users an even widening choice of operating characteristics for meeting different requirements.

Consequently, this article attempts to define and explain many of today's batteries and their differing characteristics.

The term battery applies to a range of products classed as primary and secondary. Because their active materials are irreversibly consumed during periods of usage, primary batteries can't be recharged. However, recharging secondary batteries reconstitutes their active materials and permits them to be reused many times.

Strictly speaking, a battery is an assembly of two or more cells. The cells, each made up of two dissimilar electrodes, are in contact with an electrolyte within a closed container. The voltage output of the cell is a function of the electrochemical properties of the electrodes and the electrolyte. For systems in common use today, this ranges from 1.2 to 3.0 volts.

Every cell and battery has two important characteristics: voltage and discharge rate. Voltage higher than the cell voltage are obtained by connecting cells in series so that their voltages combine. For example, a 12-volt battery would consist of six 2-volt cells or eight 1.5-volt cells. In the early days of tube-type radio, there was a constant demand for 45- and 90-volt batteries, each requiring a large number of cells.

Discharge rate is expressed in ampere-hours or milliamper-hours. This is the product of current measured in amperes or milliamperes and the number of hours that the cell or battery can supply or discharge that amount of current. The abbreviations are Ahr and mAhr.

Primary Batteries

Until recently the choice of battery power was limited to the carbon-zinc (Leclanche) dry cell used for general-purpose applications such as flashlights and portable radios. Then the zinc-chloride versions of the carbon-zinc system offered significantly improved energy density, while the alkaline-manganese dioxide system provided a further improvement, the latter being suited for efficient powering of transistorized circuitry. Mercuric oxide and silver oxide met the need for compact button cells for hearing aids, calculators, cameras, and other special needs.

Carbon-Zinc Flashlight Battery



Carbon-Zinc (Leclanche). Still the most common and lowest cost primary system for general purposes, from toys and flashlights to transistorized radios and recorders, carbon-zinc batteries and cells account for at least half of the primary battery sales.

The cell consists of a positive carbon electrode and an electrolyte composed of manganese dioxide, ammonium chloride and zinc chloride

and water. The negative electrode is the zinc case. The voltage per cell is 1.5V. Cell sizes range from AAA to D and the lowest cost battery is the 9-V rectangular case size for transistorized products.

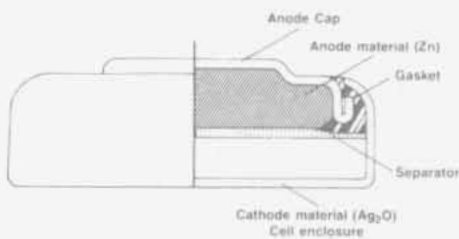
Carbon-Zinc (Zinc-Chloride). The zinc-chloride or heavy-duty version of the basic system provides about 50% more life for the same case size as the Leclanche version. Construction is similar except the ammonium chloride is omitted from the electrolyte. Cell voltage is 1.5V.

Alkaline Manganese Dioxide. The so-called alkaline cell is a further refinement of the basic carbon-zinc system, using the same positive and negative electrodes. Highly alkaline potassium hydroxide is used in place of zinc-chloride. Reportedly, these cells and batteries offer a twofold improvement in energy density over the carbon-zinc system for about twice the price. This system is better adapted for use where reliability and length of service offset the increased cost. Case sizes are similar and cell voltage is the same.

Mercuric Oxide Cells. The mercuric oxide cell has a higher electrical capacity for its size than either carbon-zinc or alkaline cells, providing 1.35 volts per cell. The cathode is mercuric oxide, the anode is zinc and the electrolyte is potassium hydroxide or sodium hydroxide. This system provides effective button-size cells for watches and hearing aids, but seems to be losing ground to the more effective silver-oxide systems.

Silver-Oxide Cells. Silver oxide cells provide more than twice the energy of carbon zinc cells of an equivalent size and offer more energy per unit volume than mercuric oxide cells. Available in two types, high drain and low drain, the silver oxide cathodes are paired to zinc anodes; and the electrolytes are potassium

Silver-Oxide Watch Battery



hydroxide or sodium hydroxide. These button-sized 1.55 cells are in wide demand for watches and hearing aids.

Magnesium Cells are primarily used in military applications due to their ability to withstand extremes in temperature and humidity and to provide energy after years of storage. A magnesium alloy is used for the anode; magnesium bromide for the electrolyte. Magnesium cells provide 1.8 volts per cell.

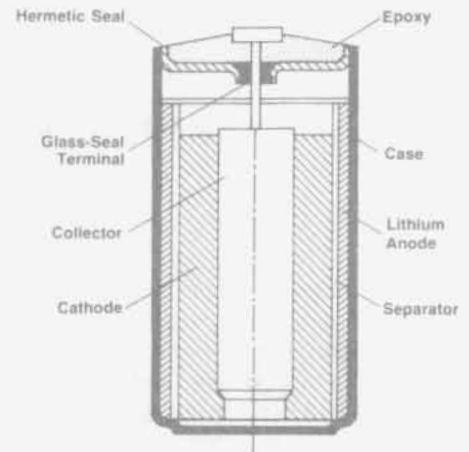
Zinc-Air Cells are high-energy primary systems available commercially today for hearing aid and

watch use. They use oxygen as the positive electrode, zinc as the negative electrode and feature an electrolyte of potassium hydroxide. Shelf life is excellent because they are only activated by removing the tape from a tiny hole, which admits air. The zinc air cell provides 1.5 volts per cell.

Lithium Cells. The term lithium cell or battery applies to a number of different electrochemical systems capable of producing from 1 to 4 volts per cell. Lithium is used as the negative electrode in all of them, but the voltage and operating characteristics are determined by the choice of cathode and electrolyte. All of the systems employ highly reactive alkali metals prepared without the use of water, so they are classed as non-aqueous.

At present, lithium systems in use or under investigation are also classed as either solid or liquid. In the solid

Lithium Cell



systems, the cathode is a metal halide, sulfide or oxide, and the electrolytes are lithium salts in organic solvent. The liquid systems have soluble reactants with catalytic materials (sulfur dioxide or thionyl chloride). The electrolytes in the liquid units can be organic or inorganic.

The Type Used in HP Calculators

Rechargeable Nicads

Nickel-cadmium batteries are often blamed for early failure when in fact, you have been abusing the poor things all along without realizing it. And true to Murphy's law, your device will go dead when you need it the most and do not have the charger with you; or you do have the charger, but there's no AC power available.

To demonstrate proper nicad use, let's look at the nicad cells used by Hewlett-Packard calculators. These cells, according to their manufacturer, should average approximately 500 charge/discharge cycles. Sometimes your treatment of these batteries may shorten or appear to shorten their useful life. Of

course, subjecting nicads to excessive temperatures will guarantee to shorten their life. But the way you use the calculator and charge the batteries can also affect their performance.

The ideal charge/discharge cycle is as follows: 1) fully charge the nicads on the recharger; 2) remove the recharger and operate the calculator on battery power until a low level indication occurs; 3) recharge fully on recharger. This method results in maximum battery performance. Actually most people do not use their calculators in this manner, but rather in the broad spectrum between two extremes. Those two

extremes are excessively deep discharging and continual recharger use.

Continual Recharger Use

Continual recharger use does not harm the calculator or batteries. If the calculator is used in a combination of recharger and battery power, and if the battery is discharged to a *different* level each charge/discharge cycle, no harm is done. If, however, a battery is subjected to a repetitive depth of discharge over a period of many months, a phenomenon known as memory may result. Memory is an apparent temporary loss of capacity. To illustrate, suppose a calculator is kept on the recharger continually, except for a 5-minute period each day when it is used on battery power. Over a long period of time, the nickel-cadmium batteries begin to "remember" the capacity they

Though lithium systems cost less than silver oxide materials, their manufacturing costs are higher. They can replace mercury and silver based systems where their voltages are about equal, but the higher lithium voltages may call for circuit or product redesign.

Lithium battery systems can present potential safety hazards because of their higher energy content, higher reactivity and the unusual nature of the materials involved. Most often, they are seen as supplementing rather than replacing silver oxide systems. But lithium cells have the highest watt hours per cubic inch (Whr/in^3) and their hermetically sealed cells afford a shelf life in excess of five years.

Secondary Batteries

Lead-Acid Cell. Storage batteries made of multiple lead-acid cells are the most widely used rechargeable batteries.

The positive electrodes of lead-acid cells are made of lead peroxide and the negative electrodes are made of sponge lead paste. The groups of positive and negative plates are interleaved and spaced by separators. The complete assembly is placed in an electrolyte of diluted sulfuric acid. A storage battery is made up of separate compartments or cells, each with its own filler and vent plug. The voltage of each cell is approximately 2 volts. Actually, automobile batteries use cells of 2.1 volts so the combinations of 6 cells provides 12.6 volts.

An interesting sidelight can be shown when you compare high cost vs low cost automobile batteries within the same group (i.e. group being a standard size of battery such as 24F). In general, the low cost battery will have fewer plates (less lead, hence lower cost), and have a lower ampere-hour rating than the high cost battery. One quick way to verify this is to weigh the two batteries.

Obviously, the battery with more plates has more lead and therefore weighs more. It also lasts longer when you inadvertently leave your lights on. It also can provide more cranking power for cold morning starts.

Of more interest to the electronics industry for the continuous power of remote instrumentation sensors, TV sets, medical instruments and truly portable tools is the true sealed lead-acid battery. No acid or vapor is vented and all evolved oxygen gas is recombined with the plate materials. These batteries and cells are presently limited to lower watt-hour ratings than the maintenance-free batteries. Although some of the cases are flashlight cell size, these sealed lead-acid cells are not interchangeable with either carbon zinc and alkaline cells.

There are a number of different proprietary methods for making sealed lead-acid cells. Some makers are

are expected to deliver each day, and they then will deliver no more than that amount. Memory is completely reversible by a few complete charge/discharge cycles (from full charge down to low level indication).

Deep Discharge

The other extreme encountered is excessive deep discharging of batteries. This is potentially the most damaging to nicad cells. In most cases, the cause of failure when a battery is too deeply discharged is an internal short. Normally a charged or partially-charged cell has enough internal energy to vaporize a short. However, when a cell has been too deeply discharged, the cell does not have enough internal energy to clear or prevent a potential short. The result is that with a number of

deep discharge cycles, the chances of shorting increase. There are two varieties of shorts possible — a low-impedance and a high-impedance short. A low-impedance shorted cell will not respond to any level of recharging current. A high-impedance shorted cell can recover under high charging currents (2A to 4A). However, the shelf life of this cell is very short as it actually discharges itself through its own internal short. Consequently, both low-impedance and high-impedance shorted cells are considered permanent failures. Another type of failure associated with deep discharge is called cell reversal. In a multi-cell battery, deep discharge will cause one cell to become exhausted first, since cells cannot be precisely matched in capacity. The cell with remaining capacity drives the exhausted cell into a reverse state of charge which is cell

reversal. This is a permanent failure, and the battery pack must be replaced.

The problem of discharging your battery too deeply does not always disappear even when you have been made aware of the situation. A malfunctioning low-level detect system could be the guilty culprit.

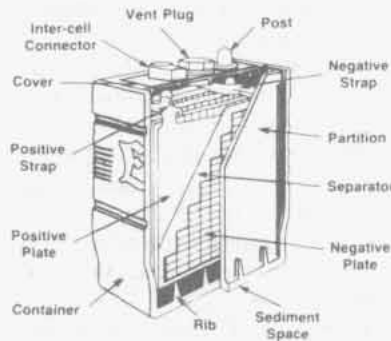
We won't discuss catastrophic cell failure in the form of venting since it is an easily recognizable problem requiring battery replacement. Excessive temperature, excessive overcharge, cell reversal, and misuse or abuse of nicads are all causes of venting.

So remember, to get an average of 500 charge/discharge cycles out of your HP calculator Nicads, give it a full charge, use it until all the decimal points light up, then give it another full charge.

using very thin, spirally wound positive and negative plates, with the liquid electrolyte contained in a separator. Other makers are using a gelled sulfuric acid electrolyte. All of these cells, however, have safety vents, usually resealable membranes, to prevent the cell from exploding in the event of accidental overcharge.

Nickel-Cadmium Cell. The nickel-cadmium cell can be recharged many times and has almost constant voltage during discharge. These cells operate well at low temperatures and can be hermetically sealed.

Lead-Acid Automobile Battery



In the charged condition, the positive electrode is nickel hydroxide and the negative electrode is metallic cadmium. The electrolyte is a

solution of potassium hydroxide. The average operating voltage is about 1.2 volts.

Nickel-cadmium power sources are divided into the low watt-hour units suitable for calculators, walkie-talkie portable radios and portable tools, not to mention vented versions with higher ratings which are widely used in aircraft ignition systems. Sealed nickel-cadmium cells are made in button sizes through the range of flashlight "D" cells. Rechargers are supplied with the consumer product as part of a line-cord transformer-rectifier assembly.

Recommended Spare Parts Kit For HP Products

SPARES

Spare Parts — Anticipated Requirements Evaluation System

The last issue of Bench Briefs showed you a simple system for ordering parts directly from HP (MOP for Mail Order Parts) so you could avoid the \$20 minimum charge. Now, here is a way to put it to use — replenishing spare parts kits.

SPARES is the name of a computer program used by HP to generate recommended spare parts lists for most HP products. After purchasing the recommended spare parts kit, if your instrument should ever need repair, there is a 90% probability of having the part available. Probability is even higher if spares are replenished as they are used.

Multiple Lists

Recommendations can be made for a single product (1 each 5245L), a quantity of identical products (96 each 5245L), or a combination list for various quantities of different products (6 each 412A, 27 each 1707A, and 9 each 5245L). Recommendations can be made for a spare parts inventory of one year up to nine years.

Long-Term Packaging

Long-term and military-standard packaging is optional. The process used for long-term packaging increases the kit's shelf life because each part is individually packaged and marked. This provides easy identification and protection against destructive effects of weather and atmospheric conditions while in storage.

For more information about SPARES, contact your local HP Sales and Service office. Reference the HP Corporate Parts Center Policies and Procedures Manual, Section 3080.

Replacement Part Cross Reference

When selecting replacement parts for your HP products, you may notice that many manuals list only an HP part number for the part, even though it appears that this part is manufactured by one of the large semiconductor manufacturers. Service personnel often ask why only HP part numbers are listed.

It is recommended that HP replacement parts be used to ensure that the original performance of the product will be obtained. While some parts used in HP instruments are identical to that which can be purchased at a local electronics distributor, many times parts will be selected for certain characteristics, such as gain, bandwidth, capaci-

tance, etc. There may also be slight mechanical differences, such as the shaping or length of leads. In some cases special quality checks are employed to ensure that high reliability parts are used at the factory and at HP field offices.

Therefore, we suggest obtaining replacement parts from HP to maintain the quality that you have paid for in your instrument. There may be situations however where HP replacement parts are not in stock and substituting parts will allow you to return the product to service immediately. In these cases it may be worthwhile to see if a substitute part will work in the circuit. Perhaps an HP part could be ordered and installed at some later date.

To help you in these situations, here's a cross-reference of HP integrated circuit part numbers to manufacturers "generic type" part numbers (whom in most cases is the originator of the part). Even though the cross-reference only lists one manufacturer, there may actually be several approved sources for an HP part. While every attempt was made to ensure the accuracy of the list, it is advisable to compare the description of the device being replaced with the description of the substituted part. For example, if the service manual describes the device being replaced as a "dual J-K flip-flop", check this against the description of the replacement part.

Manufacturers Code Number Cross Reference

Number	Manufacturer	Location	Number	Manufacturer	Location
00039	Nippon Electric Co.	Tokyo, JP	03334	Amperex Elek. Corp. Semicon. & MC Div.	Slatersville, RI
00350	Exar Integrated Systems Inc.	Sunnyvale, CA	03406	National Semiconductor Corp.	Santa Clara, CA
00575	Western Digital Corp.	Newport Beach, CA	03545	Teledyne Philbrick Nexus	Dedham, MA
01590	Plessey Semiconductors	Santa Ana, CA	03658	Optimax Inc.	Colmar, PA
01698	Texas Instr. Inc. Semicond. Cmpnt. Div.	Dallas, TX	03677	American Micro Systems Inc.	Santa Clara, CA
01795	Synertek	Santa Clara, CA	03714	Intersil Inc.	Cupertino, CA
01876	HP Div. 02 Santa Clara IC's 86	Santa Clara, CA	03755	Hybrid Systems Corp.	Burlington, MA
01921	RCA Corp. Solid State Div.	Somerville, NJ	03758	Electronic Arrays, Inc.	Mountain View, CA
01973	GE Co. Semiconductor Prod. Dept.	Auburn, NY	03780	Intech Inc.	Santa Clara, CA
01991	Transitron Electronic Corp.	Wakefield, MA	03794	Advanced Micro Devices Inc.	Sunnyvale, CA
02023	Illinois Tool Works Inc. Licon Div.	Chicago, IL	03795	Motorola Inc.	Franklin Park, IL
02037	Motorola Semiconductor Products	Phoenix, AZ	03799	Harris Semicon. Div. Harris-Intertype	Melbourne, FL
02180	Precision Monolithics Inc.	Santa Clara, CA	03811	Intel Corp.	Mountain View, CA
02237	Fairchild Semiconductor Div.	Mountain View, CA	04078	Mostek Corp.	Carrlton, TX
02290	Raytheon Co. Semiconductor Div. HQ	Mountain View, CA	04092	Monolithic Memories Inc.	Sunnyvale, CA
02569	Crystalonics, Div. Teledyne	Cambridge, MA	04183	Nitron Div. McDonnell Douglas Corp.	Cupertino, CA
02598	Unitrode Corp.	Watertown, MA	04200	Sprague Electric Co.	North Adams, MA
02634	Sprague Elect. Co. Semiconductor Div.	Concord, NH	05436	Burr Brown Co.	Tucson, AZ
02713	General Instr. Corp. Semicon. Prod. GP	Hicksville, NY	06338	SGS Ates	Milan, IT
02763	Teledyne Semiconductor	Mountain View, CA	06545	Lambda Electronics Corp.	Melville, NY
02838	Dynamic Measurements Corp.	Winchester, MA	06563	Siemens Corp. Components Group	Scottsdale, AZ
02882	Zeltex Inc. Sub. of Redcor Corp.	Concord, CA	06852	Data Delay Devices	Clifton, NJ
02883	Siliconix	Santa Clara, CA	07653	Zilog Inc.	Cupertino, CA
02910	Signetics Corp.	Sunnyvale, CA	07810	Texas Instruments France	Nice, FR
03183	HP Div. 22 Data Systems	Cupertino, CA	07915	Hytek Microsystems Inc.	San Diego, CA
03285	Analog Devices Inc.	Norwood, MA			

HP P/N Mfr. Desc.

1#13-0013	03285	4Nk	1#13-0049	02763	2740CE	1#13-0092	05436	MACRO-CCD-V
1#13-0014	05436	3112/12C	1#13-0072	03795	*1091A-7.50MHZ	1#13-0093	02237	JA7PM125C
1#13-0034	03714	145010PPD	1#13-0071	03795	*1091A-8.0120MHZ	1#13-0094	05436	MACRO-CHI-I
1#13-0035	03285	243A(SPPC)	1#13-0076	04092	ΔM01540	1#13-0098	05436	ΔMCR0G-1P
1#13-0036	03755	MAC372-12-RCII	1#13-0077	03406	LM0024PH	1#13-0100	02237	JA7PM05KC
1#13-0039	02482	70441	1#13-0078	03406	LM0021CK	1#13-0105	05436	MACRO-CHI-V
1#13-0040	02482	70440	1#13-0081	03795	K1160A-10.300MHZ	1#13-0109	02598	PIC625
1#13-0041	03795	K10042CH	1#13-0082	03795	K1100A-10.480MHZ	1#13-0110	02598	PIC626
1#13-0043	03795	K1001A-10.48575FMHZ	1#13-0084	03795	ΔM1207-003	1#13-0114	02598	PIC645
1#13-0045	03795	K1001A-5.0MHZ	1#13-0087	03795	K1115A-10MHZ	1#13-0115	02598	PIC689
1#13-0046	03795	K1100A-15MHZ	1#13-0081	03795	K1100APR.500	1#13-0114	03795	K1100A-9.8304MHZ
1#13-0047	03795	K1001A-5.0MHZ	1#13-0082	02598	PIC646	1#13-0117	03795	K1100A-1.702MHZ
1#13-0048	03795	K1100A-15MHZ	1#13-0084	02598	PIC681	1#13-0119	03795	K1100A-40MHZ
1#13-0047	03795	K1001A-10.0MHZ	1#13-0086	02598	PIC611	1#13-0120	06452	ΔM0A-4510A
1#13-0044	03285	751H	1#13-0089	03795	K1100A-27MHZ	1#13-0121	03795	K1114A-10.1376MHZ

HP P/N	Mfr.	Desc.							
1A16-1301	02237	Q3A48PC PROGRAMMED	1A18-0173	03758	F44900 MASKED	1A18-0342	03911	02101A-4	
1A16-1302	01698	SN74522RN PROGRAMMED	1A18-0174	03758	F44900 MASKED	1A18-0344	04794	AM91010PC	
1A16-1303	02237	Q3A48PC PROGRAMMED	1A18-0175	03758	F44900 MASKED	1A18-0344	02277	2102LHPC	
1A16-1304	02237	Q3A48PC PROGRAMMED	1A18-0176	03758	F44900 MASKED	1A18-0347	03794	AM92160NC MASKED	
1A16-1305	02237	Q3A48PC PROGRAMMED	1A18-0181	01698	MS4050-1JL	1A18-0353	03794	AM92160DC MASKED	
1A16-1306	02237	Q3A48PC PROGRAMMED	1A18-0182	02037	MC6590L MASKED	1A18-0354	03794	AM92160NC MASKED	
1A16-1307	02237	Q3A48PC PROGRAMMED	1A18-0183	02037	MC6590L MASKED	1A18-0355	03794	AM92160DC MASKED	
1A16-1308	02237	Q3A48PC PROGRAMMED	1A18-0184	02037	MC6590L MASKED	1A18-0356	03794	AM92160DC MASKED	
1A16-1309	02237	Q3A48PC PROGRAMMED	1A18-0185	02037	MC6590L MASKED	1A18-0357	03794	AM92160DC MASKED	
1A16-1309	02237	Q3A48PC PROGRAMMED	1A18-0186	02037	MC6590L MASKED	1A18-0360	03794	AM91310DC	
1A16-1310	03799	HM1-7611-5 PROGRAMMED	1A18-0187	02037	MC6590L MASKED	1A18-0361	02037	MC6A332L PROGRAMMED	
1A16-1310	03799	HM1-7611-5 PROGRAMMED	1A18-0188	02037	MC6590L MASKED	1A18-0362	02037	MC6A332L PROGRAMMED	
1A16-1312	03799	HM1-7611-5 PROGRAMMED	1A18-0189	02037	MC6590L MASKED	1A18-0363	02037	MC6A332L PROGRAMMED	
1A16-1313	01698	SN74522ARJ PROGRAMMED	1A18-0197	03794	AM91111RDC	1A18-0364	02037	MC6A332L PROGRAMMED	
1A16-1314	04092	6282-1J MASKED	1A18-0199	03794	AM91112APC	1A18-0373	04078	MS34009P-3 MASKED	
1A16-1315	04092	A260-1J MASKED	1A18-0201	03758	F44900 MASKED	1A18-0375	02037	MC6A590L MASKED	
1A16-1321	02910	NA25115F PROGRAMMED	1A18-0202	03758	F44900 MASKED	1A18-0381	03794	AM91110PC	
1A16-1322	02910	NA25115F PROGRAMMED	1A18-0203	02910	2A171 MASKED	1A18-0382	03911	CA316A MASKED	
1A16-1323	02910	NA25115F PROGRAMMED	1A18-0204	03758	F44900 MASKED	1A18-0383	03811	CA316A MASKED	
1A16-1324	02910	NA25291N PROGRAMMED	1A18-0205	02910	2A171 MASKED	1A18-0384	03811	CA316A MASKED	
1A16-1325	02910	NA25291N PROGRAMMED	1A18-0206	02910	2A171 MASKED	1A18-0385	03811	CA316A MASKED	
1A16-1326	02910	NA25291N PROGRAMMED	1A18-0207	02910	2A171 MASKED	1A18-0386	03811	CA316A MASKED	
1A16-1327	02910	NA25291N PROGRAMMED	1A18-0208	03794	AM92160DC MASKED	1A18-0389	03794	AM91300DC	
1A16-1328	04092	A260-1J MASKED	1A18-0209	03794	AM92160DC MASKED	1A18-0390	03794	AM91300DC	
1A16-1329	01698	SN74547AN	1A18-0210	03794	AM92160DC MASKED	1A18-0390	03714	TM650R10E	
1A16-1330	02910	NA25115N PROGRAMMED	1A18-0211	03794	AM92160DC MASKED	1A18-0391	01698	MS411A-25JL SELECTN	
1A16-1331	02910	NA25115N PROGRAMMED	1A18-0212	02910	2A171 MASKED	1A18-0392	03794	AM92160DC MASKED	
1A16-1332	02910	NA25115N PROGRAMMED	1A18-0213	02910	2A171 MASKED	1A18-0393	03794	AM92160DC MASKED	
1A16-1333	02910	NA25123F PROGRAMMED	1A18-0214	03794	AM92160DC MASKED	1A18-0395	02037	MC6A832P MASKED	
1A16-1334	02237	Q3A720C	1A18-0215	03794	AM92160DC MASKED	1A18-0396	02037	MC6A832P MASKED	
1A16-1335	02037	MC610152L	1A18-0216	02037	MC6A832L MASKED	1A18-0396	02037	MC6A832P MASKED	
1A16-1336	02910	NA25185I PROGRAMMED	1A18-0217	02037	MC6A832L MASKED	1A18-0397	02037	MC6A832P MASKED	
1A16-1337	02910	NA25185I PROGRAMMED	1A18-0218	02037	MC6A832L MASKED	1A18-0398	02037	MC6A832P MASKED	
1A16-1338	02237	10145APC	1A18-0219	02037	MC6A832L MASKED	1A18-0400	02037	MC6A832P MASKED	
1A16-1339	03406	DM8A78CAR/N	1A18-0219	02037	MC6A832L MASKED	1A18-0401	03794	AM92160DC MASKED	
1A16-1340	01698	SN74511AN PROGRAMMED	1A18-0220	02037	MC6A832L MASKED	1A18-0402	03794	AM92160DC MASKED	
1A16-1341	03406	DM74522RN PROGRAMMED	1A18-0221	02037	MC6A832L MASKED	1A18-0402	03794	AM92160DC MASKED	
1A16-1342	03406	DM74522RN PROGRAMMED	1A18-0222	02037	MC6A832L MASKED	1A18-0403	03794	AM92160DC MASKED	
1A16-1343	02910	NA25181F PROGRAMMED	1A18-0222	02037	MC6A832L MASKED	1A18-0403	03794	AM92160DC MASKED	
1A16-1344	02910	NA25181F	1A18-0222	02037	MC6A832L MASKED	1A18-0404	03794	AM92160DC MASKED	
1A16-1345	03811	Q3624A PRDG	1A18-0223	02037	MC6A832L MASKED	1A18-0405	03794	AM92160DC MASKED	
1A16-1346	03811	Q3624A PRDG	1A18-0224	02037	MC6A832L MASKED	1A18-0406	03794	AM92160DC MASKED	
1A16-1347	03811	Q3624A PRDG	1A18-0224	02037	MC6A832L MASKED	1A18-0407	03794	AM92160DC MASKED	
1A16-1348	03811	Q3624A PRDG	1A18-0224	02037	MC6A832L MASKED	1A18-0408	03794	AM92160DC MASKED	
1A16-1349	03811	Q3624A PRDG	1A18-0224	02037	MC6A832L MASKED	1A18-0409	03794	AM92160DC MASKED	
1A16-1350	03811	Q3624A PRDG	1A18-0224	02037	MC6A832L MASKED	1A18-0410	03794	AM92160DC MASKED	
1A16-1351	03714	MS56100PE PRGRAMMED	1A18-0224	02037	MC6A832L MASKED	1A18-0411	03794	AM92160DC MASKED	
1A16-1352	01698	SN74522ARJ PRGM	1A18-0224	02037	MC6A832L MASKED	1A18-0412	03794	AM92160DC MASKED	
1A16-1353	01698	SN74522ARJ PRGM	1A18-0224	02037	MC6A832L MASKED	1A18-0413	03794	AM92160DC MASKED	
1A16-1354	01698	SN74522ARJ PRGM	1A18-0224	02037	MC6A832L MASKED	1A18-0414	03794	AM92160DC MASKED	
1A16-1355	01698	SN74522ARJ PRGM	1A18-0224	02037	MC6A832L MASKED	1A18-0415	03794	AM92160DC MASKED	
1A16-1356	01698	SN74522ARJ PRGM	1A18-0224	02037	MC6A832L MASKED	1A18-0416	03794	AM92160DC MASKED	
1A16-1357	01698	SN74522ARJ PRGM	1A18-0224	02037	MC6A832L MASKED	1A18-0417	03794	AM92160DC MASKED	
1A16-1358	01698	SN74522ARJ PRGM	1A18-0224	02037	MC6A832L MASKED	1A18-0418	03794	AM92160DC MASKED	
1A16-1359	04092	A241-1N MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0419	03794	AM92160DC MASKED	
1A16-1360	04092	A241-1N MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0420	03794	AM92160DC MASKED	
1A16-1361	02910	NA25181N PROGRAMMED	1A18-0224	02037	MC6A832L MASKED	1A18-0421	03794	AM92160DC MASKED	
1A16-1362	01698	SN74522ARJ PRGM	1A18-0224	02037	MC6A832L MASKED	1A18-0422	02237	37510DC	
1A16-1363	01698	SN74522ARJ PRGM	1A18-0224	02037	MC6A832L MASKED	1A18-0425	03811	P2101A-2	
1A16-1364	01698	SN74522ARJ PRGM	1A18-0224	02037	MC6A832L MASKED	1A18-0433	03794	AM92160DC MASKED	
1A16-1365	04092	A241-1N MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0434	03794	AM92160DC MASKED	
1A16-1366	04092	A241-1N MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0435	03794	AM92160DC MASKED	
1A16-1367	02910	NA25181N PROGRAMMED	1A18-0224	02037	MC6A832L MASKED	1A18-0436	03794	AM92160DC MASKED	
1A16-1368	01698	SN74522ARJ PRGM	1A18-0224	02037	MC6A832L MASKED	1A18-0437	03794	AM92160DC MASKED	
1A16-1369	01698	SN74522ARJ PRGM	1A18-0224	02037	MC6A832L MASKED	1A18-0438	01698	MS4045-45JL	
1A16-1369	03799	HM1-7611-5 PROGRAMMED	1A18-0224	02037	MC6A832L MASKED	1A18-0439	03799	HM1-65A18-9	
1A16-2051	04092	A200-1J MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0440	03406	MS5269N	
1A16-2052	04092	A200-1J MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0441	03794	AM92160DC MASKED	
1A16-2053	04092	A200-1J MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0442	03794	AM92160DC MASKED	
1A16-2054	04092	A200-1J MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0443	01698	MS4045-30NL	
1A16-2055	04092	A200-1J MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0443	03794	AM92160DC MASKED	
1A16-2056	04092	A200-1J MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0444	03794	AM92160DC MASKED	
1A16-2057	04092	A200-1J MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0445	03794	AM92160DC MASKED	
1A16-2058	04092	A200-1J MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0446	03794	AM92160DC MASKED	
1A16-2059	04092	A200-1J MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0449	03811	P4002-1	
1A18-0037	03811	C1702A PROGRAMMED	1A18-0224	02037	MC6A832L MASKED	1A18-0451	02037	MC6A590P2 MASKED	
1A18-0061	03406	MS5241ARLN	1A18-0224	02037	MC6A832L MASKED	1A18-0452	01698	MS5270AJL PROGRAMMED	
1A18-0093	02237	3741DC	1A18-0224	02037	MC6A832L MASKED	1A18-0453	01698	MS5270AJL PROGRAMMED	
1A18-0094	00575	PD1472H-01	1A18-0224	02037	MC6A832L MASKED	1A18-0454	01698	MS5270AJL PROGRAMMED	
1A18-0095	00575	PT1482H-01	1A18-0224	02037	MC6A832L MASKED	1A18-0455	01698	MS5270AJL PROGRAMMED	
1A18-0096	01698	MS22501NC	1A18-0224	02037	MC6A832L MASKED	1A18-0456	01698	MS5270AJL PROGRAMMED	
1A18-0100	03406	MS 521A BJW/N	1A18-0224	02037	MC6A832L MASKED	1A18-0456	01698	MS5270AJL PROGRAMMED	
1A18-0102	01698	MS4103NC	1A18-0224	02037	MC6A832L MASKED	1A18-0457	01698	MS5270AJL PROGRAMMED	
1A18-0103	01698	MS4030JL	1A18-0224	02037	MC6A832L MASKED	1A18-0459	01698	MS5270AJL PROGRAMMED	
1A18-0104	03811	C1062A MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0460	01698	MS5270AJL PROGRAMMED	
1A18-0105	03811	C1302 MASKED	1A18-0224	02037	MC6A832L MASKED	1A18-0461	01698	MS5270AJL PROGRAMMED	
1A18-0106	03406	MS5261N	1A18-0224	02037	MC6A832L MASKED	1A18-0462	01698	MS5270AJL PROGRAMMED	
1A18-0107	03714	MS7512CPE	1A18-0224	02037	MC6A832L MASKED	1A18-0463	01698	MS5270AJL PROGRAMMED	
1A18-0108	02037	KA05L-1	1A18-0224	02037	MC6A832L MASKED	1A18-0464	01698	MS5270AJL PROGRAMMED	
1A18-0114	04078	MS4096-3	1A18-0224	02037	MC6A832L MASKED	1A18-0465	01698	MS5270AJL PROGRAMMED	
1A18-0115	03677	P1103A	1A18-0224	02037	MC6A832L MASKED	1A18-0466	01698	MS5270AJL PROGRAMMED	
1A18-0125									

HP P/N	Mfr.	Desc.						
1A18-0499	03406	MM5241N MASKED	1A18-0614	03794	AM9216RDC MASKED	1A18-0732	01795	SYP231AR MASKED
1A18-0500	03794	AM9216COC MASKED	1A18-0616	03794	AM9216RDC MASKED	1A18-0733	01698	TMS4732NL MASKED
1A18-0501	03794	AM9216RDC MASKED	1A18-0617	03794	AM9216RDC MASKED	1A18-0734	01698	TMS4732NL MASKED
1A18-0502	03794	AM9216RDC MASKED	1A18-0618	03794	AM9216RDC MASKED	1A18-0735	03811	PA155
1A18-0503	03794	AM9216RDC MASKED	1A18-0619	03794	AM9216RDC MASKED	1A18-0736	02037	MCMA6832PP MASKED
1A18-0504	03794	AM9216RDC MASKED	1A18-0620	03794	AM9216RDC MASKED	1A18-0739	03406	MM5244J PROGRAMMED
1A18-0505	02910	2A07N MASKED	1A18-0621	03794	AM9216RDC MASKED	1A18-0740	03406	MM5244J PROGRAMMED
1A18-0506	02910	2A07N MASKED	1A18-0622	03794	AM9216RDC MASKED	1A18-0741	03406	MM5244J PROGRAMMED
1A18-0507	02910	2A07N MASKED	1A18-0623	03794	AM9216RDC MASKED	1A18-0742	03406	MM5244J PROGRAMMED
1A18-0508	03406	MM5280N-5	1A18-0624	03794	AM9216RDC MASKED	1A18-0743	01698	TMS2716JL
1A18-0509	01698	TMS4116-15JL SELCTO	1A18-0625	03794	AM9216RDC MASKED	1A18-0744	03714	P2332 MASKED
1A18-0510	02037	MCMA6590P2 MASKED	1A18-0626	03794	AM9216RDC MASKED	1A18-0745	03406	MM5244J PROGRAMMED
1A18-0511	03794	AM9216RDC MASKED	1A18-0627	03794	AM9216RDC MASKED	1A18-0746	03794	AM9216RDC MASKED
1A18-0512	03794	AM9216RDC MASKED	1A18-0628	03794	AM9216RDC MASKED	1A18-0747	03794	AM9216RDC MASKED
1A18-0513	03794	AM9216RDC MASKED	1A18-0629	03794	AM9216RDC MASKED	1A18-0748	03794	AM9216RDC MASKED
1A18-0514	02037	MCMA6570P MASKED	1A18-0630	04143	MM7040J	1A18-0749	03794	AM9216RDC MASKED
1A18-0515	03794	AM9216RDC MASKED	1A18-0631	03183	1A42-0001 MASKED	1A18-0750	01698	TMS2700JL PROGRAMMED
1A18-0516	03794	AM9216RDC MASKED	1A18-0632	03183	1A42-0001 MASKED	1A18-0751	02037	MCMA6832L MASKED
1A18-0517	03794	AM9216RDC MASKED	1A18-0633	03183	1A42-0001 MASKED	1A18-0752	01698	TMS2700JL PROGRAMMED
1A18-0518	03794	AM9216RDC MASKED	1A18-0634	03183	1A42-0001 MASKED	1A18-0753	03406	MM7AC920N
1A18-0519	03794	AM9216RDC MASKED	1A18-0635	03183	1A42-0001 MASKED	1A18-0754	03406	MM7AC910N
1A18-0520	03794	AM9216RDC MASKED	1A18-0636	03183	1A42-0001 MASKED	1A18-0755	03794	AM9216RDC MASKED
1A18-0521	03794	AM9216RDC MASKED	1A18-0637	03183	1A42-0001 MASKED	1A18-0756	02910	2A07N MASKED
1A18-0522	03794	AM9216RDC MASKED	1A18-0638	03183	1A42-0001 MASKED	1A18-0757	02237	21L02FPC
1A18-0523	03794	AM9216RDC MASKED	1A18-0639	08183	1A42-0001 MASKED	1A18-0758	03794	AM9216RDC MASKED
1A18-0524	03794	AM9216RDC MASKED	1A18-0640	03183	1A42-0001 MASKED	1A18-0759	03794	AM9216RDC MASKED
1A18-0525	03794	AM9216RDC MASKED	1A18-0641	03183	1A42-0001 MASKED	1A18-0760	03794	AM9216RDC MASKED
1A18-0526	03794	AM9216RDC MASKED	1A18-0642	03183	1A42-0001 MASKED	1A18-0761	03794	AM9216RDC MASKED
1A18-0527	03794	AM9216RDC MASKED	1A18-0643	03811	P2114L	1A18-0762	01698	TMS2532JL
1A18-0528	03794	AM9216RDC MASKED	1A18-0644	01795	SYP2332 MASKED	1A18-0763	03794	AM9216RDC MASKED
1A18-0529	03794	AM9216RDC MASKED	1A18-0645	01795	SYP2332 MASKED	1A18-0764	03794	AM9216RDC MASKED
1A18-0530	03794	AM9216RDC MASKED	1A18-0646	01795	SYP2332 MASKED	1A18-0765	03794	AM9216RDC MASKED
1A18-0531	02910	2A07F MASKED	1A18-0647	01795	SYP2332 MASKED	1A18-0766	03794	AM9216RDC MASKED
1A18-0532	02037	MCMA6832PP MASKED	1A18-0648	01795	SYP2332 MASKED	1A18-0767	03794	AM9216RDC MASKED
1A18-0533	03794	AM9216RDC MASKED	1A18-0649	01795	SYP2332 MASKED	1A18-0768	03794	AM9216RDC MASKED
1A18-0534	03794	AM9216RDC MASKED	1A18-0650	01795	SYP2332 MASKED	1A18-0769	03794	AM9216RDC MASKED
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1A18-0536	01795	SYP2332 MASKED	1A18-0652	03183	1AC1-9XXX MASKED	1A18-0771	03811	P2115A
1A18-0537	01795	SYP2332 MASKED	1A18-0653	03183	1AC1-9XXX MASKED	1A18-0772	01795	SYP2314H MASKED
1A18-0538	01795	SYP2332 MASKED	1A18-0654	03794	AM9216RDC MASKED	1A18-0773	02713	PN-3-9316-B
1A18-0539	01795	SYP2332 MASKED	1A18-0655	03794	AM9216RDC MASKED	1A18-0774	02713	PN-3-9316-B
1A18-0540	01795	SYP2332 MASKED	1A18-0656	03794	AM9216RDC MASKED	1A18-0775	02713	PN-3-9316-B
1A18-0541	01795	SYP2332 MASKED	1A18-0657	03794	AM9216RDC MASKED	1A18-0776	03811	CA316A
1A18-0542	01795	SYP2332 MASKED	1A18-0658	03794	AM9216RDC MASKED	1A18-0777	03811	P2115A
1A18-0543	01795	SYP2332 MASKED	1A18-0659	03794	AM9216RDC MASKED	1A18-0778	03811	C2708 PROGRAMMED
1A18-0544	01795	SYP2332 MASKED	1A18-0660	03183	1AC2-YXXX MASKED	1A18-0779	03811	C2708 PROGRAMMED
1A18-0545	01795	SYP2332 MASKED	1A18-0661	03183	1AC2-YXXX MASKED	1A18-0780	03811	C2708 PROGRAMMED
1A18-0546	01795	SYP2332 MASKED	1A18-0662	03183	1AC2-YXXX MASKED	1A18-0781	03811	C2708 PROGRAMMED
1A18-0547	03794	AM9216RDC MASKED	1A18-0663	03183	1AC2-YXXX MASKED	1A18-0782	03811	C2708 PROGRAMMED
1A18-0548	03794	AM9216RDC MASKED	1A18-0664	03183	1AC2-YXXX MASKED	1A18-0783	03811	C2708 PROGRAMMED
1A18-0549	03794	AM9216RDC MASKED	1A18-0665	03183	1AC2-YXXX MASKED	1A18-0784	03811	C2708 PROGRAMMED
1A18-0550	03794	AM9216RDC MASKED	1A18-0666	03183	1AC2-YXXX MASKED	1A18-0785	03811	C2708 PROGRAMMED
1A18-0551	03811	P2112A	1A18-0667	03183	1AC2-YXXX MASKED	1A18-0786	02037	MCMA6832L MASKED
1A18-0552	03811	C2708 PROGRAMMED	1A18-0668	03794	AM9216RDC MASKED	1A18-0787	02037	MCMA6832L MASKED
1A18-0553	03811	C2708 PROGRAMMED	1A18-0669	03183	1AC1-YXXX MASKED	1A18-0788	02037	MCMA6832L MASKED
1A18-0554	03811	C2708 PROGRAMMED	1A18-0670	03183	1AC1-YXXX MASKED	1A18-0789	02037	MCMA6832L MASKED
1A18-0555	03811	C2708 PROGRAMMED	1A18-0671	03183	1AC1-YXXX MASKED	1A18-0790	02037	MCMA6832L MASKED
1A18-0556	03811	C2708 PROGRAMMED	1A18-0672	03183	1AC1-YXXX MASKED	1A18-0791	02037	MCMA6832L MASKED
1A18-0557	03811	C2708 PROGRAMMED	1A18-0673	03183	1AC1-YXXX MASKED	1A18-0792	02037	MCMA6832L MASKED
1A18-0558	03811	C2708 PROGRAMMED	1A18-0674	03183	1AC1-YXXX MASKED	1A18-0793	01795	SYP2332 MASKED
1A18-0559	03811	C2708 PROGRAMMED	1A18-0675	03183	1AC1-YXXX MASKED	1A18-0794	03811	C2716
1A18-0560	03811	C2708 PROGRAMMED	1A18-0676	03183	1AC1-YXXX MASKED	1A18-0795	01795	SYP2314A MASKED
1A18-0561	03811	C2708 PROGRAMMED	1A18-0677	03183	1AC1-YXXX MASKED	1A18-0796	03811	P2332 MASKED
1A18-0562	03811	P2114L3	1A18-0678	03183	1AC1-YXXX MASKED	1A18-0797	03811	P2332 MASKED
1A18-0563	03794	AM9216RDC MASKED	1A18-0679	03183	1AC1-YXXX MASKED	1A18-0798	03811	P2332 MASKED
1A18-0564	03794	AM9216RDC MASKED	1A18-0680	03183	1AC1-YXXX MASKED	1A18-0799	03811	P2332 MASKED
1A18-0565	03794	AM9216RDC MASKED	1A18-0681	03183	1AC1-YXXX MASKED	1A18-0800	03811	P2332 MASKED
1A18-0566	02713	FR2051	1A18-0682	03183	1AC1-YXXX MASKED	1A18-0801	03811	P2332 MASKED
1A18-0567	03794	AM9216RDC MASKED	1A18-0683	03183	1AC1-YXXX MASKED	1A18-0802	03811	P2332 MASKED
1A18-0568	03794	AM9216RDC MASKED	1A18-0684	03183	1AC1-YXXX MASKED	1A18-0803	03811	P2332 MASKED
1A18-0569	03794	AM9216RDC MASKED	1A18-0685	03183	1AC1-YXXX MASKED	1A18-0804	03811	P2332 MASKED
1A18-0570	03811	CA316A MASKED	1A18-0686	03183	1AC1-YXXX MASKED	1A18-0805	03811	P2332 MASKED
1A18-0571	03811	CA316A MASKED	1A18-0687	03183	1AC1-YXXX MASKED	1A18-0806	03811	P2332 MASKED
1A18-0572	02037	MCMA68317L MASKED	1A18-0688	03183	1AC1-YXXX MASKED	1A18-0807	03811	P2332 MASKED
1A18-0573	02037	MCMA68317L MASKED	1A18-0689	03183	1AC1-YXXX MASKED	1A18-0808	03811	P2332 MASKED
1A18-0574	02037	MCMA68317L MASKED	1A18-0690	02037	MCMA6832PP MASKED	1A18-0809	03811	P2332 MASKED
1A18-0575	02037	MCMA68317L MASKED	1A18-0691	02037	MCMA6832PP MASKED	1A18-0810	03811	P2332 MASKED
1A18-0576	02037	MCMA68317L MASKED	1A18-0692	02037	MCMA6832PP MASKED	1A18-0811	03811	P2332 MASKED
1A18-0577	02037	MCMA68317L MASKED	1A18-0693	02037	MCMA6832PP MASKED	1A18-0812	03811	P2332 MASKED
1A18-0578	02037	MCMA68308P MASKED	1A18-0694	02037	MCMA6832PP MASKED	1A18-0813	03811	P2332 MASKED
1A18-0579	03811	CA316A MASKED	1A18-0695	02037	MCMA6832PP MASKED	1A18-0814	03811	P2332 MASKED
1A18-0580	03794	AM9216RDC MASKED	1A18-0696	01795	SYP2314A MASKED	1A18-0815	03811	P2332 MASKED
1A18-0581	03794	AM9216RDC MASKED	1A18-0697	01795	SYP2314A MASKED	1A18-0816	03811	P2332 MASKED
1A18-0582	03794	AM9216RDC MASKED	1A18-0698	04078	MC38R1 MASKED	1A18-0817	03811	P2332 MASKED
1A18-0583	03794	AM9216RDC MASKED	1A18-0700	02037	MCMA6810P	1A18-0818	03811	P2332 MASKED
1A18-0584	03794	AM9216RDC MASKED	1A18-0701	02037	MCMA6810P	1A18-0819	03811	P2332 MASKED
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1A18-0586	03794	AM9216RDC MASKED	1A18-0703	01795	SYP2332 MASKED	1A18-0821	03811	P2332 MASKED
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1A18-0589	03794	AM9216RDC MASKED	1A18-0706	01795	SYP2314A MASKED	1A18-0850	03811	P2732
1A18-0590	03794	AM9216RDC MASKED	1A18-0707	02910	2A16N MASKED	1A18-0851	03811	R2716-1
1A18-0591	03794	AM9216RDC MASKED	1A18-0708	03677	SK101LP	1A18-0852	01698	2516
1A18-0592	03794	AM9216RDC MASKED	1A18-0709	01795	SYP214R-3 MASKED	1A18-0853	03794	2516
1A18-0593	03794	AM9216RDC MASKED	1A18-0710	01795	SYP2316B MASKED	1A18-0854	03794	AM9216RDC MASKED
1A18-0594	03794	AM9216RDC MASKED	1A18-0711	02910	2A16N MASKED	1A18-0855	03794	AM9216RDC MASKED
1A18-0595	03794	AM9216RDC MASKED	1A18-0712	01795	SYP2316B MASKED	1A18-0856	01698	TMS2516JL PROG
1A18-0596	03794	AM9216RDC MASKED	1A18-0713	01795	SYP2316B MASKED	1A18-0857	01698	TMS2516JL PROG
1A18-0597	03794	AM9216RDC MASKED	1A18-0714	01795	SYP2316B MASKED	1A18-0858	01698	TMS2516JL PROG
1A18-0598	03794	AM9216RDC MASKED	1A18-0715	01795	SYP2316B MASKED	1A18-0859	01698	TMS2516JL PROG
1A18-0599	03794	AM9216RDC MASKED	1A18-0716	01795	SYP2316B MASKED	1A18-0860	01698	TMS2516JL PROG
1A18-0600	03794	AM9216RDC MASKED	1A18-0717	01795	SYP2316B MASKED	1A18-0861	01698	TMS2516JL PROG
1A18-0601	03794	AM9216RDC MASKED	1A18-0718	01795	SYP2316B MASKED	1A18-0862	01698	TMS2516JL PROG
1A18-0602	03794	AM9216RDC MASKED	1A18-0719	01795	SYP2316B MASKED	1A18-0863	01698	TMS2516JL PROG
1A18-0603	03794	AM9216RDC MASKED	1A18-0720	01795	SYP2316B MASKED	1A18-0864	01698	TMS2516JL PROG
1A18-0604	03794	AM9216RDC MASKED	1A18-					

HP P/N	Mfr.	Desc.
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1A18-0842	03183	1A42-6200 MASKED
1A18-0843	03183	1A42-6201 MASKED
1A18-0844	01698	TM5473PML
1A18-0845	03811	P2142
1A18-0846	02713	0n-3-9316 MASKED
1A18-0847	02713	0n-3-9316 MASKED
1A18-0848	02713	0n-3-9316 MASKED
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1A18-0902	02713	0n-3-9316 MASKED
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1A20-0045	02237	971PC
1A20-0046	01921	CA3005
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1A20-0048	02237	941HC
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1R20-0462	02910	NR251N
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1R20-0707	01698	SN74L141N
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1R20-0796	02037	MC1A62L
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1R20-0870	01698	SN7408J
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1A20-0429	01921	CA4022AF	1A20-1069	0169A	SN54H60J	1A20-1214	0169A	SN7412AN
1A20-0430	01921	CA4026AE	1A20-1070	0169A	SN5430J	1A20-1215	0169A	SN74LS136AN
1A20-0431	01921	CA4024AF	1A20-1071	0169A	SN54H74J	1A20-1216	0169A	SN74LS138N
1A20-0432	01921	CA4033AF	1A20-1072	0169B	SN74S139N	1A20-1217	0169A	SN74LS151N
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1A20-0439	01921	CA4013AF	1A20-1079	02910	NR13N	1A20-1225	02037	MC10231P
1A20-0440	01921	CA4044AF	1A20-1081	02937	MC8T26AF	1A20-1227	02037	MC1037P
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1A20-0446	01921	CA4001AF	1A20-1087	03811	P4206A	1A20-1233	0169A	SN74L47N
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1A20-1634	01698	SN74S240N
1A20-1636	02037	MC14502BAL
1A20-1637	02037	MC6870A
1A20-1638	01698	SN74S240N
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1A20-1651	03406	MM74C901N
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1A20-1658	02037	MC14541RCP
1A20-1659	01921	CM40182BY
1A20-1660	01921	CM4067HE
1A20-1661	01921	CM4089RE
1A20-1662	01921	CM4094RE
1A20-1663	01921	CM4095RE
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1A20-1665	01921	CM4098RE
1A20-1666	01921	CM40181BY
1A20-1667	01921	CM4060AE
1A20-1668	01698	SN74LS74J
1A20-1669	01698	SN75452BL
1A20-1670	02237	75492PC
1A20-1672	01921	CM4077RF
1A20-1673	01698	SN75322N
1A20-1674	03406	MM74C30N
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1A20-1676	01698	SN74S373N
1A20-1677	01698	SN74S374N

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1A20-1763	01698	TMSR080AN
1A20-1764	01698	SN74L391N
1A20-1765	01698	SN74LS261N
1A20-1766	02037	MC3455CP
1A20-1767	01698	SN7427J
1A20-1768	02737	F100160C
1A20-1769	03285	AD7530JN
1A20-1770	01698	SN74284N
1A20-1771	01698	SN74285N
1A20-1772	01698	SN74116N
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1A20-1774	03406	LF1331L
1A20-1775	03406	DS3611L
1A20-1776	03406	DM0035C
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1A20-1778	01698	SN54LS02J
1A20-1779	01698	SN75422RJR
1A20-1780	01698	SN54LS53J
1A20-1781	01698	SN5400J
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1A20-1783	02910	74191N
1A20-1784	03406	MM74C85N
1A20-1785	02863	DG210CJ
1A20-1786	02037	MC3462P
1A20-1787	02737	4A2780C
1A20-1788	01698	MC1451TRCP
1A20-1789	02910	NR77N
1A20-1790	01698	SN74LS113AN
1A20-1791	02910	MM251001 PROGRAMMED
1A20-1792	03406	MM8009J
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1A20-1794	03406	MM74C154N
1A20-1795	02910	NR72N
1A20-1796	02037	MC1021NL
1A20-1797	02037	MC10109L
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1A20-1799	01698	SN75061AN
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1A20-1801	03406	DA1201C
1A20-1802	03285	AD562JN/81N
1A20-1803	02863	DG210CJ
1A20-1804	02863	DG5068D
1A20-1805	02037	MC3442P
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1A20-1807	03406	DS8834N
1A20-1808	02023	MM5813
1A20-1809	02037	MC14580RCP
1A20-1810	03794	AM74LS148N
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1A20-1812	02737	3A702DC
1A20-1813	02037	MC14534RCP
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1A20-1817	01698	SN74ALS270N
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1A20-1819	02910	RT98B
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1A20-1822	03794	AM25LS07PC
1A20-1823	03794	AM25LS09PC
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1A20-1825	01698	SN74ALS106N
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1A20-1829	03406	DM81LS98N
1A20-1830	03406	DM8550N
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1A20-1835	01698	SN54LS00J
1A20-1836	01698	SN54LS277J
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1A20-1846	01921	CM04018AF
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1A20-1934	02180	DA-C-0HEQ
1A20-1935	03406	MM74C905J
1A20-1936	02037	MC14091RCL
1A20-1937	03406	MM74C81J
1A20-1938	03406	LF13201N
1A20-1939	01698	SN74ALS1A3J
1A20-1940	01698	SN74ALS1A0J
1A20-1941	02037	MC10130L
1A20-1942	02037	MC10114L
1A20-1943	02037	MC10117L
1A20-1944	01698	TL607CP
1A20-1945	01698	SN74L154N
1A20-1946	02037	MC10212P
1A20-1947	01698	CM04008AE
1A20-1948	01698	CM04042AE
1A20-1949	01698	CM04511BF
1A20-1950	01698	CM04016AE
1A20-1951	01698	CM04500AE
1A20-1952	01698	CM04012HCP
1A20-1953	02037	MC14023RCP
1A20-1954	02037	MC14024RCP
1A20-1955	01921	CM04013RAE
1A20-1956	01921	CM04027AE
1A20-1957	01921	CM04025HCP
1A20-1958	03794	AM9354RCP
1A20-1959	02037	MC14071RCP
1A20-1960	02037	MC14072RCP
1A20-1961	02037	MC14073RCP
1A20-1962	02037	MC14074RCP
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1A20-1965	02037	MC14025HCP
1A20-1966	03794	AM9354RCP
1A20-1967	02037	MC14071RCP
1A20-1968	02037	MC14072RCP
1A20-1969	01698	TL607CP
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1A20-1971	01698	SN74ALS1A5N
1A20-1972	01921	CM04500AE
1A20-1973	02037	MC12061P
1A20-1974	03794	AM25LS04CP
1A20-1975	02737	9A6RCP
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1A20-1979	03285	AD5651K
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1A20-1981	03406	LF13302N
1A20-1982	01698	SN74LS299N
1A20-1983	03406	DM8117CD
1A20-1984	02737	7ALS393CP
1A20-1985	02037	MC10100L
1A20-1986	01698	SN74LS390N
1A20-1987	03794	AM25LS160CP
1A20-1988	02037	MC10158L
1A20-1989	01698	SN74LS5243N
1A20-1990	03285	AD7550AD
1A20-1991	01698	SN74LS574N
1A20-1992	03406	MM5301AHN
1A20-1993	02737	9A70PC
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1A20-1995	01698	AM9800A-4AD
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1A20-1997	02037	MC14014RCP
1A20-1998	02037	4A69RCP
1A20-1999	02037	MC14021HCP
1A20-2000	02037	MC14060RCP
1A20-2001	02037	MC14070RCP
1A20-2002	01921	CM04008AE
1A20-2003	01921	CM04042AE
1A20-2004	02037	MC14584RCP
1A20-2005	02037	MC14585RCP
1A20-2006	02037	MC14586RCP
1A20-2007	02037	MC14587RCP
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1A20-2018	02037	MC14598RCP
1A20-2019	02037	MC14599RCP
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1A20-2054	02037	MC14634RCP
1A20-2055	02037	MC14635RCP

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1A20-2210	02037	MC6848BP	1A26-0042	02037	MC174J	1A26-0147	02180	PAC-1000CQ3
1A20-2220	02037	MC14078BCP	1A26-0043	01921	CA307T	1A26-0148	02037	MC400AH
1A20-2221	01921	CA0407RF	1A26-0044	02237	UA7390C	1A26-0210	02037	MC1420A
1A20-2222	01921	CA04094RF	1A26-0047	02910	MF562B	1A26-0211	03406	LM312D
1A20-2223	02037	MC14032RCP	1A26-0048	02910	MC2145K	1A26-0212	03406	LM320K-05
1A20-2224	02037	MC14034RCP	1A26-0049	01698	UA723CJ	1A26-0213	02237	74145K
1A20-2225	01921	CA04041URF	1A26-0051	01698	TL514CN	1A26-0214	02910	MF505A
1A20-2226	01921	CA04045RF	1A26-0052	02237	UA711DC	1A26-0215	02910	MF546A
1A20-2227	01921	CA04000RF	1A26-0056	02237	UA740MC	1A26-0216	03406	LM318N
1A20-2228	02037	MC14044RCP	1A26-0058	02910	MF501A	1A26-0217	03406	LM310M
1A20-2229	01921	CA04512RF	1A26-0059	01698	LM201AL	1A26-0218	03406	LM4000-R
1A20-2230	01921	CA04047RF	1A26-0060	02037	MC1438B	1A26-0219	03406	LM318N
1A20-2231	01921	CA04031RF	1A26-0061	03793	SG3501AJ	1A26-0220	02237	UA776TC
1A20-2232	02037	MC14034RCP	1A26-0064	02237	UA7330C	1A26-0221	02910	MF521A
1A20-2233	01921	CA04094RF	1A26-0065	01698	SN7231P	1A26-0222	02910	MC7915CT
1A20-2234	03406	DS3649N	1A26-0067	02910	MF5311A	1A26-0223	02910	MC7905_CCT
1A20-2236	01698	SN55543BJG	1A26-0069	02237	LM301AN	1A26-0224	02237	PC4558T
1A20-2238	03406	DM2901ADC	1A26-0070	02037	MC1741CL	1A26-0225	01921	CA3100T
1A20-2239	03406	DP8304	1A26-0072	02237	MC1456G	1A26-0226	02910	MF567V
1A20-2240	02037	MC68A02P	1A26-0074	03285	AN583K (SEL)	1A26-0227	03406	LM320H-05
1A20-2241	01921	CA040103RF	1A26-0075	01921	CA3079	1A26-0228	02037	MC7912CT
1A20-2242	02237	9K0030C	1A26-0077	03406	LM311F	1A26-0229	02237	UA4136PC
1A20-2243	01698	SN75469N	1A26-0078	01921	CA3030	1A26-0230	02910	SF555CT
1A20-2244	01698	SN74LS179N	1A26-0079	03545	1321	1A26-0231	03406	LM322N
1A20-2245	03811	PR04H MASKED	1A26-0081	03406	LM318H	1A26-0232	02237	TAM12HC
1A20-2246	03406	M5369AA/N	1A26-0082	03285	AN741LH	1A26-0233	02180	CS5725CJ
1A20-2247	02910	NR25100I	1A26-0084	02037	MC1776CG	1A26-0234	02180	DP-05CJ
1A20-2248	01698	54LS08	1A26-0087	01921	CA300A	1A26-0235	01921	CA305J
1A20-2249	01698	54LS10	1A26-0089	03545	1322	1A26-0236	02237	UA760HC
1A20-2250	01698	54LS30	1A26-0090	03285	AN741KH (SFL)	1A26-0237	03406	LM240
1A20-2251	01698	54LS19A	1A26-0091	06563	DRAM_6,8R10	1A26-0238	03406	LM220K-15
1A20-2252	01698	54S50	1A26-0094	01698	SN75233AN	1A26-0239	03406	LM220K-12
1A20-2253	01698	54S40	1A26-0098	03406	LM211H	1A26-0240	02237	UA760HC (SFL)
1A20-2257	02037	MC14503RCP	1A26-0100	02237	TA12UC	1A26-0241	06150	X030
1A20-2258	02037	MC14174RCP	1A26-0102	01698	SN72747J	1A26-0242	03406	LM325AS
1A20-2259	01698	AC5947NF	1A26-0101	02910	MF565K	1A26-0243	03714	ICLR001/D (SFL)
1A20-2260	03406	IM0291ANC	1A26-0102	03406	LM312M	1A26-0244	03714	ICLR00A/D (SEL)
1A20-2261	01698	SN54LS11J	1A26-0103	03406	MC1545R	1A26-0245	02037	MC1558R
1A20-2262	03794	AM25LS2539PC	1A26-0104	03406	LM371H	1A26-0246	02910	MF529A
1A20-2263	03811	PR041A MSKD	1A26-0105	02983	DM172BK	1A26-0247	03406	LM370N
1A20-2264	02237	4040BPC	1A26-0106	02037	MC7815CP	1A26-0248	02037	MC7805CK
1A20-2265	02237	4008BPC	1A26-0108	03406	LM0062CH	1A26-0249	03780	A-4350
1A20-2266	02910	MF590F	1A26-0109	03799	HA2-2625-A0593	1A26-0250	02037	MC1408L-6
1A20-2267	02910	MF591F	1A26-0110	03406	LM212M	1A26-0251	03285	AD504A
1A20-2268	01698	SN74LS645N	1A26-0111	02037	MC1458R	1A26-0252	03406	LM004ZCH (SFL)
1A20-2269	03811	PR04H MSKD	1A26-0112	03406	LM316AN	1A26-0253	03285	AN514K
1A20-2270	03794	AM25LS2569DC	1A26-0113	03406	LM207M	1A26-0254	03285	AN7520JN
1A20-2271	03811	DR03V	1A26-0114	02237	710HM	1A26-0255	02037	MC3442P
1A20-2272	02237	F3870PC MASKED	1A26-0115	02910	MF526A	1A26-0256	02037	MC1741SCP1
1A20-2273	02634	UNN2981A	1A26-0116	02180	CM-01-CJ	1A26-0257	02910	MF522A
1A20-2274	02634	UH-N-2UARB	1A26-0117	02237	TA12MC	1A26-0258	03793	SG1502N
1A20-2275	03406	MM74C90N	1A26-0119	02910	MF555T	1A26-0259	02037	MC4007J
1A20-2276	03406	MM74C86N	1A26-0120	03406	LM390UV	1A26-0260	02237	UA7824KC
1A20-2277	02037	MC1402PHAL	1A26-0121	03714	AN07C	1A26-0261	03285	AN532JD
1A20-2278	03811	CR74B	1A26-0122	02237	TA05UC	1A26-0262	03285	AN520LN
1A20-2279	02037	MC14175RCP	1A26-0123	02037	MC7912CK	1A26-0263	02180	DP-05EJ
1A20-2280	04078	MKP3870 MSKD	1A26-0124	02910	MF529K	1A26-0264	03406	LM0062CP
1A20-2282	01698	SN55461JG	1A26-0125	02037	MC1514K	1A26-0265	03406	LM200R
1A20-2283	01698	SN55462JG	1A26-0126	02037	MC7819CK	1A26-0270	03799	HA-2004A
1A20-2284	02037	MC68A50P	1A26-0127	02180	PAC-1000RCQ3	1A26-0271	01698	SN72741P
1A20-2285	03795	MCART1A-1.0MHZ	1A26-0128	02037	MC1468L	1A26-0272	03406	LM361H
1A20-2287	02910	4745253N	1A26-0129	03714	ICLR001CT2	1A26-0273	02037	MC7814KACP
1A20-2288	04078	MK3885P	1A26-0130	02910	MF550L	1A26-0275	02037	MC7812ACP
1A20-2289	03811	CR251A	1A26-0131	03714	ICLR00ACTY	1A26-0276	02037	MC78L05ACP
1A20-2290	03406	DS3632N	1A26-0132	02237	UA740DC	1A26-0277	03406	LM320T-15
1A20-2291	02037	MC68A03P	1A26-0136	02237	UA7470M	1A26-0281	02037	MC79L14ACP
1A20-2292	01590	SPRE17ADG	1A26-0137	02910	MF500N	1A26-0282	02037	MC79L12ACP
1A20-2293	02037	MC68B00P	1A26-0138	02037	LM4339P	1A26-0283	03406	LM325S
1A20-2294	03811	PR04H MSKD	1A26-0139	01921	CA1458G	1A26-0284	02037	MC79L9AC
1A20-2295	03811	PR355 MSKD	1A26-0140	02037	MC1448R	1A26-0285	02037	MC79L0RACP
1A20-2296	02037	MC8502P	1A26-0141	03406	LM319D	1A26-0286	02037	MC79L03C
1A20-2297	02037	MC8500P	1A26-0142	02037	MC1458CP1	1A26-0289	02037	MC3476R
1A20-2298	07653	ZA0A-CPU-PS	1A26-0144	02037	MC7905CP	1A26-0291	03406	LM324F
1A20-2299	07653	ZA0A-DMA-PS	1A26-0145	02037	MC7806CP	1A26-0292	01921	CA308H
1A20-2300	07653	ZA0A-SIO/P-PS	1A26-0146	02037	MC7408CP	1A26-0293	02037	MC1306P
1A20-2301	07653	ZA0A-CTC-PS	1A26-0147	02037	MC7812CP	1A26-0294	02037	MC7905CT
1A20-2304	01698	SN7422J	1A26-0149	02037	MC7418CP	1A26-0295	03285	AN533JH
1A20-2306	02037	MC14490VP	1A26-0150	02237	TA24UC	1A26-0299	03406	LM320T-24
1A20-2307	02037	MC68A40P	1A26-0152	02569	CR1425BK	1A26-0300	02237	UA790M24HF
1A20-2308	03811	PR039-A	1A26-0153	01921	CA3075	1A26-0301	01698	SN72L052P
1A20-2309	03406	MM74C923N	1A26-0155	02037	MC1406L	1A26-0302	02037	MC1741SCG
1A20-2310	04078	MK5039Q	1A26-0156	03406	MM550H	1A26-0303	01921	CA710
1A26-0002	02037	MC1510G	1A26-0159	02037	MC1350P	1A26-0304	03406	LF355H
1A26-0003	02037	MC1456CG	1A26-0160	02237	TA06KC	1A26-0305	02237	TA06T2C
1A26-0004	02237	UA304HC	1A26-0161	02037	LM4324P	1A26-0306	03406	LM339AN
1A26-0006	02037	MC1469G	1A26-0162	04406	LM371H	1A26-0307	01921	CA3130T
1A26-0009	02180	CS5725CJ	1A26-0164	02237	TA2PC	1A26-0309	03285	AN562KN/BIN
1A26-0010	02237	723HM	1A26-0165	03406	LM4250CH	1A26-0310	03285	AN518J
1A26-0011	01698	SN5274J	1A26-0167	01921	CA3094AT	1A26-0311	02037	MC79149P1
1A26-0013	02180	SS5741CJ	1A26-0169	03406	LM320K-15	1A26-0312	02037	MC3403P
1A26-0014	02037	MC1595L	1A26-0172	03406	LM308N	1A26-0314	03406	LM355-1H
1A26-0015	01921	CA3060D	1A26-0173	03406	LM320K-5,2	1A26-0315	03406	LM348N
1A26-0016	02037	MM4204G	1A26-0175	03406	LM319N	1A26-0316	03406	LM3079-1H
1A26-0017	03406	LM205H	1A26-0176	03285	AN506JH	1A26-0318	04338	TR4231
1A26-0019	02037	MC1437L	1A26-0177	02763	723BE	1A26-0319	03406	LF395K
1A26-0020	02180	PAC-01CY	1A26-0178	03406	LM320H-12	1A26-0320	01921	CA3099E
1A26-0021	03406	LM310H	1A26-0179	03406	LM320H-5,2	1A26-0324	03406	LM209K
1A26-0022	02037	MC1439L	1A26-0180	02037	MC1459P1	1A26-0325	02037	MC177A
1A26-0023	02037	MC1496L	1A26-0181	03406	LM323K	1A26-0326	02290	PC4558NR
1A26-0024	02037	MC1469P	1A26-0182	03285	AN540J	1A26-0327	03285	AN518KH (SFL)
1A26-0025								

HP P/N	Mfr.	Desc.	HP P/N	Mfr.	Desc.	HP P/N	Mfr.	Desc.
1A26-0342	02237	UA7490HC	1A26-0471	02180	OP-07CJ	1A26-0609	02180	MIX08FG
1A26-0343	02037	MC1430CG	1A26-0472	03406	LH0044ACH	1A26-0610	02180	MIX24FG
1A26-0344	02037	MC7908CP	1A26-0473	02037	MLM2046ISEL1	1A26-0611	03406	LM2904N
1A26-0345	02237	UA78M1PUC	1A26-0474	02037	MC3467P	1A26-0616	02180	OP-11EY
1A26-0346	03406	LM358N	1A26-0475	02037	MC3468P	1A26-0620	01698	UA7924CKC
1A26-0348	03406	LM377N	1A26-0476	01698	TL601CP	1A26-0621	02763	R702CN
1A26-0349	02237	UA78M06HL	1A26-0477	01698	TL510CP	1A26-0622	02180	RF5-0J
1A26-0353	02237	UA78L1ACH	1A26-0478	02237	UA7908UC	1A26-0623	03406	LM334Z
1A26-0356	03285	AN7530JD	1A26-0479	01698	LM293P	1A26-0624	0543A	VFC32KP
1A26-0357	01406	LF357H	1A26-0480	01698	LF1333JN	1A26-0625	02910	NF5553N
1A26-0358	03406	LF256H, SEL NOISE	1A26-0481	03406	LH0033CG	1A26-0626	01921	CA3130A5
1A26-0360	02037	MC3431D	1A26-0482	03714	HA2-2525-5	1A26-0627	03285	AN542L
1A26-0364	02037	MC12040P	1A26-0483	02237	UA79M6GUC	1A26-0628	02180	OP-11FY
1A26-0365	03799	HA2065-5	1A26-0484	02237	UA78M6GUC	1A26-0629	01698	UA79M12CKC
1A26-0366	02037	MC7812CT(SEL)	1A26-0485	03785	AN7530JN	1A26-0631	03406	LM350K
1A26-0367	02037	MC78M05CG	1A26-0486	02037	MC14057RCP	1A26-0632	03406	LM343D
1A26-0368	02037	MC7912CT(SEL)	1A26-0488	03406	LM218H	1A26-0633	02910	NF5534AT
1A26-0369	02037	MC7812CT(SEL)	1A26-0489	03714	IH502HCE	1A26-0634	03406	LM343H
1A26-0370	03406	LM340K-A	1A26-0490	03714	IH5032CPE	1A26-0635	02180	OP-07CP
1A26-0371	03406	LF256H	1A26-0491	02237	UAF355TC	1A26-0636	03285	AN7529KN
1A26-0372	03406	LM555CN	1A26-0492	03406	DS3630N	1A26-0638	03406	LM360N-8
1A26-0374	02237	9A50-10C	1A26-0493	02037	MLH308AP1	1A26-0639	03285	AN752AJN
1A26-0375	03406	LF5700H	1A26-0495	02037	MC79L12ACG	1A26-0640	01698	TL0614CP
1A26-0376	03406	LM323K(SEL)	1A26-0496	02037	MC79L04ACG	1A26-0641	02180	OP-07EY
1A26-0377	03406	LM320T-18	1A26-0497	03406	LF311H	1A26-0642	02037	MC1409L
1A26-0378	03406	LM322N(SEL)	1A26-0498	01698	SN7654QN	1A26-0643	01698	TL431CLP
1A26-0379	02037	MC347681(-20/70)	1A26-0499	03406	LH0091CJ	1A26-0644	03714	HA2-2515-5
1A26-0380	03406	LM311H(SEL)	1A26-0500	03285	AN536K	1A26-0648	03406	LM342P-12
1A26-0381	02037	MC1459G(-70/70)	1A26-0501	02037	MC14083RCP			
1A26-0382	02037	MC1355P	1A26-0502	02037	MC14084RCP			
1A26-0383	03406	LM308H(SEL)	1A26-0503	03406	LF398H			
1A26-0385	03406	LM309H(SEL)	1A26-0504	03285	AN753ALD			
1A26-0386	03406	LM309K(SEL)	1A26-0505	02037	MC1741NCP1			
1A26-0387	03714	ICL8250 C PE	1A26-0507	02037	CA3140F			
1A26-0388	03406	LM0071-1H	1A26-0508	03785	AN561JN			
1A26-0390	03406	LM3911H	1A26-0509	02037	MC1658P			
1A26-0391	03714	ICL741C-LN-TY	1A26-0510	03406	LF13332N			
1A26-0392	03794	AW301AH	1A26-0511	01698	UA79M15CLA			
1A26-0393	01698	LM317KC	1A26-0512	02037	MC78M1SCG			
1A26-0394	03406	LM78L10ACH	1A26-0517	03406	ANC0809PCN			
1A26-0395	02237	7A15UC	1A26-0519	01698	TL071CP			
1A26-0397	03406	LM220K-5.0	1A26-0520	01698	TL071RCP			
1A26-0398	03406	LM271H	1A26-0521	01698	TL072CP			
1A26-0399	02037	MC3340P	1A26-0522	01698	TL074CN			
1A26-0400	02037	MC1555G	1A26-0523	03406	LM337K			
1A26-0401	02883	L144CJ	1A26-0524	03406	LM324AN			
1A26-0402	06545	LA5-1515	1A26-0526	02037	MC3420P			
1A26-0403	06545	LA5-1815	1A26-0527	03406	LM337T			
1A26-0404	02237	UA7952UC	1A26-0528	03406	LF356RH			
1A26-0405	03406	LH0022CH	1A26-0529	02037	MC341VCP			
1A26-0408	03714	ICL8212CPA	1A26-0531	02237	UA75972C			
1A26-0409	02037	MC1723L	1A26-0532	03799	HA1-4605-5			
1A26-0410	01698	TL084CN	1A26-0533	03406	LM326H			
1A26-0411	02037	MC1453ARCP	1A26-0534	01921	CA3080F			
1A26-0412	03406	LM393N	1A26-0536	03406	LM340AK-5			
1A26-0413	03799	HA2-2605-5	1A26-0537	03406	LM220K-5.2			
1A26-0414	03406	LH0070-2H	1A26-0538	01698	TL084BCN			
1A26-0415	02910	S05000R	1A26-0539	03406	LM317H			
1A26-0416	03406	LF13331D	1A26-0540	03714	ICL8211CTY			
1A26-0417	03406	LF13333D	1A26-0542	02180	OP-14CJ			
1A26-0418	02237	UA7912UC	1A26-0543	02237	UA714HC			
1A26-0419	03406	LM3909N	1A26-0544	02037	MC1403U			
1A26-0420	02037	MC145HCP1	1A26-0545	01698	TL082ACP			
1A26-0421	03785	AN536AJ	1A26-0546	02910	NF592K			
1A26-0422	03406	LF298H	1A26-0547	01698	TL072ACP			
1A26-0423	03406	LM317K	1A26-0548	03406	LM161D			
1A26-0424	02037	MC3405P	1A26-0549	01921	CA3140H			
1A26-0425	03799	HA2-2645-5	1A26-0550	02237	UA0801FPC			
1A26-0426	03794	AM6A70L	1A26-0551	01698	TL7805ACKC			
1A26-0427	01921	CA741CGH	1A26-0552	03406	LF13741H			
1A26-0428	01698	SN3524J	1A26-0554	03406	LM340LA7-12			
1A26-0429	03799	H1-1819A-5	1A26-0555	03406	LM340LAZ-5			
1A26-0430	03285	AN559KN	1A26-0556	02037	MC1458NG			
1A26-0431	02037	MC14433L	1A26-0557	03406	LM3480			
1A26-0432	03714	ICL8049 FC PF	1A26-0558	03406	LM337H			
1A26-0433	03406	LF356BN	1A26-0559	03406	LM340K-24			
1A26-0434	03406	LM341P-A.0	1A26-0565	01698	TL494CN			
1A26-0435	03406	LM341P-12	1A26-0567	02037	MLMC101A			
1A26-0436	03406	LM341P-24	1A26-0568	03406	LM320M-A			
1A26-0437	02037	MC1495L	1A26-0569	02910	NF5534AT			
1A26-0438	03406	LM340L&H-12	1A26-0572	01698	TL084ACN			
1A26-0439	03406	LM-0053CG	1A26-0573	03714	ICL8060NCG			
1A26-0440	02180	OP-01CJ	1A26-0574	02237	UA714LHC			
1A26-0441	02237	UA796U1C	1A26-0575	02763	9A00CJ			
1A26-0442	03714	IH5027CPE	1A26-0576	02180	OP-16E			
1A26-0443	02237	UA78GKC	1A26-0577	02190	HAC-10ACCQ4			
1A26-0444	02237	UA796KC	1A26-0578	03794	AM6R5HL			
1A26-0445	02237	UA7905UC	1A26-0579	03794	AM6R6CN			
1A26-0446	03714	ICL8052CPN	1A26-0580	03406	AF134-1CJ			
1A26-0447	03406	LF257H	1A26-0581	01406	LF1350RN			
1A26-0448	03285	AN7520LN(SEL)	1A26-0582	03406	LF13201D			
1A26-0449	03406	LM320T-B.0	1A26-0583	02237	UA79M6GUC			
1A26-0450	01698	TL497CN	1A26-0584	02237	UA78MGHC			
1A26-0451	02037	MC7915CK	1A26-0585	03406	LM329U7			
1A26-0452	02883	LN130CJ	1A26-0586	02237	UA78L65AWC			
1A26-0453	02180	DAC-100AC03	1A26-0587	02883	LN121CJ			
1A26-0454	02910	NE527A	1A26-0588	02883	LN120CJ			
1A26-0455	03714	ICL8013CC TZ	1A26-0590	03406	LF13509D			
1A26-0456	02237	UA78GUC	1A26-0591	06545	LA5 19U			
1A26-0457	03406	LM325H	1A26-0592	03406	LM358AH			
1A26-0458	03406	LF255H	1A26-0593	02763	R750CJ			
1A26-0459	03406	LM0042CD	1A26-0594	03406	LH0044CH			
1A26-0460	02237	UA78L2AWC	1A26-0595	03285	AN522A(SEL)			
1A26-0461	01698	TL702CL(SEL)	1A26-0598	02037	MC12002P			
1A26-0462	02037	MC3410CL	1A26-0599	02037	MC14564RCP			
1A26-0464	02037	MC78M15CP	1A26-0600	01698	TL074ACN			
1A26-0465	01921	CA3140T	1A26-0601	02180	OP-16F			
1A26-0466	02037	MCC1774C	1A26-0602	03285	AN7506KD			
1A26-0467	02037	MC1403P1	1A26-0603	02237	UA78540PC			
1A26-0468	02037	MC3423P1	1A26-0605	02883	D6508CK			
1A26-0469	03334	ATF431	1A26-0606	02883	D6201CK			
1A26-0470	02037	MC14084RCP	1A26-0607	03406	LM340AT-15			
			1A26-0608	02910	UA78080A			

Desc.	Mfr.	HP P/N						
C2708 PROGRAMMED	03R11	181H-0782	CN4029AF	01921	1820-0927	D3624A PROGRAMMED	03R11	1816-1023
C2708 PROGRAMMED	03R11	181A-0783	CN4029AE	01921	1820-0931	D3624A PROGRAMMED	03R11	1816-1024
C2708 PROGRAMMED	03R11	181A-0784	CN4030AF	01921	1820-1528	D3624A PROGRAMMED	03R11	1816-1026
C2708 PROGRAMMED	03R11	181A-0785	CN4030AF	01921	1820-0947	D3624A PROGRAMMED	03R11	1816-1027
C2716	03R11	181A-0794	CN4031AF	01921	1820-1536	D3624A PROGRAMMED	03R11	1816-1064
C2080A	03R11	1820-1611	CN4032AE	01921	1820-0963	D3624A PROGRAMMED	03R11	1816-1066
C251A	03R11	1820-2289	CN4033AE	01921	1820-2231	D3624A PROGRAMMED	03R11	1816-1067
C253	03R11	1820-2109	CN4034AE	01921	1820-0925	D3624A PROGRAMMED	03R11	1816-1099
C275	03R11	1820-2191	CN4035AE	01921	1820-0932	D3624A PROGRAMMED	03R11	1816-1300
CR316A	03R11	181H-0770	CN4035AF	01921	1820-0977	74201	03R11	1820-2071
CR316A MASKED	03R11	1818-0141	CN4036AU	01921	1820-0969	74289	03R11	1820-2070
CR316A MASKED	03R11	181A-0142	CN4037AE	01921	1820-1554	7R008-1	03R11	1820-1721
CR316A MASKED	03R11	181A-0143	CN4037AE	01921	1820-0959	74039	03R11	1820-2771
CR316A MASKED	03R11	181A-0144	CN4038AE	01921	1820-0945	74224	03R11	1820-1921
CR316A MASKED	03R11	1818-0145	CN4039AE	01921	1820-0924	74279-5	03R11	1820-2150
CR316A MASKED	03R11	1818-0170	CN4040AF	01921	1820-0960	7A1201CD	0340A	1820-1837
CR316A MASKED	03R11	1818-0236	CN4041AE	01921	1820-0937	7AC-01CY	02180	1826-0020
CR316A MASKED	03R11	1818-0382	CN4041UMF	01921	1820-1925	7AC-08E9	02180	1820-1934
CR316A MASKED	03R11	1818-0383	CN4042AF	01921	1820-0928	7AC-1004CQ3	02180	1826-0453
CR316A MASKED	03R11	1818-0384	CN4042AF	01921	1820-2725	7AC-100CCQ3	02180	1826-0127
CR316A MASKED	03R11	1818-0385	CN4043AE	01921	1820-0958	7AC-100CCQ1	02180	1826-0197
CR316A MASKED	03R11	1818-0386	CN4044AF	01921	1820-1840	7AC-100CCQ4	02180	1826-0577
CR316A MASKED	03R11	1818-0571	CN4044AF	01921	1820-1956	7AC377-12-HCD	02180	1826-0577
CR316A MASKED	03R11	1818-0572	CN4045AE	01921	1820-0941	7AC711-C5R-1	02180	1826-0577
CR316A MASKED	03R11	1818-0579	CN4045AE	01921	1820-1537	7ACR00-CH1-1	02180	1826-0577
CR748	01921	1820-2278	CN4045AE	01921	1820-0940	7ACR00-CH1-V	02180	1826-0577
CA 3001	01921	1820-0192	CN4046AF	01921	1820-1532	7ACR00-CCD-V	02180	1826-0577
CA1458G	01921	1826-0139	CN4046AF	01921	1820-1597	7ADU-4-5100	02180	1826-0577
CA3000	01921	1820-0297	CN4047AE	01921	1820-1318	DG172R	02883	1826-0105
CA3007	01921	1820-0417	CN4047AE	01921	1820-2226	DG184RP	02883	1820-1724
CA3004	01921	1826-0087	CN4048AF	01921	1820-1184	DG200RA	02883	1820-1807
CA3005	01921	1820-0046	CN4049AF	01921	1820-1317	DG200RA	02883	1826-0154
CA3010	01921	1820-0047	CN4049AF	01921	1820-2230	DG201CJ	02883	1820-1840
CA3012	01921	1820-0474	CN4050AF	01921	1820-1116	DG201CJ	02883	1820-1971
CA3015A	01921	1820-0103	CN4051BE	01921	1820-1145	DG201CJ	02883	1826-0606
CA301R	01921	1820-0352	CN4051BE	01921	1820-1547	DG201CJ	02883	1820-1841
CA3020	01921	1820-0298	CN4052BF	01921	1820-1146	DG201CJ	02883	1820-1725
CA3023	01921	1820-0433	CN4053BF	01921	1820-1543	DG201CJ	02883	1826-0605
CA3026	01921	1820-0240	CN4053BF	01921	1820-1976	DG201CJ	02883	1826-0605
CA3028A	01921	1820-0306	CN4053BF	01921	1820-1315	DG201CJ	02883	1826-0605
CA3028B	01921	1820-0137	CN4053BF	01921	1820-1513	DG201CJ	02883	1826-0605
CA3029	01921	1820-0326	CN4053BF	01921	1820-1314	DG201CJ	02883	1826-0605
CA3030	01921	1826-0078	CN4053BF	01921	1820-1313	DG201CJ	02883	1826-0606
CA3051	01921	1820-0249	CN4054AE	01921	1820-1510	DG201CJ	02883	1820-1841
CA3051	01921	1820-0249	CN4054AE	01921	1820-1545	DG201CJ	02883	1820-1725
CA3057	01921	1826-0230	CN4055AD	01921	1820-1331	DG201CJ	02883	1826-0605
CA3059	01921	1826-0041	CN4055AD	01921	1820-1646	DG201CJ	02883	1826-0605
CA30600	01921	1826-0015	CN4056AE	01921	1820-1649	DG201CJ	02883	1820-1033
CA3075	01921	1826-0153	CN4056AE	01921	1820-1667	DG201CJ	02883	1820-1054
CA307AAV	01921	1826-0187	CN4056AE	01921	1820-1325	DG201CJ	02883	1820-1514
CA3079	01921	1826-0075	CN4056AE	01921	1820-1325	DG201CJ	02883	1820-0602
CA307T	01921	1826-0047	CN4056AE	01921	1820-1583	DG201CJ	02883	1820-1047
CA3080	01921	1826-0185	CN4056AE	01921	1820-1548	DG201CJ	02883	1820-0593
CA3080E	01921	1826-0534	CN4056AE	01921	1820-1660	DG201CJ	02883	1820-0594
CA3085	01921	1826-0292	CN4056AE	01921	1820-2221	DG201CJ	02883	1820-0595
CA3094AT	01921	1826-0167	CN4056AE	01921	1820-1410	DG201CJ	02883	1820-0596
CA3099E	01921	1826-0321	CN4056AE	01921	1820-1404	DG201CJ	02883	1820-0597
CA310AT	01921	1826-0218	CN4056AE	01921	1820-1601	DG201CJ	02883	1820-0603
CA3130AS	01921	1826-0626	CN4056AE	01921	1820-1483	DG201CJ	02883	1820-1055
CA3139T	01921	1826-0307	CN4056AE	01921	1820-1550	DG201CJ	02883	1820-0600
CA3149E	01921	1826-0506	CN4056AE	01921	1820-1403	DG201CJ	02883	1820-0601
CA3149H	01921	1826-0549	CN4056AE	01921	1820-1408	DG201CJ	02883	1820-0599
CA3140H	01921	1826-0465	CN4056AE	01921	1820-1405	DG201CJ	02883	1820-1885
CA741CUM	01921	1826-0427	CN4056AE	01921	1820-1578	DG201CJ	02883	1816-1089
CA741CUM	01921	1826-0203	CN4056AE	01921	1820-1544	DG201CJ	02883	1816-1158
CA741CUM	01921	1826-0103	CN4056AE	01921	1820-1672	DG201CJ	02883	1816-1159
CA741CUM	01921	1826-0742	CN4056AE	01921	1820-1407	DG201CJ	02883	1816-1044
CA741CUM	01921	1820-2227	CN4056AE	01921	1820-1488	DG201CJ	02883	1816-1045
CA741CUM	01921	1820-0946	CN4056AE	01921	1820-1486	DG201CJ	02883	1816-1100
CA741CUM	01921	1820-1534	CN4056AE	01921	1820-1551	DG201CJ	02883	1816-1101
CA741CUM	01921	1820-0948	CN4056AE	01921	1820-1409	DG201CJ	02883	1816-1341
CA741CUM	01921	1820-1537	CN4056AE	01921	1820-2017	DG201CJ	02883	1816-1342
CA741CUM	01921	1820-0978	CN4056AE	01921	1820-2018	DG201CJ	02883	1820-1148
CA741CUM	01921	1820-0926	CN4056AE	01921	1820-1661	DG201CJ	02883	1820-0845
CA741CUM	01921	1820-1955	CN4056AE	01921	1820-1577	DG201CJ	02883	1820-1254
CA741CUM	01921	1820-0979	CN4056AE	01921	1820-1600	DG201CJ	02883	1820-2098
CA741CUM	01921	1820-2241	CN4056AE	01921	1820-1662	DG201CJ	02883	1820-1295
CA741CUM	01921	1820-0980	CN4056AE	01921	1820-2222	DG201CJ	02883	1820-1294
CA741CUM	01921	1820-0949	CN4056AE	01921	1820-1663	DG201CJ	02883	1820-1293
CA741CUM	01921	1820-1534	CN4056AE	01921	1820-1664	DG201CJ	02883	1820-1131
CA741CUM	01921	1820-0950	CN4056AE	01921	1820-2209	DG201CJ	02883	1820-1167
CA741CUM	01921	1820-1539	CN4056AE	01921	1820-1881	DG201CJ	02883	1820-1794
CA741CUM	01921	1820-0939	CN4056AE	01921	1820-1650	DG201CJ	02883	1820-1872
CA741CUM	01921	1820-1531	CN4056AE	01921	1820-1665	DG201CJ	02883	1820-1759
CA741CUM	01921	1820-1963	CN4056AE	01921	1820-2233	DG201CJ	02883	1820-1873
CA741CUM	01921	1820-0970	CN4056AE	01921	1820-1959	DG201CJ	02883	1820-0623
CA741CUM	01921	1820-0976	CN4056AE	01921	1820-1957	DG201CJ	02883	1820-0906
CA741CUM	01921	1820-1541	CN4056AE	01921	1820-2229	DG201CJ	02883	1820-0505
CA741CUM	01921	1820-0981	CN4056AE	01921	1820-2229	DG201CJ	02883	1820-1292
CA741CUM	01921	1820-1675	CN4056AE	01921	1820-1899	DG201CJ	02883	1820-1468
CA741CUM	01921	1820-1958	CN4056AE	01921	1820-1900	DG201CJ	02883	1820-1143
CA741CUM	01921	1820-0933	CN4056AE	01921	1820-1516	DG201CJ	02883	1820-1113
CA741CUM	01921	1820-0933	CN4056AE	01921	1820-1556	DG201CJ	02883	1820-1291
CA741CUM	01921	1820-0933	CN4056AE	01921	1820-1515	DG201CJ	02883	1820-1857
CA741CUM	01921	1820-1666	CN4056AE	01921	1820-1555	DG201CJ	02883	1820-1874
CA741CUM	01921	1820-1659	CN4056AE	01921	1826-0152	DG201CJ	02883	1820-0262
CA741CUM	01921	1820-0934	CN4056AE	01921	025A0	DG201CJ	02883	1816-0300
CA741CUM	01921	1820-1529	CN4056AE	01921	02180	DG201CJ	02883	1816-0249
CA741CUM	01921	1820-0951	CN4056AE	01921	03811	DG201CJ	02883	1820-116A
CA741CUM	01921	1820-1553	CN4056AE	01921	03811	DG201CJ	02883	1820-1472
CA741CUM	01921	1820-0935	CN4056AE	01921	03811	DG201CJ		

Desc.	Mfr.	HP P/N	Mfr.	HP P/N	Mfr.	HP P/N	Mfr.	HP P/N
LM309K (SEL)	03406	1826-0386	MC10125L	02037	1820-1052	MC140288CL	02037	1820-1526
LM310H	03406	1826-0021	MC10130L	02037	1820-1944	MC140788CP	02037	1820-1512
LM310N	03406	1826-0208	MC10130P	02037	1820-0816	MC140288CP	02037	1820-1962
LM311F	03406	1826-0077	MC10131P	02037	1820-0817	MC140428CP	02037	1820-2223
LM311H (SEL)	03406	1826-0380	MC10133L	02037	1820-0814	MC140348CP	02037	1820-2232
LM312L	01698	1826-0026	MC10134L	02037	1820-0819	MC140358CP	02037	1820-2080
LM312N	03406	1826-0201	MC10135L	02037	1820-0820	MC140388CP	02037	1820-2224
LM312H	03406	1826-0102	MC10136L	02037	1820-0821	MC140391	02037	1826-0467
LM315AH	03406	1826-0112	MC10137L	02037	1820-0822	MC1403U	02037	1826-0544
LM317H	03406	1826-0539	MC10138L	02037	1820-1381	MC140404CL	02037	1820-2054
LM317K	03406	1826-0423	MC10139P	02037	1820-0102	MC140404CP	02037	1820-1495
LM317KC	01698	1826-0393	MC10140AL	02037	1820-0824	MC140424CP	02037	1820-1501
LM318H	03406	1826-0081	MC10141L	02037	1820-0825	MC140424CP	02037	1820-1912
LM318N	03406	1826-0207	MC10141P	02037	1820-0213	MC140438CP	02037	1820-2124
LM319N	03406	1826-0141	MC10145L	02037	1820-1993	MC140448CP	02037	1880-2228
LM319H	03406	1826-0191	MC10149L	02037	1820-0180	MC140468CP	02037	1826-0470
LM320H-05	03406	1826-0175	MC10140L	02037	1820-0826	MC140494CP	02037	1820-1505
LM320H-12	03406	1826-0220	MC10141P	02037	1820-0826	MC140494CP	02037	1820-1615
LM320H-15	03406	1826-0178	MC10142L	02037	1820-0527	MC140494CP	02037	1820-1746
LM320H-5.2	03406	1826-0192	MC10142P	02037	1820-2067	MC140508CP	02037	1820-1521
LM320H-6	03406	1826-0568	MC10144L	02037	1820-0828	MC140508CP	02037	1820-1547
LM320K-05	03406	1826-0202	MC10144P	02037	1820-0829	MC140518CL	02037	1820-2013
LM320K-15	03406	1826-0169	MC10146P	02037	1820-0440	MC140518CP	02037	1820-1546
LM320K-5.2	03406	1826-0173	MC10147P	02037	1820-1359	MC140528CL	02037	1826-0486
LM320T-15	03406	1826-0277	MC10176L	02037	1820-2193	MC140528CP	02037	1826-0642
LM320T-18	03406	1826-0377	MC10176P	02037	1820-1399	MC140534CP	02037	1826-0502
LM320T-24	03406	1826-0299	MC10178L	02037	1820-2066	MC1405L	02037	1826-0642
LM320T-H.0	03406	1826-0449	MC10179L	02037	1820-1632	MC140664CP	02037	1820-1931
LM321H	03406	1826-0162	MC10179P	02037	1820-0830	MC140688CP	02037	1820-1592
LM322N	03406	1826-0225	MC1017P	02037	1820-0146	MC140494URCL	02037	1820-2014
LM322N (SEL)	03406	1826-0378	MC10181L	02037	1820-0831	MC14064URCP	02037	1826-0155
LM323K	03406	1826-0181	MC1018P	02037	1820-1014	MC14070HCL	02037	1820-1908
LM323K (SEL)	03406	1826-0376	MC10195P	02037	1820-1685	MC140708CP	02037	1820-2015
LM324AN	03406	1826-0524	MC10197P	02037	1820-2023	MC140718CP	02037	1820-1970
LM324F	03406	1826-0291	MC1019P	02037	1820-1036	MC14071CP	02037	1820-1388
LM325AS	03406	1826-0238	MC102AP	02037	1820-0212	MC140738CL	02037	1820-1910
LM325H	03406	1826-0457	MC10210L	02037	1820-1830	MC140758CL	02037	1820-2091
LM325S	03406	1826-0283	MC10211P	02037	1820-1482	MC140758CP	02037	1820-2220
LM326H	03406	1826-0533	MC10212L	02037	1820-1832	MC140758CP	02037	1820-1907
LM3290Z	03406	1826-0545	MC10212P	02037	1820-1950	MC140778CP	02037	1820-1930
LM3347	03406	1826-0623	MC10216L	02037	1820-1320	MC140818CP	02037	1826-0248
LM337H	03406	1826-0558	MC10216P	02037	1820-1224	MC140824CP	02037	1826-0248
LM337K	03406	1826-0523	MC10223P	02037	1820-0157	MC1408L-A	02037	1826-0188
LM337T	03406	1826-0527	MC1024P	02037	1820-0578	MC14093HCL	02037	1820-1936
LM339AU	03406	1826-0306	MC1025P	02037	1820-0444	MC14174HCP	02037	1820-2274
LM340AK-5	03406	1826-0536	MC1026P	02037	1820-0255	MC1420G	02037	1820-0200
LM340AT-15	03406	1826-0407	MC1031P	02037	1820-0235	MC1430P	02037	1820-0115
LM340K-24	03406	1826-0559	MC1032P	02037	1820-0581	MC1431P	02037	1820-0160
LM340K-H	03406	1826-0370	MC1033P	02037	1820-0276	MC1433G	02037	1820-0316
LM340LAH-12	03406	1826-0438	MC1034P	02037	1820-0101	MC1433L	02037	1820-0181
LM340LAZ-12	03406	1826-0554	MC1035P	02037	1820-0253	MC1433P	02037	1820-0317
LM340LAZ-5	03406	1826-0555	MC1037P	02037	1820-1227	MC1436CU	02037	1826-0343
LM341P-12	03406	1826-0435	MC1039P	02037	1820-0275	MC1436G	02037	1826-0038
LM341P-2A	03406	1826-0436	MC1040P	02037	1820-0667	MC1437L	02037	1826-0019
LM341P-8.0	03406	1826-0434	MC1043P	02037	1820-0792	MC1438H	02037	1826-0060
LM342P-12	03406	1826-0648	MC1047P	02037	1820-0897	MC1439G	02037	1820-0201
LM343N	03406	1826-0632	MC1048P	02037	1820-0473	MC1439L	02037	1826-0022
LM343H	03406	1826-0634	MC10576F	02037	1820-2167	MC14411P	02037	1820-1779
LM348U	03406	1826-0557	MC1062P	02037	1820-0916	MC14412VP	02037	1820-2164
LM348N	03406	1826-0315	MC1065P	02037	1820-0917	MC14433L	02037	1826-0431
LM350K	03406	1826-0631	MC1068P	02037	1820-0791	MC1445L	02037	1826-0334
LM355-1H	03406	1826-0314	MC1069P	02037	1826-0598	MC14490FP	02037	1820-1947
LM358AH	03406	1826-0592	MC12012P	02037	1820-1242	MC14490VP	02037	1820-2306
LM358N	03406	1826-0346	MC12013L	02037	1820-1888	MC14501URCP	02037	1820-1079
LM360N-8	03406	1826-0638	MC12040P	02037	1820-1344	MC14502HAL	02037	1820-1635
LM361H	03406	1826-0272	MC12040L	02037	1826-0304	MC145028CP	02037	1820-1385
LM361N	03406	1826-0210	MC12044P	02037	1820-1915	MC145038CP	02037	1820-2257
LM370N	03406	1826-0245	MC12041P	02037	1820-1977	MC145068CP	02037	1820-1386
LM371H	03406	1826-0104	MC12117L	02037	1820-1025	MC14507CP	02037	1820-1330
LM377N	03406	1826-0348	MC1213L	02037	1820-1026	MC14508HCL	02037	1820-1693
LM380N-8	03406	1826-0209	MC1306P	02037	1826-0293	MC145104CP	02037	1820-1189
LM381N	03406	1826-0206	MC1350P	02037	1826-0159	MC145118CP	02037	1820-1413
LM390UN	03406	1826-0120	MC1355P	02037	1826-0382	MC14512CP	02037	1820-1241
LM3909N	03406	1826-0419	MC14001HCP	02037	1820-1745	MC14515HCP	02037	1820-1329
LM3911N	03406	1826-0390	MC14001URCP	02037	1820-1499	MC14516CP	02037	1820-1114
LM393N	03406	1826-0412	MC14001URCP	02037	1820-1620	MC145178CP	02037	1820-1815
LM395K	03406	1826-0320	MC14002HCP	02037	1820-2079	MC145188CL	02037	1820-1591
LM4250UCH	03406	1826-0165	MC14002URCP	02037	1820-1339	MC145188CP	02037	1820-1122
LM555CN	03406	1826-0373	MC140088CP	02037	1820-1511	MC145198CP	02037	1820-1387
LM709H	03406	1820-0162	MC140088HCL	02037	1820-2086	MC145208CP	02037	1820-1150
LM78L10ACH	03406	1826-0394	MC14007HCP	02037	1820-1503	MC145208CP	02037	1820-2021
LM5700H	03406	1826-0375	MC140118CP	02037	1820-1525	MC14522HAL	02037	1820-1181
MC1001P	02037	1820-0472	MC140118CP	02037	1820-1747	MC14522CP	02037	1820-1175
MC1004P	02037	1820-0142	MC14011URCP	02037	1820-1500	MC145268CP	02037	1820-1328
MC1006P	02037	1820-0666	MC14011URCP	02037	1820-1621	MC145278CP	02037	1820-1265
MC1007P	02037	1820-0147	MC14012HCP	02037	1820-1960	MC145288CL	02037	1820-2051
MC10100L	02037	1820-1990	MC14012URCP	02037	1820-1507	MC145288CP	02037	1820-1356
MC10101P	02037	1820-0801	MC140138CP	02037	1820-1497	MC145108CP	02037	1820-1327
MC10102P	02037	1820-0802	MC140138CP	02037	1820-1617	MC14532HCL	02037	1820-1570
MC10103L	02037	1820-1831	MC14014HCP	02037	1820-1514	MC145324CP	02037	1820-1355
MC10103P	02037	1820-1686	MC140158CL	02037	1820-2055	MC145344CP	02037	1820-1855
MC10104P	02037	1820-1400	MC140158CP	02037	1820-1176	MC145368CP	02037	1826-0411
MC10105P	02037	1820-0803	MC140158CP	02037	1820-1502	MC145388CL	02037	1820-1569
MC10106P	02037	1820-0804	MC140158CP	02037	1820-1622	MC145388CP	02037	1820-1932
MC10107P	02037	1820-0805	MC140158CP	02037	1820-2008	MC145398CL	02037	1820-1549
MC10109P	02037	1820-0806	MC140168CP	02037	1820-1504	MC145398CP	02037	1820-1471
MC1010P	02037	1820-0145	MC140168CP	02037	1820-1614	MC145418CP	02037	1820-1658
MC10110P	02037	1820-0807	MC140178CP	02037	1820-1508	MC145438CP	02037	1820-2097
MC10111P	02037	1820-0808	MC14					

Desc.	Mr.	HP P/N	Mr.	HP P/N	Mr.	HP P/N	Mr.	HP P/N
NR251851 PROGRAMMEN	02910	1816-1203	02180	1826-0628	5A280N	1820-0419		
NR251851 PROGRAMMEN	02910	1816-1204	02180	1826-0642	5A292F	1820-1098		
NR251851 PROGRAMMEN	02910	1816-1205	02180	1826-0576	5A41027	1820-1682		
NR251851 PROGRAMMEN	02910	1816-1206	02180	1826-0601	5A41008	1820-0415		
NR251851 PROGRAMMEN	02910	1816-1207	03677	1818-0115	5M8857K6	05430		
NR251851 PROGRAMMEN	02910	1816-1208	03794	1818-0320	5F555CT	1813-0140		
NR251851 PROGRAMMEN	02910	1816-1209	03811	1818-0425	5G3501AJ	02910		
NR251851 PROGRAMMEN	02910	1816-120A	03811	1818-0342	5G3504K	1826-0224		
NR251851 PROGRAMMEN	02910	1816-1209	03811	1818-0553	5G3501AJ	03793		
NR251851 PROGRAMMEN	02910	1816-1210	03811	1818-0492	5G3524J	1826-0258		
NR251851 PROGRAMMEN	02910	1816-1211	03811	1818-0643	5G3524J	03793		
NR251851 PROGRAMMEN	02910	1816-1212	03811	1818-0562	5G3524J	1826-0661		
NR251851 PROGRAMMEN	02910	1816-1213	03811	1818-0895	5G3524J	01698		
NR251851 PROGRAMMEN	02910	1816-1214	03714	1818-0744	5G3524J	1826-0428		
NR251851 PROGRAMMEN	02910	1816-1215	03811	1818-0797	5G3524J	01698		
NR251851 PROGRAMMEN	02910	1816-1216	03811	1818-0794	5G3524J	1820-0341		
NR251851 PROGRAMMEN	02910	1816-1217	03811	1818-0799	5G3524J	01698		
NR251851 PROGRAMMEN	02910	1816-1218	03811	1818-0800	5G3524J	1820-0342		
NR251851 PROGRAMMEN	02910	1816-1219	03811	1818-0801	5G3524J	01698		
NR251851 PROGRAMMEN	02910	1816-1220	03811	1818-0802	5G3524J	1820-1137		
NR251851 PROGRAMMEN	02910	1816-1221	03811	1818-0803	5G3524J	01698		
NR251851 PROGRAMMEN	02910	1816-1222	03811	1818-0804	5G3524J	1820-0086		
NR251851 PROGRAMMEN	02910	1816-1223	03811	1818-0805	5G3524J	01698		
NR251851 PROGRAMMEN	02910	1816-1224	03811	1818-0806	5G3524J	1820-0345		
NR251851 PROGRAMMEN	02910	1816-1225	03811	1818-0807	5G3524J	01698		
NR251851 PROGRAMMEN	02910	1816-1226	03811	1818-0808	5G3524J	1820-0096		
NR251851 PROGRAMMEN	02910	1816-1227	03811	1818-0809	5G3524J	01698		
NR251851 PROGRAMMEN	02910	1816-1228	03811	1818-0810	5G3524J	1820-0346		
NR251851 PROGRAMMEN	02910	1816-1229	03811	1818-0811	5G3524J	01698		
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NR25270B PROGRAMMEN	02910	1816-1171	03811	1818-0825	5G3524J	01698		
NR25270B PROGRAMMEN	02910	1816-1193	03811	1818-0826	5G3524J	1820-0095		
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NR25291N PROGRAMMEN	02910	1816-1324	03811	1818-0828	5G3524J	1820-0349		
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NR25291N PROGRAMMEN	02910	1816-1326	03811	1818-0830	5G3524J	1820-0094		
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NR2583N	02910	1820-1777	03811	1818-0838	5G3524J	1820-0310		
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SN7440J	01699	1820-0071	SN74LS05N	01699	1820-1200	SN74LS49AN	01699	1820-2078
SN7442AN	01699	1820-0214	SN74LS08N	01699	1820-1201	SN74LS51N	01699	1820-1210
SN7445H	01699	1820-0468	SN74LS09N	01699	1820-1246	SN74LS54AN	01699	1820-1285
SN7446AN	01699	1820-1037	SN74LS107AN	01699	1820-1469	SN74LS55N	01699	1820-1284
SN7447AN	01699	1820-0995	SN74LS109AN	01699	1820-1282	SN74LS640N	01699	1820-2206
SN7448N	01699	1820-1038	SN74LS10N	01699	1820-1202	SN74LS645N	01699	1820-2268
SN74490N	01699	1820-1465	SN74LS112N	01699	1820-1212	SN74LS668N	01699	1820-1434
SN7450N	01699	1820-0062	SN74LS113AN	01699	1820-1213	SN74LS669N	01699	1820-1435
SN7451N	01699	1820-0063	SN74LS113AN	01699	1820-1821	SN74LS670N	01699	1820-1447
SN7451N	01699	1820-0073	SN74LS11N	01699	1820-1203	SN74LS73AN	01699	1820-1574
SN7459N	01699	1820-0084	SN74LS122N	01699	1820-1422	SN74LS7AJ	01699	1820-1668
SN745AN	01699	1820-0074	SN74LS123N	01699	1820-1423	SN74LS7AN	01699	1820-1112
SN7460N	01699	1820-0085	SN74LS124N	01699	1820-1424	SN74LS75N	01699	1820-1411
SN7470N	01699	1820-0065	SN74LS124AN	01699	1820-1568	SN74LS83AN	01699	1820-0910
SN7472N	01699	1820-0304	SN74LS12KAN	0				

Desc.	Mfr.	HP P/N						
SVC2316H MASKED	01794	1818-0721	TMS2516JL	0169A	1818-0498	UA711UC	02237	1826-0055
SVC2316H MASKED	01794	1818-0722	TMS2516JL PROG	0169A	1818-0856	UA714HC	02237	1826-0543
SVC2316H MASKED	01794	1818-0723	TMS2516JL PROG	0169A	1818-0857	UA714LHC	02237	1826-0574
SVC2316H MASKED	01794	1818-0724	TMS2516JL PROG	0169A	1818-0858	UA723CJ	0169A	1826-0049
SVC2316H MASKED	01794	1818-0725	TMS2516JL PROG	0169A	1818-0859	UA726HC	02237	1826-0031
SVC2316H MASKED	01794	1818-0726	TMS2516JL PROG	0169A	1818-0860	UA733UC	02237	1826-0064
SVC2316H MASKED	01794	1818-0727	TMS2516JL PROG	0169A	1818-0861	UA734HC	02237	1826-0183
SVM1404A	01794	1820-0763	TMS2516JL PROG	0169A	1818-0862	UA739UC	02237	1826-0944
SVP2316A MASKED	01794	1818-0697	TMS2516JL PROG	0169A	1818-0863	UA7404C	02237	1826-0056
SVP2316A MASKED	01794	1818-0706	TMS2516JL PROG	0169A	1818-0864	UA747UM	02237	1826-0135
SVP2316A MASKED	01794	1818-0795	TMS2516JL PROG	0169A	1818-0865	UA749HC	02237	1826-0184
SVP2316H MASKED	01794	1818-0710	TMS2516JL PROG	0169A	1818-0866	UA7490HC	02237	1826-0347
SVP2316H MASKED	01794	1818-0728	TMS2516JL PROG	0169A	1818-0867	UA75472C	02237	1826-0541
SVP2316H MASKED	01794	1818-0729	TMS2516JL PROG	0169A	1818-0868	UA7A04C	02237	1826-0137
SVP2316H MASKED	01794	1818-0730	TMS2516JL PROG	0169A	1818-0869	UA7A04HC	02237	1826-0231
SVP2316H MASKED	01794	1818-0731	TMS2516JL PROG	0169A	1818-0870	UA7A04HC (SFL)	02237	1826-0274
SVP2316H MASKED	01794	1818-0732	TMS2516JL PROG	0169A	1818-0871	UA776TC	02237	1826-0212
SVP2316H MASKED	01794	1818-0733	TMS2708JL PROGRAMMED	0169A	1818-0762	UA780RDA	02910	1826-0608
SVP2316H MASKED	01794	1818-0734	TMS2708JL PROGRAMMED	0169A	1818-0452	UA7824XC	02237	1826-0272
SVP2316H-3 MASKED	01794	1818-0709	TMS2708JL PROGRAMMED	0169A	1818-0453	UA78GKC	02237	1826-0447
SVP2332 MASKED	01794	1818-0951	TMS2708JL PROGRAMMED	0169A	1818-0454	UA78G01C	02237	1826-0456
SVP2332 MASKED	01794	1818-0952	TMS2708JL PROGRAMMED	0169A	1818-0455	UA78H45KC	02237	1813-0100
SVP2332 MASKED	01794	1818-0535	TMS2708JL PROGRAMMED	0169A	1818-0456	UA78H125C	02237	1813-0093
SVP2332 MASKED	01794	1818-0536	TMS2708JL PROGRAMMED	0169A	1818-0457	UA78H15KC	02237	1813-0124
SVP2332 MASKED	01794	1818-0538	TMS2708JL PROGRAMMED	0169A	1818-0458	UA78H8KCH	02237	1813-0123
SVP2332 MASKED	01794	1818-0539	TMS2708JL PROGRAMMED	0169A	1818-0459	UA78L15ACH	02237	1826-0353
SVP2332 MASKED	01794	1818-0540	TMS2708JL PROGRAMMED	0169A	1818-0460	UA78L264WC	02237	1826-0460
SVP2332 MASKED	01794	1818-0541	TMS2708JL PROGRAMMED	0169A	1818-0461	UA78L424WC	02237	1826-0586
SVP2332 MASKED	01794	1818-0542	TMS2708JL PROGRAMMED	0169A	1818-0462	UA78M06HL	02237	1826-0349
SVP2332 MASKED	01794	1818-0543	TMS2708JL PROGRAMMED	0169A	1818-0463	UA78M12UC	02237	1826-0345
SVP2332 MASKED	01794	1818-0544	TMS2708JL PROGRAMMED	0169A	1818-0464	UA78M6HC	02237	1826-0584
SVP2332 MASKED	01794	1818-0545	TMS2708JL PROGRAMMED	0169A	1818-0465	UA78M6U1C	02237	1826-0464
SVP2332 MASKED	01794	1818-0546	TMS2708JL PROGRAMMED	0169A	1818-0466	UA78S04PC	02237	1826-0603
SVP2332 MASKED	01794	1818-0644	TMS2708JL PROGRAMMED	0169A	1818-0467	UA7905UC	02237	1826-0445
SVP2332 MASKED	01794	1818-0645	TMS2708JL PROGRAMMED	0169A	1818-0468	UA7906UC	02237	1826-0478
SVP2332 MASKED	01794	1818-0646	TMS2708JL PROGRAMMED	0169A	1818-0750	UA7912UC	02237	1826-0418
SVP2332 MASKED	01794	1818-0647	TMS2716JL	0169A	1818-0752	UA7924XC	0169A	1826-0620
SVP2332 MASKED	01794	1818-0648	TMS2716JL	0169A	1818-0743	UA7952UC	02237	1826-0404
SVP2332 MASKED	01794	1818-0649	TMS2716JL	0169A	1818-0491	UA796KC	02237	1826-0444
SVP2332 MASKED	01794	1818-0650	TMS3002LP	0169A	1820-0211	UA796U1C	02237	1826-0441
SVP2332 MASKED	01794	1818-0651	TMS3113NC	0169A	1826-1188	UA798KHC	02237	1813-0127
SVP2332 MASKED	01794	1818-0652	TMS3120NC	0169A	1820-1346	UA79M124HC	02237	1826-0300
SVP2332 MASKED	01794	1818-0653	TMS31224C	0169A	1820-1178	UA79M12CKC	0169A	1826-0629
SVP2332 MASKED	01794	1818-0654	TMS3129NC	0169A	1820-2092	UA79M15CLA	0169A	1826-0511
SVP2332 MASKED	02037	1826-0507	TMS31444NL MASKED	07810	1818-0493	UA79M6HC	02237	1826-0583
SVP2332 MASKED	01991	1820-0058	TMS4027-15JL SELCTD	0169A	1818-0317	UA79M6U1C	02237	1826-0483
SVP2332 MASKED	0633R	1826-0318	TMS4027-20JL SELCTD	0169A	1818-0334	UAF359TC	02237	1826-0491
SVP2332 MASKED	01991	1820-0133	TMS4030JL	0169A	1818-0103	UHN-5707A	02634	1820-2020
SVP2332 MASKED	0169A	1820-0279	TMS4045-70JL	0169A	1818-0443	UHN29R1A	02634	1820-2273
SVP2332 MASKED	0169A	1826-0647	TMS4045-45JL	0169A	1818-0438	UMP-402	04200	1820-1120
SVP2332 MASKED	0169A	1826-0520	TMS4050-1JL	0169A	1818-0181	UMP-407	02634	1820-2129
SVP2332 MASKED	0169A	1826-0519	TMS4050JL	0169A	1818-0146	UMP-408	04200	1820-1086
SVP2332 MASKED	0169A	1826-0547	TMS4050NL	0169A	1818-0147	ULN-2064A	02634	1820-2170
SVP2332 MASKED	0169A	1826-0521	TMS4060-2JL	0169A	1818-0247	ULN-2068B	02634	1820-2274
SVP2332 MASKED	0169A	1826-0600	TMS4060JL	0169A	1818-0165	ULN-2074A	02634	1820-2130
SVP2332 MASKED	0169A	1826-0522	TMS4060NL	0169A	1818-0263	ULN-2111A	02634	1826-0029
SVP2332 MASKED	0169A	1826-0545	TMS4103NC	0169A	1818-0102	UM1500	04200	1820-049A
SVP2332 MASKED	0169A	1826-0572	TMS4116-15JL SELCTD	0169A	1818-0509	UPD169U	00030	1820-2060
SVP2332 MASKED	0169A	1826-0538	TMS4116-20JL SELCTD	0169A	1818-0341	UPD228U	00039	1820-1920
SVP2332 MASKED	0169A	1826-0410	TMS4116-25JL SELCTD	0169A	1818-0340	UPD241U	00039	1820-1844
SVP2332 MASKED	0169A	1826-0643	TMS4116-26JL SELCTD	0169A	1818-0391	UPD253U	00039	1820-2005
SVP2332 MASKED	0169A	1826-0565	TMS4732NL	0169A	1818-0894	UPD255AD	00039	1820-1919
SVP2332 MASKED	0169A	1826-0450	TMS4732NL MASKED	0169A	1818-0733	VFC32KP	05474	1826-0624
SVP2332 MASKED	0169A	1826-0051	TMS4732NL MASKED	0169A	1818-0734	XC79L45GC	02037	1826-0332
SVP2332 MASKED	0169A	1826-0476	TMSR080AM	0169A	1820-1783	XC79L12CA	02037	1826-0331
SVP2332 MASKED	0169A	1820-1973	TNA3709V	01991	1820-0113	XR-2207CP	00350	1820-1648
SVP2332 MASKED	0169A	1820-1948	TR1602A	00575	1820-1681	XP2240	00350	1820-1628
SVP2332 MASKED	0169A	1826-0477	TR1602B	00575	1820-1219	XR320	00350	1826-0237
SVP2332 MASKED	0169A	1826-0461	TR1602B-05	00575	1820-1911	Z80A-CPU-PS	07653	1820-2298
SVP2332 MASKED	0169A	1820-0396	UA20R01EPC	02237	1826-0550	Z80A-CIC-PS	07653	1820-2301
SVP2332 MASKED	0169A	1826-0551	UA20H	02237	1826-0072	Z80A-CMA-PS	07653	1820-2299
SVP2332 MASKED	0169A	1820-1174	UA3044C	02237	1826-0004	Z80A-SIL-72-PS	07653	1820-2300
SVP2332 MASKED	0169A	1820-1232	UA4130PC	02237	1826-0222	Z8440	02842	1813-0040
SVP2332 MASKED	0169A	1818-0096	UA710HC	02237	1820-0355	Z8441	02842	1813-0039

supplement to
BENCH BRIEFS
 SERVICE NOTE INDEX

Need Any Service Notes?

Here's the latest listing of Service Notes available for Hewlett-Packard products. To obtain information for instruments you own, remove the order form and mail it to the HP distribution center nearest you.

140T OSCILLOSCOPE

140T-1A-S. All prefixes. Modification to reduce shock hazard during failure conditions.

141T STORAGE OSCILLOSCOPE

141T-7A-S. All prefixes. Elimination of potential safety hazard.

204C/D OSCILLATOR

204C/D-3A. 204C and 204C-H20 serials 0989A18215 and below, and 204D serials 1105A05485 and below. Modification to accept new type batteries (Option 002 only).

239A OSCILLATOR

239A-1. Serials 1814A00100 thru 1814A00226. Procedures for correction of wiring of ground select switch.

239A-2. Serials 1814A00100 thru 1814A00231. Procedures for correction of amplitude instability.

339A DISTORTION MEASUREMENT SET

339A-1. Serials below 1730A00451. Solving oscillation problems when testing high gain amplifiers.

339A-2. Serials below 1730A00410. Procedures for replacement of zener diodes A4CR5, A4CR11 and photocells A3E1, A3E2.

339A-3. Serials below 1730A00555. Replacement procedures for photocell A3E1.

339A-4A. Serials below 1730A00409. Replacement procedures for photomodule A2E1.

419A DC NULL VOLTMETER

419A-7A-S. Elimination of potential shock hazard.

427A VOLTMETER

427A-5. Serials 0947A18910 and below. Meter stability improvement when switching from DCV+ to DCV- positions.

432C POWER METER

432C-2. Serials 1832A and below. Modification to buffer BCD output data.

465A AMPLIFIER

465A-6. Serials 0970A05175 and below. Recommended replacement for transistor Q9.

478A THERMISTOR MOUNTS

478A-1D. All serials. Thermistor assembly replacement procedure.

478A-2A. Serials below 49673. RF connector assembly replacement procedures

478A-3. All serials between 49673 to 65600. Ground modification to prevent currents flowing through thermistors.

495A MICROWAVE AMPLIFIER

495A-8A. Serials 826-0311 thru 1717A. Modification to prevent arcing in high voltage circuits.

608C/D VHF SIGNAL GENERATORS

608D-4B. 608C serials below 2354 and 608D serials below 4916. Recommended silicon rectifier conversion.

895A POWER SUPPLY

295A-2. Serials 1821A-01702 and below. Modification to replace zener reference diode 1902-0763.

1200A/B OSCILLOSCOPE

1200A/B-1A. Serials 1202A and below. Recommended low voltage regulator transistor replacement.

1201A/B OSCILLOSCOPE

1201A/B-9. Serials 1331A and below. Recommended low voltage regulator transistor replacement.

1220A OSCILLOSCOPE

1220A-21A. Serials 1814A, 1814S, and below. Recommended CRT replacement.

1222A OSCILLOSCOPE

1222A-1A. Serials 1809A, 1809S, and below. Recommended CRT replacement.

1310A DISPLAY

1310A-19-S. Serials 1812A-01656 and below. Elimination of potential hazard.

1311A DISPLAY

1311A-19-S. Serials 1552A-01477 and below. Elimination of potential hazard.

1317A DISPLAY

1317A-6-S. Serials 1649A-00600 and below. Elimination of potential hazard.

1321A DISPLAY

1321A-6-S. Serials 1656A-00425 and below. Elimination of potential hazard.

1350A GRAPHICS TRANSLATOR

1350A-1. All serials. Resistor change to standardize Z axis amplifier U65 selection.

1610A LOGIC ANALYZER

1610A-4-S. Serials 1812A00645 and below. Elimination of power line socket shock hazard.

1610A-5. Serials 1822A and below and 01610-63005's serials below 1806A01040. Modification to prevent fuse failures due to line fluctuations.

1610A-6. Modification to the display board to improve performance.

1610A-7. All serials. Low voltage power supply troubleshooting.

1611A LOGIC STATE ANALYZER

10262A-1. Serials 1818A00511 and below. Modification to 10262A personality module for input signal threshold detection.

1615A LOGIC ANALYZER

1615A-1-S. Serials 1825A00626 and below. Elimination of power line socket shock hazard.

1640A SERIAL DATA ANALYZER

1640A-1-S. Serials 1827A00315 and below. Elimination of power socket shock hazard.

1640A-2. Serials 1827A00295 and below. Power supply current limit modification.

1640A-3. Serials 1835A00402 and below. Recommended replacement for clamping diodes on A4 interface board.

1710B OSCILLOSCOPE

1710B-15. All serials. Modification to eliminate intermittent auto baseline at slow sweeps.

1712A OSCILLOSCOPE

1712A-14. All serials. Modification to prevent intermittent auto baseline at slow sweeps.

1715A OSCILLOSCOPE

1715A-2. Serials 1820A01025 and below. Recommended replacement parts to improve reliability of analog assembly A18.

1715A-3. Serials 1728A and below. Modification to eliminate intermittent auto baseline at slow sweeps.

1720A OSCILLOSCOPE

1720A-18. All serials. Modification to eliminate intermittent auto baseline at slow sweeps.

1722A/B OSCILLOSCOPE

1722A-18. All serials. Modification to eliminate intermittent auto baseline at slow sweeps.

1722B-1. Serials 1737A and below. Modifications to eliminate intermittent auto baseline at slow sweeps.

1725A OSCILLOSCOPE

1725A-2. Serials 1823A00800 and below. Recommended replacement parts for reliability of analog assembly A18.

1725A-2. Serials 1720A and below. Modifications to prevent intermittent auto baseline at slow sweeps.

1742A OSCILLOSCOPE

1742A-1. Serials prefixed 1807A. Modification to prevent false readings in delayed sweep "TRIG'D" mode.

1915A OUTPUT AMPLIFIER

1915A-4A. Serials 1522A and below. Preferred replacement parts for A5CR2 and A5CR3 diodes.

3325A SYNTHESIZER/ FUNCTION GENERATOR

3325A-1. Serials 1748A00310 and below. Recommended power supply modification.

3330A/B AUTOMATIC SYNTHESIZER

3330A/B-10. Serials 1331A02237 and below. Recommended isolated HP-IB timing improvement.

3335A FREQUENCY SYNTHESIZER

3335A-2. Serials below 1640A00300. Elimination of potential problem when replacing A4U56, A5Q1, A5Q2, A5CR3, or A4.

3335A-3. Serials below 1640A00376. Recommended installation of special sweep mode switch.

3403A/B/C/ TRUE RMS VOLTMETER

3403C-7. All serials. Recommended modifications to update 3403A to 3403C. Supplements 3403C-4.

3420A/B DC DIFFERENTIAL VOLTMETER/RATIOMETER

3420A/B-5C-S. Elimination of potential safety hazard.

3435A MULTIMETER

3435A-3. Serials 1606A06400 and below. Recommended replacement of A1U14 and A1U15 digit drivers.

3438A HP-IB MULTIMETER

3438A-3. Serials 1717A00920 and below. Recommended replacement of A1U14 and A1U15 digit drivers.

3450B DIGITAL MULTIMETER

3450B-5. All serials. Recommended power supply transformer replacement.

3455A DIGITAL VOLTMETER

3455A-12B. Serials 1622A02566 to 1622A03300. Recommendations to improve ohms converter response time.

3455A-13. Serials 1622A03538 and below. Recommended modifications to reduce switch bounce and A1U48 oscillations.

3466A MULTIMETERS

3466A-4A. All serials. Recommended replacement of integrator of amp U400.

3466A-6. Serials 1716A02781 and below. Recommended true RMS converter replacement.

3466A-7. Serials 1716A03380 and below. Recommended replacement of A4U901, A4U905, A4U906, and A4U911 digit drivers.

3495A SCANNER

3495A-3. Serials 1428A02505 and below. Recommended modifications to meet European VDE conducted RFI specifications with accessory 44413A.

3551A TRANSMISSION TEST SET

3551A-9A. Serials 1550A04325 and below. Recommended A3 input amplifier assembly, front panel, and front subpanel replacement.

3551A-11. Serials 1550A04325 and below. Recommended replacement kit for new type WECO 310 jacks.

3555B TRANSMISSION AND NOISE MEASURING SET

3555B-2D. Serials 0992A05670 and below. Recommendations for improved power supply reliability.

3582A SPECTRUM ANALYZER

3582A-1. All serials. How to replace front panel switches.

3585A

3585A-1. Serials below 1750A00230. Input/conversion assembly rust problem correction.

3702A DEMODULATOR DISPLAY

3702A-24. All serials. Recommended replacement of varactor diode A3CR5 (0122-0602).

3702A-25. All serials. Recommended replacement of A3 assembly I.F. mixer & local oscillator.

3702B IF/BB RECEIVER

3702B-40. Serials below 1242U-00251. Recommended field replacement of A2 assembly.

3702B-41. Serials below 1438U-01046 and serials 1438U-01046 to 1723U-02055 inclusive. Replacement of Y2 display switch (S7).

3702Z DEMODULATOR DISPLAY

3702Z-9. All serials. Replacement of varactor diode A3CR5.

3702Z DEMODULATOR DISPLAY

3702Z-10. All serials. Replacement of A3 assembly I.F. mixer & local oscillator.

3721A CORRELATOR

3721A-16. Serials 1544U-00660 and below. Recommendations for improved operation of reset circuitry.

3721A-17. Serials 1544U-00665 and below. Elimination of noise on dither position.

3745A/B SELECTIVE LEVEL MEASURING SET

3745A/B-4C. Serials 1607U and below. Recommendations to eliminate HP-IB system operational errors.

3745A/B-19. Serials 1815U and above. Preferred replacement of A109 ROM1.

3745A/B-21. Serials 1815U. Improvement in low frequency noise floor.

3745A/B-22. Serials 1812U and below. Preferred replacement of A109 ROM4.

3745A/B-23. Serials 1815U, 1831U and 1836U. Prevention of possible remote start-up problem.

3745A/B-24. Serials 1812U and below. Recommended retrofit kit for special option H14.

3745A/B-26. Serials between 1815U and 1844U. XY driver (option 040) wire harness modification

3747A/B SELECTIVE LEVEL MEASURING SET

3747A/B-1. Serials 1819U and below. Improvement in low frequency noise floor.

3747A/B-2. Serials 1834U and below. Prevention of possible remote start-up problem.

3747A/B-3. Serials 1804U and below. Recommended modification to 10MHz crystal filter assembly.

3747A/B-5. Serials between 1804U and 1908U. XY driver (option 040) wire harness modification.

3760A DATA GENERATOR

3760A-11. Serials 1744U-00356 to 1744U-00394. Recommended modification to data delay switching.

3763A ERROR DETECTOR

3763A-2. Serials below 1812U-00156. Modification to reduce the susceptibility of the 3763A to conducted line interference.

3770A AMPLITUDE/DELAY DISTORTION ANALYZER

3770A-17A. Serials below 1651U-00483. Recommendations to improve attenuation distortion response with input frequencies widely separated/preventing oscillation on A31.

3770A-36. Serials below 1817U-00503. Preferred replacement for loudspeaker LS1.

3770A-37. All serials. Recommended retrofitting instructions for option 001 (+10dBm switch).

3770B TELEPHONE LINE ANALYZER

3770B-14. Serials below 1728U-00246. Recommended replacements to prevent oscillations on assembly A31.

3770B-16. Serials below 1728U-00311. Procedures to prevent shorting of capacitors on A23 assembly.

3771A/B DATA LINE ANALYZER

3771A/B-1. All serials. Retrofitting instructions for printer board option 004.

3780A PATTERN GENERATOR/ ERROR DETECTOR

3780A-4B. Serials below 1804U-00531. Modification to prevent noise on the AC line supply.

3780A-10B. Serials below 1804U-00531. Recommendations to reduce the susceptibility to conducted mains supply interference.

3780A-16. All serials. Procedures for selection of correct data threshold level.

3964A INSTRUMENTATION TAPE RECORDER

3964A-16A. Serials 1715A through 1814A; and option 009/010 with serials 1821A00792 and below. Recommended modification of A24 F1 and F2 to 5 amps.

3968A INSTRUMENTATION TAPE RECORDER

3968A-16A/8868A-14A. Serials 1715A through 1814A; and option 009/010 with serials 1821A00702 and below. Recommended modification A24 LF1 and F2 to 5 amps.

5045A DIGITAL IC TESTER

5045A-5B. All serials. Recommended new relays check test cards.

5045A-9. All serials. Recommended handling precaution for CMOS boards.

5045A-10. All serials. Power supply modification to prevent overvoltage adjustment conditions.

5045A-11. All serials. Revised cross talk test to improve current performance tests.

5045A-12. All serials. Recommended proper ground reference for test equipment.

5045A-13. Serials 1748A00345 and below. Paper advance circuit modification to prevent Q2 drive transistor damage.

5045A-15. All serials. Revised 5045A A11 adjustments.

5300A MEASURING SYSTEM

5300A-5. All serials. Recommended 10548A diagnostic test card update.

5300B MEASURING SYSTEM

5300B-2. All serials. Recommended 10548A diagnostic test card update.

5307A HIGH RESOLUTION COUNTER

5307A-1A. Serials 1308. Modification to install ground input overload protection.

5308A 75 MHz TIMER/COUNTER

5308A-4A. Serials 1720 and below. Recommended modification to prevent self-check erroneous display.

5312A ACSII CONVERTER

5312A-3. Troubleshooting procedures using signature analysis.

5314A UNIVERSAL COUNTER

5314A-1. Serial 1816. Recommended modifications of A1 main board assemblies.

5328A UNIVERSAL COUNTER

5328A-U-15A. Serials 1818U-00761 and above. Recommended replacement for A2 power supply assembly.

5328A-22. Series 1625. Troubleshooting option 011 (HP-IB) using signature analysis.

5328A-23. Serials 1828-08626, 1828-08733, 1828-08743, 1828-08742, and 1828-09052. Recommended improvement to A3 oscillator support assembly.

5342A MICROWAVE FREQUENCY COUNTER

5342A-9. Serials 1812 and below. Recommended procedure to correct false frequency readout.

5354A FREQUENCY COUNTER

5354A-8. All serials. Compatibility and repair information.

5363A TIME INTERVAL PROBES

5363A-3. All serials. Recommended probe FET replacement.

5370A UNIVERSAL TIME INTERVAL COUNTER

5370A-1. All serials. Recommended HP-IB verification program.

5370A-2. Recommended ROM changes.

5381A 80 MHz FREQUENCY COUNTER

5381A-2. Serials 1624 and below. Recommended field replacement of A1CR1 full wave bridge rectifier.

5420A DIGITAL SIGNAL ANALYZER

5420A-14. All serials. Modification to improve performance of 54470B digital filter.

5451B/C FOURIER ANALYZER

5451B-19/5451C-01. Serials 1748A and below. Modification to prevent intermittent operation of 5477A system control while running modal analysis.

5500C LASER HEAD

5526A-4. Serials 1648A and below. Modification to eliminate laser starting problems.

6110A THRU 6116A DC POWER SUPPLY

6110A-2. Serials 1815A01507 and older. Recommended modification to replace zener diode 1902-0763.

6111A-2. Serials 1606A02096 and below. Recommended modification to replace zener diode 1902-0763.

6112A-2. Serials 1634A01849 and below. Recommended modification to replace zener diode 1902-0763.

6113A-3. Serials 1617A01250 and below. Recommended modification to replace zener diode 1902-0763.

6116A-2. Serials 1741A01825 and below. Recommended modification to replace zener diode 1902-0763.

6128C THRU 6131A DIGITAL VOLTAGE SOURCE

6128C-1. Serials 1621A00150 and below. Modification to replace zener diode 1902-0763.

6129C-2. Serials 1739A00366 and below. Modification to replace zener diode 1902-0763.

6130C-2. Serials 1821A01045 and below. Modification to replace zener diode 1902-0763.

6131C-2. Serials 1825A00680 and below. Modification to replace zener diode 1902-0763.

6282A THRU 6296ADC POWER SUPPLY

6282A-3. Serials 1814A03006 and below. Modification to replace zener diode 1902-0763.

6286A-3. Serials 1744A03991 and below. Modification to replace zener diode 1902-0763.

6291A-2. Serials 1810A04422 and below. Modification to replace zener diode 1902-0763.

6296A-3. Serials 1816A03146 and below. Modification to replace zener diode 1902-0763.

6427B THRU 6434B POWER SUPPLY

6427B-2. Serials 1711A01140 and below. Modification to replace zener diode 1902-0763.

6428B-2. Serials 1834A02369 and below. Modification to replace zener diode 1902-0763.

6433B-2. Serials 1706A03305 and below. Modification to replace zener diode 1902-0763.

6434B-2. Serials 1826A02850 and below. Modification to replace zener diode 1902-0763.

6438B/6439B/6443B/6448B POWER SUPPLY

6438B-2. Serials 1706A01695 and below. Modification to replace zener diode 1902-0763.
 6439B-2. Serials 1821A01775 and below. Modification to replace zener diode 1902-0763.
 6443B-2. Serials 1706A02090 and below. Modification to replace zener diode 1902-0763.
 6448B-2. Serials 1825A02166 and below. Modification to replace zener diode 1902-0763.

6515A/6516A POWER SUPPLY

6515A-2. Serial 1712A04660. Modification to replace zener diode 1902-0763.
 6516A-2. Serials 1818A04030. Modification to replace zener diode 1902-0763.

6521A/6522A/6525A POWER SUPPLY

6521A-6. Serial 1818A01190. Modification to replace zener diode 1902-0763.
 6522A-6. Serial 1820A01267. Modification to replace zener diode 1902-0763.
 6525A-6. Serials 1827A02471 and below. Modification to replace zener diode 1902-0763.

7221A GRAPHIC PLOTTER

7221A-6/9872A-8. 7221A Serials 1823A-01381 and below, and 07221-60181 and 07221-66131 manufactured before 10/1/78. Change power-up sequence to processor BIB's.

7402A/7404A OSCILLOGRAPHIC RECORDERS

7402A-8. Serial prefixes: 7402A — 1720A03286 to 1720A03500, 7404A — 1740A00541 to 1740A00580. Recommended procedures to lubricate drive roller bearings.
 7402A-9. Serials 1820A3600 and below. Noise reduction modification on options 004 and 0009.

8018A DATA GENERATOR *

8018A-1. Serials 1702G00101-1702G00205. Recommended improved power supply kit.
 8018A-2. Serials 1826G00285 and below. A3 bit rate board modification.

8165A PROGRAMMABLE SIGNAL SOURCE

8165A-2. Serials 1812G00241 to 1812G00281. Procedure to eliminate power-on problem.

8165A PROGRAMMABLE SIGNAL SOURCE

8165A-3. Serials 1701G00101 to 1812G00281. Recommended power dissipation improvement on A10.

8411A HARMONIC FREQUENCY CONVERTER

8411A-2. All serials. Recommended adjustment procedures to ensure compatibility with broadband applications.
 8411A-3. All serials. Correct part numbers to use when replacing sampler assemblies.

8412A PHASE-MAGNITUDE DISPLAY

8412A-6. Serials 1625A and below. Modification for use with 8750A storage-normalizer. Supersedes P-08512-60051.
 8412A-7-S. Serials 1812A and below. Improvement of fuse labeling.
 8412A-8. Serials 1720A through 1812A and instruments modified for use with 8750A storage-normalizer. Recommended replacement for A3U1, A3U3, and A3U4 BI-FET analog switches.

8414A POLAR DISPLAY

8414A-5. Serials 1616A03675 and below. Recommended replacement for high voltage oscillator transistors Q1 and Q2.

8443A/B TRACKING GENERATOR/COUNTER

8443A/B-1-S. 8443A serials 1217A and below; 8443B serials 1228A and below. Elimination of potential shock hazard.

8478B THERMISTOR MOUNT

8478B-1A. Serials 2383 through 2898 and serials 24aa and above. Recommended thermistor assembly replacement kit.
 8478B-2. All serials 1144A12160 and below. Recommended ground modification.

8501A STORAGE-NORMALIZER

8501A-2. Serials 1830A00220 and below. Modification of rear panel connectors to be compatible with new and improved interconnect and labeling interface cables.

8503A/B S-PARAMETER TEST SET

8503A-1/8503B-1. All serials. Recommended procedures for cleaning of solenoid contacts in A5 coaxial switch assembly.

8505A NETWORK ANALYZER

8505A-14. Serials 1833A00770 and below. Modification of rear panel connectors to be compatible with new and improved interconnect and labeling interface cables.

8558B SPECTRUM ANALYZER

8558B-13A. Serials 1612A and below. Two pot gear drive tuning modification.
 8558B-16. All serials. Recommendations for changing standard 8558B into 75 ohm option 001 or 002.
 8558B-18. Serials 1823A04286 to 1823A04360. Recommended replacement of W9 ribbon cable PC connectors.

8565A SPECTRUM ANALYZER

8750A-2/8565A-3. Improvement of the 8750A horiz. gain control range when used with the 8565A spectrum analyzer.
 8565A-4. Serials 1849A and below. Recommended parts for oversized AT1 isolator.
 8565A-5. All serials. Recommended YTO replacement kit.

8568A SPECTRUM ANALYZER

8568A-2. Serials 1806A thru 1818A. MOS counter IC date codes with known defective devices.
 8568A-3. All serials. Procedure to correct delay following instrument preset.
 8568A-4. Serials 1805A and below. Recommended modification to improve 10 Hz bandwidth noise floor.
 8568A-5. All serials. List of operation and service documentation available.
 8568A-6A. All serials. User information available to improve performance.
 8568A-9. All serials. Replacement of A28 battery pack.
 8568A-11. All serials. Recommended fuse replacement.
 8568A-12. IF-display sections prefixed 1811A and below. Recommended modifications to A1V1 CRT/A1A2 Z axis amplifier compatibility.

8614A SIGNAL GENERATOR

8614A-19A. Serials 1748A and below. Recommended replacement for germanium transistors on A500.
 8616A-17A. Serials 1739A and below. Recommended replacement for germanium transistors on A500.

8660A/B/C/ SYNTHESIZED SIGNAL GENERATOR

8660A-29. All serials. Programming interface verification program.

8699B RF UNIT

8699B-5A. Serials 1441A and below. Recommended A3 YIG oscillator replacement kit.

8750A STORAGE-NORMALIZER

8750A-2/8565A-3. Serials 1808A and below. Improvement of the 8750A horiz gain control range when used with the 8565A spectrum analyzer.
 8750A-4A. Serials 1808A and below. Selected resistor for use with option 003 and 004 dedicated interface cards.
 8750A-5. All serials. Recommended 220V/240V line voltage fuse replacement
 8750A-6. All serials. 8750A/8410B multi-octave glitches explained.

8868A INSTRUMENTATION TAPE RECORDER

3968A-16A/8868A-14A. Serials 1715A through 1814A, and Option 009/010 with serials 1821A00702 and below. Recommended modification of A24 F1 and F2 to 5 amps.

9411A CONTROLLER CARD

9411A-3. Clarification of prom/control card rev compatibilities.

9571A-DTS 70

9571A-1. All serials. Recommended installation of SPT9 in Rev. C software.
 9571A-2. Modification of self test file (%FT600) for systems that do not have power supply programmers.
 9571A-3. 91073A prom vendor change.

9862A CALCULATOR PLOTTER

9862A-6A. All serials. Mechanical parts list correction.

9872A GRAPHIC PLOTTER

7221A-6/9872A-8. 9872A serials 1810A-02691 and below, and 09872-60131 and 09872-66131 manufactured before 10/1/78. Change power-up sequence to processor BIB's.
 9872A-9. Recommended memory PCA replacement.

10262A PERSONALITY MODULE

10262A-1. Serials 1818A00511 and below, 1611A option A18. Modification for input signal threshold detection.

10761 BINARY MULTIPLIER

10761A-1. Serials below 1712. Modification to eliminate signal timing problems.

59308A TIMING GENERATOR

59308A-3. Serials 1740A00466 through 1744A00690. Modification to improve 5 volt regulator.

69351A/B POWER SUPPLY

69351A-1/69351B-1. 69351A all serials, 69351B serials 1818A02638 and below. Modification to use zener diode 1902-0785.

86242A/C RF PLUG-INS

86242A-3B. All serials. Recommended YTO replacement kit. Supersedes 86242A-1, 86242A-3, 86242A-3A.
 86242C-1C. All serials. Recommended YTO replacement kit. Supersedes 86242C-1, 86242C-1A, 86242C-1B.

86250A/B/C/D RF

86250A-3A. Serials 1238A and below and 1246A and above. Recommended YTO replacement kit. Supersedes 86250A/B-1 and 86250A-3.
 86250B-3A. Serials 1238A and below and 1246A and above. Recommended YTO replacement kit. Supersedes 86250A/B-1 and 86250B-3.
 86250C-1A. Serials 1625A and below. Recommended YTO replacement kit. Supersedes 86250C-1
 86250D-1A. Serials 1709A and below. Recommended YTO replacement kit. Supersedes 86250D-1

86330B/86331B OSCILLATOR MODULES

86330B-3/86331B-3. All serials with option 001. Modification to RF mounting bracket when replacing modulator-amplifier-detector.

86341B OSCILLATOR MODULES

86341B-3. All serials with option 001. Recommended modification to LRF mounting bracket when replacing modulator-amplifier-detector.

86342A/C OSCILLATOR MODULE

86342A-4B. All serials. Recommended YTO replacement kit. Supersedes 86342A-1, 86342A-4, 86342A-4A
 86342C-1B. All serials. Recommended YTO replacement kit. Supersedes 86342C-1, 86342C-1A

83650C OSCILLATOR MODULE

86350C-1A. Serials 1741A and below. Recommended YTO replacement kit. Supersedes 86350C-1.

86351A OSCILLATOR MODULE

86351A-3A. All serials. Recommended YTO replacement kit. Supersedes 86351A-3.

86352A OSCILLATOR MODULE

86352A-3A. All serials. Recommended YTO replacement kit. Supersedes: 86352A-3.

94151A PROGRAMMABLE DRIVER/COMPARATOR CARD

94151A-1. Modification to improve drive signal characteristics under capacitive load when used in 9571A.

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READERS CORNER

Here's your chance to share your ideas and views with other *Bench Briefs* recipients. In Reader's Corner, we will print letters to the Editor, troubleshooting tips, modification information, and new tools and products that have made your job easier. In short, Reader's Corner will feature anything from readers that is of general interest to electronic service personnel.

If there is something you have to share with other *Bench Briefs* readers, let us hear from you.

An Infallible I.Q. Test

Puzzles often turn up in the strangest places. This one was given to me at a picnic outing I recently attended. The solutions are found by matching the numbered statements with the list of words.

- | | |
|--|--|
| 1) That which Noah built | 9) A dog sitting in a refrigerator |
| 2) An article for serving ice cream | 10) What a boy does on the lake when his motor won't run |
| 3) What a bloodhound does in chasing a woman | 11) What do you call a person who wrote for an Inn |
| 4) An expression to represent the loss of a parrot | 12) What the captain said when the boat was bombed |
| 5) An appropriate title for a knight named Koll | 13) What a little acorn says when he grows up |
| 6) A sunburned man | 14) What one does to trees that are in the way |
| 7) A tall coffee pot perking | 15) What you do if you have yarn and needles |
| 8) What one does when it rains | 16) Can George Washington turn into a country? |

Editor's Note

In the last issue of *Bench Briefs* an incorrect part number was listed on page 23 for an insulator used in the 8640B/M Signal Generators. Part number 0841-00064 should be 08641-00064.

Also, the last issue of *Bench Briefs* was incorrectly numbered Volume 18 Number 1; it should be Volume 19 Number 1. This issue is Volume 19 Number 2.

Sorry for any inconvenience this may have caused.

Editor

- A. Hypotenuse
- B. Polygon
- C. Inscribe
- D. Geometry
- E. Unit
- F. Centar
- G. Decagon
- H. Arc
- I. Circle
- J. Axiom
- K. Cone
- L. Coincide
- M. Cosecant
- N. Tangent
- O. Hero
- P. Perpendicular

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MAY-JULY 1979
Volume 19 Number 2

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