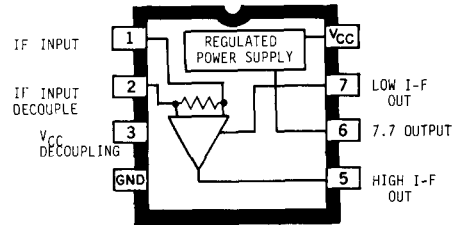


### TYPE ULN-2209M I-F GAIN BLOCK with VOLTAGE REGULATOR

The Type ULN-2209M four-stage limiting amplifier provides the function of an I-F gain block and is designed for use in communications and F-M receivers.

#### FEATURES

- Gain at 10.7 MHz: 50 dB Typical
- Operating Voltage Range: 10 V – 20 V
- Excellent Temperature Stability
- Power Supply Rejection Ratio: 40 dB Typical



- Operating Temperature Range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Plastic Package (8-pin) Dual In-Line M

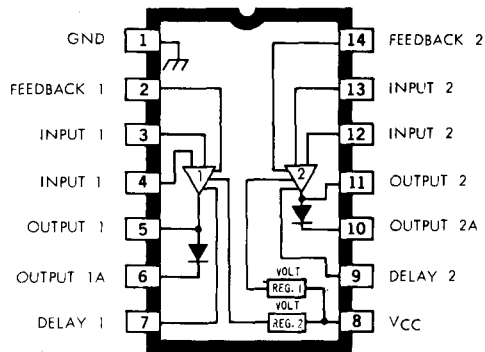
### TYPE ULN-2231A DUAL PREAMPLIFIER

The Type ULN-2231A Dual Preamplifier is a linear monolithic integrated circuit designed for use with low-level signals in low-noise applications. It offers outstanding value, performance, and reliability in both consumer and industrial products such as stereo tape players, microphone amplifiers, F-M stereo receivers, and phonograph amplifiers.

An integral voltage regulator eliminates the need for audio or r-f coupling. Internal feedback resistors are provided for NAB equalization.

#### FEATURES

- Single Power Supply Operation
- High Input Impedance
- Wide Power Supply Range
- Matched Open Loop Voltage Gain
- Turn-On Delay
- Low External Parts Count



- Internal Schottky Diodes to Prevent Tape Marking During Turn-Off
- Internal Transient Protection
- Operating Temperature Range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Plastic Package (14-pin) Dual In-Line A

### TYPE ULN-2244A PHASE-LOCKED LOOP STEREO DECODER

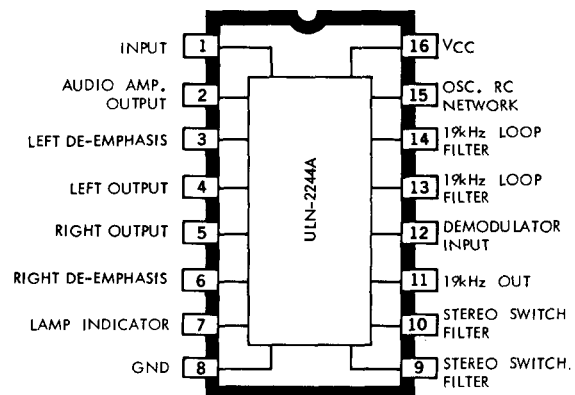
The ULN-2244A is a monolithic integrated circuit used for decoding stereo multiplexed signals in F-M receivers, while eliminating the tuning coils required to operate previous design stereo processors. The circuit creates a signal which is in phase with and of exactly double the 19 kHz pilot signal provided during stereo transmission. This 38 kHz subcarrier signal is used to demodulate the stereo information.

The stereo switch portion of the circuit is disabled during weak stereo signals or monaural broadcasts.

Additional features include emitter-follower outputs for driving low impedance loads and a voltage regulator for increased stability.

#### FEATURES

- High Channel Separation
- Low T.H.D.
- High Power Supply Decoupling
- 100 mA Lamp Driver Capability



- High  $V_{CC}$  Frequency Stability
- High Processing Gain
- Operating Voltage: 10.5 to 16 V
- Operating Temperature Range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Plastic Package (16-pin) Dual In-Line A

### Alpha-Numeric CROSS-REFERENCE to SPRAGUE Integrated Circuits

| To Replace | Use Sprague Type | To Replace | Use Sprague Type | To Replace | Use Sprague Type | To Replace | Use Sprague Type |
|------------|------------------|------------|------------------|------------|------------------|------------|------------------|
| SN75474P   | UDN3614M         | SN76642N   | ULN2113A         | TL1741C    | ULN2151D         | 732DC      | ULN2120A         |
| SN76104N   | ULN2120A         | SN76643N   | ULN2111A         | TL7401N    | US8881A          | 741-93-5B  | ULN2151D         |
| SN76105N   | ULN2122A         | SN76665N   | ULN2165A         | TL7437N    | US7437A          | 741CE      | ULN2151D         |
| SN76111N   | ULN2121A         | SN76669N   | ULN2136A         | TL7438N    | US7438A          | 741HC      | ULN2151D         |
| SN76113N   | ULN2128A         | SN76675N   | ULN2129A         | UA741CT    | ULN2151D         | 741TC      | ULN2151M         |
| SN76115N   | ULN2110A         | SN76678P   | ULN2209M         | UA741CV    | ULN2151M         | 746DC      | ULN2114A         |
| SN76116N   | ULN2244A         | SN76688ND  | ULN2211P         | UA741EHC   | ULN2151D         | 746HC      | ULN2114K         |
| SN76130N   | ULN2126A         | SN76689N   | ULN2289A         | UA741HC    | ULN2151D         | 753TC      | ULN2209M         |
| SN76177ND  | ULN2278P         | SSS741BJ   | ULN2151D         | UA741TC    | ULN2151M         | 758DC      | ULN2244A         |
| SN76226    | ULN2216          | SW7401N    | US8881A          | UA2136     | ULN2136A         | 767DC      | ULN2128A         |
| SN76227    | ULN2217          | SW7437N    | US7437A          | UA3064     | ULN2264A         | 767PC      | ULN2128A         |
| SN76228    | ULN2218          | SW7438N    | US7438A          | UA3065     | ULN2165A         | 780DC      | ULN2124A         |
| SN76242N   | ULN2124A         | T2741WV    | ULN2151D         | UA3067     | ULN2267A         | 781DC      | ULN2127A         |
| SN76243AN  | ULN2127A         | T7401B1    | US8881A          | UA3075     | ULN2129A         | 7432DC     | US7432A          |
| SN76246N   | ULN2114A         | TBA221     | ULN2151D         | UA3089     | ULN2289A         | 7432PC     | US7432A          |
| SN76246N   | ULN2228A         | TBA221B    | ULN2151M         | UC4741C    | ULN2151D         | 7437DC     | US7437A          |
| SN76267N   | ULN2267A         | TBA221N    | ULN2151D         | UC4741CE   | ULN2151M         | 7437PC     | US7437A          |
| SN76298N   | ULN2298A         | TBA331     | ULN2046          | XR1310     | ULN2110A         | 7438DC     | US7438A          |
| SN76564N   | ULN2264A         | TBA341     | ULN2054          | 705PC      | ULN2278P         | 7438PC     | US7438A          |
| SN76635N   | ULN2137A         | TDA1200    | ULN2289A         | 720DC      | ULN2137A         | 7439DC     | US7439A          |
|            |                  |            |                  | 729DC      | ULN2122A         |            |                  |

### Original Source CROSS-REFERENCE to SPRAGUE Integrated Circuits

| To Replace                         | Use Sprague Type | To Replace                           | Use Sprague Type | To Replace                       | Use Sprague Type | To Replace                             | Use Sprague Type |
|------------------------------------|------------------|--------------------------------------|------------------|----------------------------------|------------------|--|------------------|
| <b>ADVANCED MICRO DEVICES INC</b>  |                  | <b>FAIRCHILD SEMICONDUCTOR Cont.</b> |                  | <b>INTERSIL INC</b>              |                  | <b>MOTOROLA SEMI. PROD. INC. Cont.</b> |                  |
| AM741HC                            | ULN2151D         | CA3086                               | ULN2086A         | ICB8008C                         | ULN2151D         | MC1339P2                               | ULN2126A         |
| AMSSS741CJ                         | ULN2151D         | SN75451BP                            | UDN3611M         | ICB8741C                         | ULN2151D         | MC1356P                                | ULN2136A         |
| <b>AEG-TELEFUNKEN</b>              |                  | SN75452BP                            | UDN3612M         | ICL8008CPA                       | ULN2151M         | MC1357P2                               | ULN2111A         |
| TL1741C                            | ULN2151D         | SN75453BP                            | UDN3613M         | ICL8008CT Y                      | ULN2151D         | MC1357PQ                               | ULN2111N         |
| TL7401N                            | US8881A          | SN75454BP                            | UDN3614M         | 741-93-5B                        | ULN2151D         | MC1358P2                               | ULN2165A         |
| TL7437N                            | US7437A          | UA741EHC                             | ULN2151D         | <b>ITT SEMICONDUCTORS</b>        |                  |  |                  |
| TL7438N                            | US7438A          | UA741HC                              | ULN2151D         | ITT505*                          | UHP482           | MC1358PQ                               | ULN2165N         |
| <b>ANALOG DEVICES INC</b>          |                  | UA741TC                              | ULN2151M         | ITT512                           | UHP491           | MC1364P2                               | ULN2264A         |
| AD502J                             | ULN2151D         | UA2136                               | ULN2136A         | ITT552                           | ULN2001A         | MC1370P                                | ULN2124A         |
| AD502K                             | ULN2151D         | UA3064                               | ULN2264A         | ITT554                           | ULN2002A         | MC1371P2                               | ULN2127A         |
| AD512J                             | ULN2151D         | UA3065                               | ULN2165A         | ITT556                           | ULN2003A         | MC1375P                                | ULN2129A         |
| AD512K                             | ULN2151D         | UA3067                               | ULN2267A         | ITT3064                          | ULN2264A         | MC1389P                                | ULN2289A         |
| AD514J                             | ULN2151D         | UA3075                               | ULN2129A         | ITT3065                          | ULN2165A         | MC1398P2                               | ULN2298A         |
| AD514K                             | ULN2151D         | UA3089                               | ULN2289A         | ITT7401N                         | US8881A          | MC1439G                                | ULN2139D         |
| AD514L                             | ULN2151D         | 705PC                                | ULN2278P         | ITT7438AN                        | US7438A          | MC1439P1                               | ULN2139M         |
| AD741CH                            | ULN2151D         | 720DC                                | ULN2137A         | ITT7437N                         | US7437A          | MC1741CG                               | ULN2151D         |
| AD741CN                            | ULN2151M         | 729DC                                | ULN2122A         | <b>LITHIC SYSTEMS INC</b>        |                  |  |                  |
| AD741JN                            | ULN2151M         | 732DC                                | ULN2120A         | LA3045                           | ULS2045H         | MC1741CP1                              | ULN2151M         |
| AD741KH                            | ULN2151D         | 741CE                                | ULN2151D         | LA3046                           | ULN2046A         | MC3003                                 | US7432A          |
| AD741KN                            | ULN2151M         | 741HC                                | ULN2151D         | LA3086                           | ULN2086A         | MC3491P*                               | UHP482           |
| AD741LH                            | ULN2151D         | 741TC                                | ULN2151M         | <b>MICROPAC INDUSTRIES INC</b>   |                  |  |                  |
| AD741LN                            | ULN2151M         | 746DC                                | ULN2151D         | SSS741CJ                         | ULN2151D         | MC7437L                                | US7437A          |
| <b>EXAR INTEGRATED SYSTEMS INC</b> |                  | 746HC                                | ULN2114A         | <b>MIL ELECTRONICS INC</b>       |                  |  |                  |
| XR1310                             | ULN2110A         | 753TC                                | ULN2114K         | ML3046                           | ULN2046A         | MC7438L                                | US7438A          |
| <b>FAIRCHILD SEMICONDUCTOR</b>     |                  | 758DC                                | ULN2209M         | <b>MOTOROLA SEMI. PROD. INC.</b> |                  |  |                  |
| CA3045                             | ULN2045H         | 767DC                                | ULN2244A         | MC1304P                          | ULN2120A         | MC75451P                               | UDN3611M         |
| CA3046                             | ULN2046A         | 767PC                                | ULN2128A         | MC1305P                          | ULN2122A         | MC75452P                               | UDN3612M         |
| CA3065                             | ULN2165A         | 780DC                                | ULN2124A         | MC1307P                          | ULN2128A         | MC75453P                               | UDN3613M         |
| CA3067                             | ULN2267A         | 781DC                                | ULN2127A         | MC1310EP                         | ULN2110A         | MC75454P                               | UDN3614M         |
| CA3075                             | ULN2129A         | 7432DC                               | US7432A          | MC1310P                          | ULN2110A         | MPQ2221                                | TPQ2221          |
|                                    |                  | 7432DC                               | US7437A          | <b>MOTOROLA SEMI. PROD. INC.</b> |                  |  |                  |
|                                    |                  | 7437PC                               | US7437A          | MC1304P                          | ULN2120A         | MPQ2222                                | TPQ2222          |
|                                    |                  | 7438DC                               | US7438A          | MC1305P                          | ULN2122A         | MPQ2483                                | TPQ2483          |
|                                    |                  | 7438PC                               | US7438A          | MC1307P                          | ULN2128A         | MPQ2484                                | TPQ2484          |
|                                    |                  | 7439DC                               | US7439A          | MC1310EP                         | ULN2110A         | MPQ2906                                | TPQ2906          |
|                                    |                  |                                      |                  | MC1310P                          | ULN2110A         | MPQ2907                                | TPQ2907          |
|                                    |                  |                                      |                  | MC1311P                          | ULN2244A         | MPQ3725                                | TPQ3725          |
|                                    |                  |                                      |                  | MC1324P                          | ULN2224A         | MPQ3725A                               | TPQ3725A         |
|                                    |                  |                                      |                  | MC1328P                          | ULN2228A         | MPQ3798                                | TPQ3798          |
|                                    |                  |                                      |                  | MC1328P2                         | ULN2114A         | MPQ3799                                | TPQ3799          |
|                                    |                  |                                      |                  | MC1328PQ                         | ULN2114N         | MPQ3904                                | TPQ3904          |
|                                    |                  |                                      |                  |                                  |                  | MPQ3906                                | TPQ3906          |
|                                    |                  |                                      |                  |                                  |                  | MPQ6001                                | TPQ6001          |
|                                    |                  |                                      |                  |                                  |                  | MPQ6002                                | TPQ6002          |
|                                    |                  |                                      |                  |                                  |                  | MPQ6100                                | TPQ6100          |
|                                    |                  |                                      |                  |                                  |                  | MPQ6100A                               | TPQ6100A         |
|                                    |                  |                                      |                  |                                  |                  | SN7401N                                | US8881A          |

\*Indicates the Sprague suggested replacement is similar but not an exact pin-for-pin electrical replacement.

# SPRAGUE

## INTEGRATED CIRCUIT CROSS REFERENCE GUIDE O.E.M. TO SPRAGUE

### Original Source CROSS-REFERENCE to SPRAGUE Integrated Circuits

| To Replace                        | Use Sprague Type | To Replace                           | Use Sprague Type | To Replace                               | Use Sprague Type | To Replace                     | Use Sprague Type |
|-----------------------------------|------------------|--------------------------------------|------------------|--|------------------|--------------------------------|------------------|
| <b>NATIONAL SEMI. MICRO. DIV.</b> |                  | <b>NUCLEONIC PRODUCTS CO. INC.</b>   |                  | <b>SGS-ATES</b>                          |                  | <b>TEXAS INSTRUMENTS Cont.</b> |                  |
| CA 3045                           | ULN2045H         | NC7401N                              | US8881A          | TDA 1200                                 | ULN2289A         | SN55462JP                      | UDS3612H         |
| CA 3046                           | ULN2046A         | SFC2046E                             | ULN2046A         | L141T1                                   | ULN2151D         | SN55463JP                      | UDS3613H         |
| CA 3054                           | ULN2054A         | SFC2054EC                            | ULN2054A         | T7401B1                                  | US8881A          | SN55464JP                      | UDS3614H         |
| CA 3086                           | ULN2086A         | <b>N V PHILIPS</b>                   |                  | <b>SIEMENS</b>                           |                  | SN55471JP                      | UDS3611H         |
| DM7401N                           | US8881A          | TBA221                               |                  | ULN2151D                                 | SN55472JP        | UDS3612H                       |                  |
| DM7427N                           | US7427A          | TBA221B                              | ULN2151M         | <b>SIGNETICS CORP.</b>                   |                  | SN55473JP                      | UDS3613H         |
| DM7432N                           | US7432A          | <b>PLESSEY SEMICONDUCTORS</b>        |                  | N5065A                                   | ULN2165A         | SN55474JP                      | UDS3614H         |
| DM7437N                           | US7437A          | SL3045                               | ULN2046A         | N5070B                                   | ULN2124A         | SN75451BP                      | UDN3611M         |
| DM7438N                           | US7438A          | SL3046                               | ULN2046A         | N5071A                                   | ULN2127A         | SN75452BP                      | UDN3612M         |
| DS3611N                           | UDN3611M         | SL3086                               | ULN2086A         | N5072A                                   | ULN2114A         | SN75453BP                      | UDN3613M         |
| DS3612N                           | UDN3612M         | SL3145                               | ULN2045H         | N5111A                                   | ULN2111A         | SN75454BP                      | UDN3614M         |
| DS3613N                           | UDN3613M         | <b>PRECISION MONOLYTHICS INC.</b>    |                  | N7401A                                   | US8881A          | SN75461P                       | UDN3611M         |
| DS3614N                           | UDN3614M         | DVR-01                               | UHP480           | N7437A                                   | US7437A          | SN75462P                       | UDN3612M         |
| DS7889N*                          | UHP482           | SSS741BJ                             | ULN2151D         | N7438A                                   | US7438A          | SN75463P                       | UDN3613M         |
| DS8885N*                          | UHP481           | <b>RAYTHEON COMPANY</b>              |                  | N8881A                                   | US8881A          | SN75464P                       | UDN3614M         |
| DS8889N*                          | UHP482           | RC741T                               | ULN2151D         | NE546A                                   | ULN2137A         | SN75471P                       | UDN3611M         |
| LM377                             | ULN2278P         | <b>RCA CORP. SOLID STATE DIV.</b>    |                  | PA239                                    | ULN2126A         | SN75472P                       | UDN3612M         |
| LM380                             | ULN2280B         | CA 758E                              | ULN2244A         | UA741CT                                  | ULN2151D         | SN75473P                       | UDN3613M         |
| LM384                             | ULN2281B         | CA 1310E                             | ULN2110A         | UA741CV                                  | ULN2151M         | SN75474P                       | UDN3614M         |
| LM741CH                           | ULN2151D         | CA 1398E                             | ULN2298A         | <b>SILICON GENERAL INC.</b>              |                  | SN76104N                       | ULN2120A         |
| LM741CN                           | ULN2151M         | CA 2111AE                            | ULN2111A         | SG 741CM                                 | ULN2151M         | SN76105N                       | ULN2122A         |
| LM746N                            | ULN2114A         | CA 3014                              | ULN2113A         | SG 741SCM                                | ULN2151M         | SN76111N                       | ULN2121A         |
| LM1304N                           | ULN2120A         | CA 3045                              | ULN2045H         | SG 741SCT                                | ULN2151D         | SN76113N                       | ULN2128A         |
| LM1304N-01                        | ULN2120N         | CA 3046                              | ULN2046A         | SG 3081N                                 | ULN2081A         | SN76115N                       | ULN2110A         |
| LM1305N                           | ULN2122A         | CA 3047                              | ULN2047          | SG 3082N                                 | ULN2082A         | SN76116N                       | ULN2244A         |
| LM1305N-01                        | ULN2122N         | CA 3054                              | ULN2054A         | SG 3086                                  | ULN2086A         | SN76130N                       | ULN2126A         |
| LM1307N                           | ULN2128A         | CA 3065                              | ULN2165A         | SG 3217J                                 | ULN2151D         | SN76177ND                      | ULN2278P         |
| LM1307N-01                        | ULN2128N         | CA 3067                              | ULN2267A         | SG 3821J                                 | ULN2045H         | SN76226                        | ULN2216          |
| LM1310N                           | ULN2110A         | CA 3070                              | ULN2124A         | SG 3821N                                 | ULN2046A         | SN76227                        | ULN2217          |
| LM1800                            | ULN2244A         | CA 3071                              | ULN2127A         | SG 3822N                                 | ULN2054A         | SN76228                        | ULN2218          |
| LM1820N                           | ULN2137A         | CA 3072                              | ULN2114A         | SG 3822N                                 | ULN2054A         | SN76242N                       | ULN2124A         |
| LM1841N                           | ULN2136A         | CA 3075                              | ULN2129A         | SG 3886N                                 | ULN2086A         | SN76243AN                      | ULN2127A         |
| LM2111N                           | ULN2111A         | CA 3081                              | ULN2081A         | <b>SOLITRON DEVICES INC.</b>             |                  | SN76246N                       | ULN2114A         |
| LM2111N-01                        | ULN2111N         | CA 3082                              | ULN2082A         | UC4741C                                  | ULN2151D         | SN76246N                       | ULN2228A         |
| LM2113N                           | ULN2113A         | CA 3083                              | ULN2083          | UC4741CE                                 | ULN2151M         | SN76267N                       | ULN2267A         |
| LM2113N-01                        | ULN2113N         | CA 3086                              | ULN2086A         | <b>STEWART-WARNER MICROCIRCUITS INC.</b> |                  | SN76298N                       | ULN2298A         |
| LM3045H                           | ULN2045H         | CA 3089                              | ULN2289A         | SW7401N                                  | US8881A          | SN76564N                       | ULN2264A         |
| LM3046N                           | ULN2046A         | CA 3120E                             | ULN2125A         | SW7437N                                  | US7437A          | SN76635N                       | ULN2137A         |
| LM3054N                           | ULN2054A         | CA 3121                              | ULN2269A         | SW7438N                                  | US7438A          | SN76642N                       | ULN2113A         |
| LM3064N                           | ULN2264A         | CA 3123E                             | ULN2137A         | SW7438N                                  | US7438A          | SN76643N                       | ULN2111A         |
| LM3065N                           | ULN2165A         | <b>R T C</b>                         |                  | <b>TEXAS INSTRUMENTS</b>                 |                  | SN76665N                       | ULN2165A         |
| LM3065N-01                        | ULN2165N         | TBA221B                              | ULN2151M         | SN7427N                                  | US7427A          | SN76669N                       | ULN2136A         |
| LM3067N                           | ULN2267A         | TBA221N                              | ULN2151D         | SN7437N                                  | US7437A          | SN76675N                       | ULN2129A         |
| LM3070N                           | ULN2124A         | <b>SESCOSEM</b>                      |                  | SN7438N                                  | US7438A          | SN76678P                       | ULN2209M         |
| LM3071N                           | ULN2127A         | TBA331                               | ULN2046          | SN72741L                                 | ULN2151D         | SN76688ND                      | ULN2211P         |
| LM3075N                           | ULN2129A         | TBA341                               | ULN2054          | SN72741P                                 | ULN2151M         | SN76689N                       | ULN2289A         |
| LM3075N-01                        | ULN2129N         | <b>THOMSON CSF</b>                   |                  | SN55451B JP                              | UDS3611H         | <b>THOMSON CSF</b>             |                  |
| LM3086N                           | ULN2086A         | SFC2741C                             |                  | SN55452B JP                              | UDS3612H         | SFC2741DC                      | ULN2151D         |
| LM3611N                           | UDN3611M         | SFC2741DC                            |                  | SN55453B JP                              | UDS3613H         | ULN2151M                       |                  |
| LM3612N                           | UDN3612M         | <b>TRANSISTRON ELECTRONICS CORP.</b> |                  | SN55454B JP                              | UDS3614H         | ULN2151M                       |                  |
| LM3613N                           | UDN3613M         | T2741WV                              |                  | SN55461 JP                               | UDS3611H         | ULN2151D                       |                  |
| LM3614N                           | UDN3614M         |                                      |                  |  |                  |                                |                  |
| MC1304P                           | ULN2120A         |                                      |                  |  |                  |                                |                  |
| MC1305P                           | ULN2122A         |                                      |                  |  |                  |                                |                  |
| MC1307P                           | ULN2128A         |                                      |                  |  |                  |                                |                  |
| MC1310P                           | ULN2210A         |                                      |                  |  |                  |                                |                  |

\*Indicates the Sprague suggested replacement is similar but not an exact pin-for-pin electrical replacement.

Although care has been taken in the preparation of this guide to insure its technical correctness, no responsibility is assumed by the Sprague World Trade Corp. for any consequences of the use of items listed.

Warranty is limited to replacement of defective parts only.

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