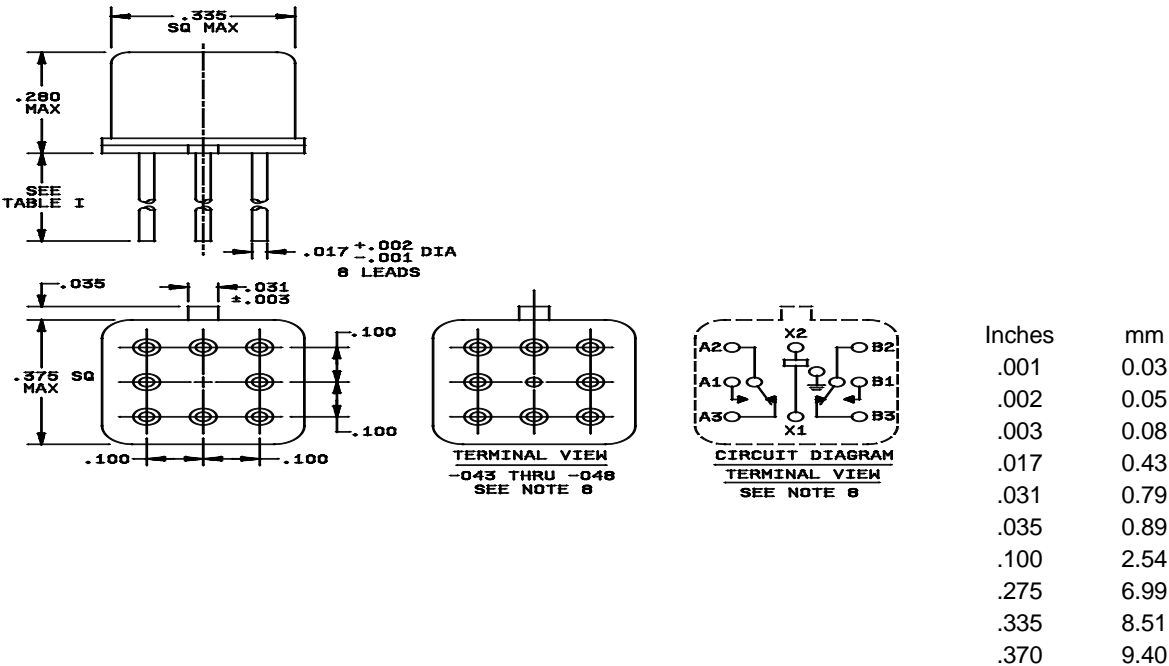


PERFORMANCE SPECIFICATION SHEET

RELAYS, ELECTROMAGNETIC, ESTABLISHED RELIABILITY, DPDT,  
LOW LEVEL TO 1 AMPERE TERMINALS 0.100-INCH GRID PATTERN

This specification sheet is approved for use by all  
Departments and Agencies of the Department of Defense.

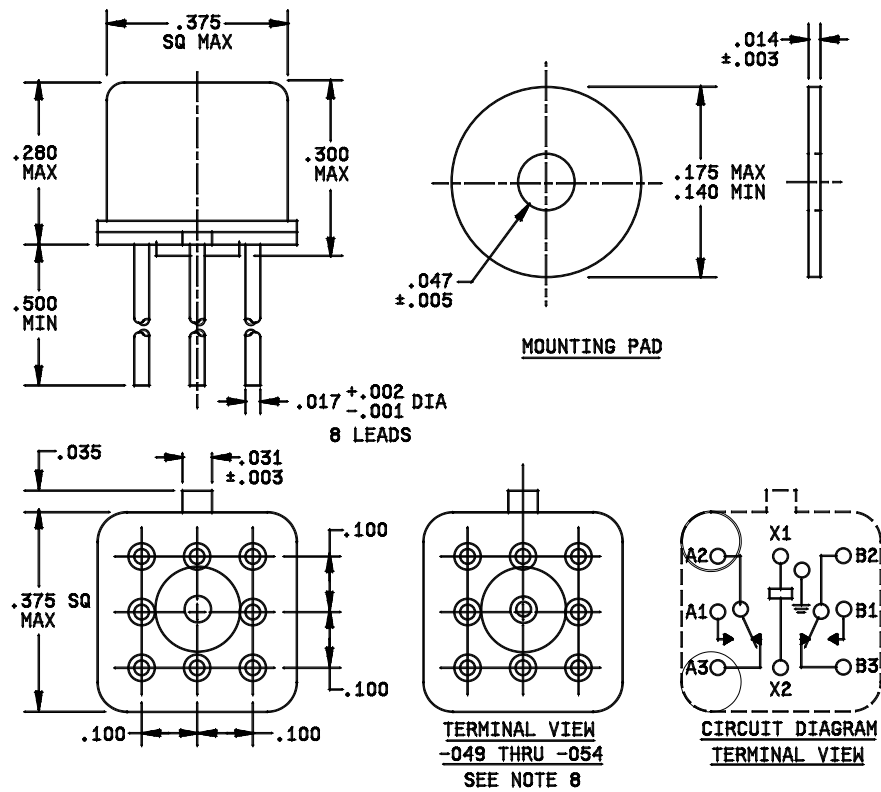
The complete requirements for acquiring the filters described herein shall  
consist of this specification sheet and the latest issue of [MIL-PRF-39016](#).



- NOTES:
1. Dimensions are in inches.
  2. Metric equivalents are given for general information only.
  3. Unless otherwise specified, tolerance is  $\pm .010$  (0.25 mm).
  4. Terminal numbers shown above are for reference only. Numbers do not appear on relay.
  5. Coil symbol optional in accordance with [MIL-STD-1285](#).
  6. Circuit diagram shown on part is the terminal view.
  7. See [table I](#) for lead lengths.
  8. M39016/17-043 through M39016/17-048 shall be supplied with a case grounding pin welded to the relay header as shown.

FIGURE 1. Dimensions and configuration.





## NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only.
3. Unless otherwise specified, tolerance is  $\pm .010$  (0.25 mm).
4. Terminal numbers shown above for reference only. Numbers do not appear on relay.
5. Coil symbol optional in accordance with MIL-STD-1285.
6. Circuit diagram shown on part is the terminal view.
7. Mounting pad shall be a polyester film per MIL-I-631, Type G, Class I.
8. M39016/17-049 through -054 shall be supplied with a case grounding pin welded to the relay header as shown.

| Inches | mm    |
|--------|-------|
| .001   | 0.03  |
| .002   | 0.05  |
| .003   | 0.08  |
| .017   | 0.43  |
| .031   | 0.79  |
| .035   | 0.89  |
| .047   | 1.93  |
| .100   | 2.54  |
| .170   | 4.32  |
| .335   | 8.51  |
| .370   | 9.40  |
| .375   | 9.53  |
| .400   | 10.16 |
| .500   | 12.70 |

FIGURE 2. Dimensions and configuration (relay with mounting pad).

REQUIREMENTS:

CONTACT DATA:

Load ratings:

High level (relay case grounded):

Resistive:

1.0 ampere at 28 V dc.

250 milliamperes at 115 V ac 60 and 400 Hz case not grounded.

100 milliamperes at 115 V ac 60 and 400 Hz case grounded.

Inductive load: 0.2 ampere at 28 V dc with 0.32 henry inductance.

Lamp: 0.10 ampere at 28 V dc.

Low level: 10 to 50  $\mu$ A at 10 to 50 mV dc or peak ac.

Intermediate current: Applicable.

Contact resistance or voltage drop:

Initial: 0.10 ohm maximum (0.110 ohm maximum with mounting pad).

High level:

During life: Not more than 5 percent of open circuit voltage.

After life: 0.20 ohm maximum (0.210 ohm maximum with mounting pad).

Low level:

During life: 100 ohms maximum.

After life: 0.15 ohm maximum (0.160 ohm maximum with mounting pad).

Intermediate current:

During: 3 ohms maximum.

After: 0.20 ohm maximum (0.210 ohm maximum with mounting pad).

Contact bounce: 1.5 milliseconds maximum (applicable to failure rate level "L").

Contact stabilization time: 2.5 milliseconds maximum (applicable to failure rate levels "M", "P", and "R").

Overload (high level only): Two times rated current. Not applicable to ac load ratings.

COIL DATA: See [table I](#).

Operate time: 2.0 ms maximum over temperature range with rated coil voltage.

Release time: 1.5 ms maximum over temperature range from rated coil voltage.

#### ELECTRICAL DATA:

Insulation resistance: 10,000 megohms minimum at 500 V dc, except the resistance between coil and case at high temperature shall be 1,000 megohms minimum.

Dielectric withstanding voltage:

|  | Sea level<br>V rms (60 Hz) | Post<br>intermediate<br>current life test<br>Sea level V rms<br>(60 Hz) | Altitude<br>V rms (60 Hz)       |
|--|----------------------------|---|---------------------------------|
| Between case, frame, or enclosure and all contacts<br>in the energized and de-energized positions. | 500                        | 500   | 125<br>All terminals<br>to case |
| Between case, frame, or enclosure and coils.   | 500                        | 500   |                                 |
| Between all contacts and coils.  | 500                        | 500   |                                 |
| Between open contacts in the energized and<br>de-energized positions.                              | 500                        | 375   |                                 |
| Between contact poles.   | 500                        | 500   |                                 |
| Between coils of dual coil relays.   | N/A                        | N/A   |                                 |

#### ENVIRONMENTAL DATA:

Temperature range: -65°C to +125°C.

Vibration (sinusoidal): [MIL-STD-202-204](#). Contact chatter shall not exceed 10 microseconds maximum for closed contacts, and 1 microsecond maximum closure for open contacts.

Vibration (random): [MIL-STD-202-214](#), test condition IG. Contact chatter shall not exceed 10 microseconds maximum for closed contacts, and 1 microsecond maximum closure for open contacts. Applicable to qualification and group C testing only.

Shock (specified pulse): [MIL-STD-202-213](#), test condition B (75 g's). Contact chatter shall not exceed 10 microseconds maximum for closed contacts, and 1 microsecond maximum closure for open contacts.

Magnetic interference: Applicable.

Resistance to soldering heat: Applicable.

Acceleration: Applicable.

Salt atmosphere (corrosion): In accordance with [MIL-STD-750](#), method 1041.

PHYSICAL DATA:

Terminal strength ([MIL-STD-202-211](#)):

Pull test: Test condition A, 1 pound pull.

Bend test: Test condition C, ½ pound load.

Twist test: As specified in [MIL-PRF-39016](#).

Solderability: Applicable.

Dimensions and configuration: See [figure 1](#).

Weight: 2.55 grams (0.09 ounce) maximum.

Seal: Hermetic.

Minimum marking: Military part number, "J" with the date code (example J0430), circuit diagram, manufacturer's name or source code.

LIFE TEST REQUIREMENTS:

High level: 100,000 cycles per relay.

Low level: 100,000 cycles plus 900,000 cycles mechanical life.

Part or Identifying Number (PIN): M39016/17- (dash number from [table I](#) and suffix letter designating failure rate level).

QUALIFICATION INSPECTION:

Qualification inspection and sample size: See [table II](#).

TABLE I. Dash numbers and characteristics. [1/](#)

| Dash number <a href="#">2/</a> |                            |   | Coil voltage <a href="#">3/</a><br>(V dc) |     | At +25°C                             |  |  |   | Over temperature range                                   |  |   |
|--------------------------------|----------------------------|---|---|-----|--------------------------------------|--|--|---|--|--|---|
| Lead length<br>.187<br>±.010   | Lead length<br>.500<br>min | Mounting pads<br>(fig. 2)<br><a href="#">4/</a> | Rated                                     | Max | Coil resist-<br>ance<br>ohms<br>±10% | Speci-<br>fied<br>pickup<br>value<br>(voltage)<br>(V dc) | Speci-<br>fied<br>hold<br>value<br>(voltage)<br>(V dc) | Speci-<br>fied<br>dropout<br>value<br>(voltage)<br>(V dc) | Speci-<br>fied<br>pickup<br>value<br>(voltage)<br>(V dc) | Speci-<br>fied<br>hold<br>value<br>(voltage)<br>(V dc) | Speci-<br>fied<br>dropout<br>value<br>(voltage)<br>(V dc) |
| 025                            | 031                        | 037   | 5   | 5.8 | 50                                   | 2.7  | 1.4  | 0.22  | 3.5  | 2.3  | 0.14  |
| 026                            | 032                        | 038   | 6   | 8   | 98                                   | 3.5  | 2.0  | 0.28  | 4.5  | 3.2  | 0.18  |
| 027                            | 033                        | 039   | 9   | 12  | 220                                  | 5.3  | 3.0  | 0.54  | 6.8  | 4.9  | 0.35  |
| 028                            | 034                        | 040   | 12  | 16  | 390                                  | 7.0  | 4.0  | 0.63  | 9.0  | 6.5  | 0.41  |
| 029                            | 035                        | 041   | 18  | 24  | 880                                  | 10.5   | 6.0  | 0.91  | 13.5   | 10.0   | 0.59  |
| 030                            | 036                        | 042   | 26.5                                      | 32  | 1,560                                | 14.2   | 8.0  | 1.37  | 18.0   | 13.0   | 0.89  |
|                                | 043 <a href="#">5/</a>     | 049 <a href="#">5/</a>                          | 5   | 5.8 | 50                                   | 2.7  | 1.4  | 0.22  | 3.5  | 2.3  | 0.14  |
|                                | 044 <a href="#">5/</a>     | 050 <a href="#">5/</a>                          | 6   | 8   | 98                                   | 3.5  | 2.0  | 0.28  | 4.5  | 3.2  | 0.18  |
|                                | 045 <a href="#">5/</a>     | 051 <a href="#">5/</a>                          | 9   | 12  | 220                                  | 5.3  | 3.0  | 0.54  | 6.8  | 4.5  | 0.35  |
|                                | 046 <a href="#">5/</a>     | 052 <a href="#">5/</a>                          | 12  | 16  | 390                                  | 7.0  | 4.0  | 0.63  | 9.0  | 6.5  | 0.41  |
|                                | 047 <a href="#">5/</a>     | 053 <a href="#">5/</a>                          | 18  | 24  | 880                                  | 10.5   | 6.0  | 0.91  | 13.5   | 10.0   | 0.59  |
|                                | 048 <a href="#">5/</a>     | 054 <a href="#">5/</a>                          | 26.5                                      | 32  | 1,560                                | 14.2   | 8.0  | 1.37  | 18.0   | 13.0   | 0.89  |

[1/](#) Each relay possesses high level and low level capabilities. However, relays previously tested or used above 10 mA resistive at 6 V dc maximum or peak ac open circuits not recommended for subsequent use in low level applications.

[2/](#) The suffix letter L, M, P, or R to designate the applicable failure rate level shall be added to the applicable listed dash number. Failure rate level (percent per 10,000 cycles): L, 3.0; M, 1.0; P, 0.1; R, 0.01. Example, 025L - - - - -42R.

[3/](#) CAUTION: The use of any coil voltage less than the rated coil voltage will compromise the operation of the relay.

[4/](#) Relays supplied with mounting pads (-037 through -042) shall have the pad rigidly attached.

[5/](#) Relays are supplied with a case grounding pin welded to the header (see figures [1](#) and [2](#)).

TABLE II. Qualification inspection and sample size. [1/](#)

| Single submission   | Group submission   |   |
|---|--|---|
| 18 units plus 1 open unit for level L at C = 0 <a href="#">2/</a> | M39016/17-036  | 18 units plus 1 open unit for level L at C = 0 <a href="#">2/</a>                                   |
| 33 units plus 1 open unit for level M at C = 0 <a href="#">2/</a> |  | 33 units plus 1 open unit for level M at C = 0 <a href="#">2/</a>                                   |
| Qualification inspection as applicable.                           | M39016/17-031<br>M39016/17-032                                   | Qualification inspection as applicable.<br>2 units each PIN<br>Qualification inspection, table, Q2. |
|   | M39016/17-033<br>M39016/17-034<br>M39016/17-035<br>M39016/17-048 | 1 unit terminal strength and solderability.   |

- 1/ For retention of qualification or extension of qualification to lower failure rate levels, all life test data accumulated on [MIL-PRF-39016/18](#), [/19](#), [/41](#), [/42](#), and [/43](#), may be used in addition to MIL-PRF-39016/17 data. Prior to performance of qualification or extension of qualification testing, the relay manufacturer shall preselect the sampling plan.
- 2/ The number of units required for qualification testing shall be increased as required in group V, [table II](#), [MIL-PRF-39016](#), if the relay manufacturer elects to test the number of units permitting one or more failures. Prior to performance of qualification inspection testing the relay manufacturer shall preselect the sampling plan.

Qualification inspection (reduced testing) (sample size - 2 units each coil voltage and 1 unsealed unit). See [table III](#).

If the relays produced for MIL-PRF-39016/17 are similar in construction and design except for the suppresser and steering diodes and coil assembly, as applicable, to the relays produced for [MIL-PRF-39016/18](#), [/19](#), [/41](#), [/42](#), and [/43](#), then reduced testing for qualification of MIL-PRF-39016/17 relays may be performed concurrent with or subsequent to successful qualification of [MIL-PRF-39016/18](#), [/19](#), [/41](#), [/42](#), and [/43](#) relays. For reduced testing, see [table III](#).

TABLE III. Qualification inspection (reduced testing).

| Examination or test                              |
|--|
| 2 units each coil voltage                        |
| Group II of qualification inspection table       |
| 1 unsealed sample unit for internal examination. |

Initial qualification of relays supplied with mounting pads (-37 through -042 and -049 through -054) shall be tested as specified below:

MIL-PRF-39016/17J

Perform the following tests as specified in the qualification inspection table of [MIL-PRF-39016](#), in the order shown below:

Before installation of mounting pad: Screening, visual and mechanical inspection (internal), thermal shock, resistance to solvents, vibration (sinusoidal), vibration (random), shock (specified pulse), acceleration, terminal strength, magnetic interference (when specified), capacitance (when specified), coil life (applicable to continuous duty relays only), resistance to soldering heat, salt spray (corrosion), overload (applicable to high level relays only), life, terminal strength, and intermediate current.

After installation of mounting pad, perform the following tests as specified in the qualification inspection table of [MIL-PRF-39016](#), in the order shown below:

Insulation resistance, dielectric withstanding voltage, static contact resistance, specified pickup, hold, or dropout values (voltages), coil resistance, operate and release time, contact dynamic characteristics, coil transient suppression (when specified), solderability, seal, visual and mechanical inspection (external).

Qualification inspection (reduced testing for previously qualified relays) for relays supplied with mounting pads (-037 through -042): Two (2) units of the 26.5-volt rated coil voltage (-042) shall be tested as specified below:

Before installation of mounting pad, perform the following tests as specified in the qualification inspection table of [MIL-PRF-39016](#) in the order shown below:

For failure rate level L only: Screening.

For failure rate levels M, P, and R: Vibration (sinusoidal) test duration shall be 10 minutes, vibration (random), particle impact noise detection (P.I.N.D., when specified), screening.

After installation of pad, perform the following tests as specified in the qualification inspection table of [MIL-PRF-39016](#) in the order shown below:

Insulation resistance, dielectric withstanding voltage, static contact resistance, specified pickup, hold, and dropout values (voltages), coil resistance, operate and release time, contact dynamic characteristics, coil transient suppression (when specified), solderability, seal, visual and mechanical inspection (external).

Group A testing for relays supplied with mounting pads (-037 through -042 and -049 through -054), shall be tested as specified below:

Perform seal test immediately preceding the A2 electrical tests. Relay leads shall be formed and the mounting pad removed before the seal test. After the seal test, the mounting pad shall be rigidly attached to the relay and the remaining group A tests and the remaining group A tests performed (The seal test is not performed with group A4.).

SUPERSESSION DATA:

Supersession data: See [table IV](#).



TABLE IV. Supersession data.

| Superseded<br>part no.<br>M5757/89- | New<br>part no.<br>M39016/17-<br><a href="#">1/</a> | Superseded<br>part no.<br>M39016/17-<br><a href="#">2/</a> | New<br>part no.<br>M39016/17- |
|-------------------------------------|---|--|-------------------------------|
| 001, 025                            | 031   | 001  | 031                           |
| 002, 026                            | 032   | 002  | 032                           |
| 003, 027                            | 033   | 003  | 033                           |
| 004, 028                            | 034   | 004  | 034                           |
| 005, 029                            | 035   | 005  | 035                           |
| 006, 030                            | 036   | 006  | 036                           |
| 007, 031                            | 025   | 007  | 025                           |
| 008, 032                            | 026   | 008  | 026                           |
| 009, 033                            | 027   | 009  | 027                           |
| 010, 034                            | 028   | 010  | 028                           |
| 011, 035                            | 029   | 011  | 029                           |
| 012, 036                            | 030   | 012  | 030                           |
| 013, 037                            | 031   | 013  | 031                           |
| 014, 038                            | 032   | 014  | 032                           |
| 015, 039                            | 033   | 015  | 033                           |
| 016, 040                            | 034   | 016  | 034                           |
| 017, 041                            | 035   | 017  | 035                           |
| 018, 042                            | 036   | 018  | 036                           |
| 019, 043                            | 025   | 019  | 025                           |
| 020, 044                            | 026   | 020  | 026                           |
| 021, 045                            | 027   | 021  | 027                           |
| 022, 046                            | 028   | 022  | 028                           |
| 023, 047                            | 029   | 023  | 029                           |
| 024, 048                            | 030   | 024  | 030                           |

[1/](#) Complete part number shall contain suffix letter L, M, P, or R to designate failure rate level (see [2/](#) of [table I](#)). A part with any failure rate supersedes the applicable [MIL-DTL-5757](#) part.

[2/](#) Dash numbers -001 through -024, .225 inch high cans have been canceled and are superseded by dash numbers -025 through -036, .280 inch high cans. The .225 inch cans are no longer manufactured.

Cross-reference for Government logistical support: See [table V](#).

## MIL-PRF-39016/17J

TABLE V. Cross reference for Government logistical support.

| Superseded<br>part no.<br>M557/89- | New<br>part no.<br>M39016/17- | Support with<br>part no.<br>M39016/17- | Superseded<br>part no.<br>M5757/89- | New<br>part no.<br>M39016/17- | Support with<br>part no.<br>M39016/17- |
|------------------------------------|-------------------------------|--|-------------------------------------|-------------------------------|--|
| 001                                | 031                           | 031                                    | 011                                 | 029                           | 035                                    |
| 002                                | 032                           | 032                                    | 012                                 | 030                           | 036                                    |
| 003                                | 033                           | 033                                    | 013                                 | 031                           | 031                                    |
| 004                                | 034                           | 034                                    | 014                                 | 032                           | 032                                    |
| 005                                | 035                           | 035                                    | 015                                 | 033                           | 033                                    |
| 006                                | 036                           | 036                                    | 016                                 | 034                           | 034                                    |
| 007                                | 025                           | 031                                    | 017                                 | 035                           | 035                                    |
| 008                                | 026                           | 032                                    | 018                                 | 036                           | 036                                    |
| 009                                | 027                           | 033                                    | 019                                 | 025                           | 031                                    |
| 010                                | 028                           | 034                                    | 020                                 | 026                           | 032                                    |
| 021                                | 027                           | 033                                    | 001                                 | 031                           | 031                                    |
| 022                                | 028                           | 034                                    | 002                                 | 032                           | 032                                    |
| 023                                | 029                           | 035                                    | 003                                 | 033                           | 033                                    |
| 024                                | 030                           | 036                                    | 004                                 | 034                           | 034                                    |
| 025                                | 031                           | 031                                    | 005                                 | 035                           | 035                                    |
| 026                                | 032                           | 032                                    | 006                                 | 036                           | 036                                    |
| 027                                | 033                           | 033                                    | 007                                 | 025                           | 031                                    |
| 028                                | 034                           | 034                                    | 008                                 | 026                           | 032                                    |
| 029                                | 035                           | 035                                    | 009                                 | 027                           | 033                                    |
| 030                                | 036                           | 036                                    | 010                                 | 028                           | 034                                    |
| 031                                | 025                           | 031                                    | 011                                 | 029                           | 035                                    |
| 032                                | 026                           | 032                                    | 012                                 | 030                           | 036                                    |
| 033                                | 027                           | 033                                    | 013                                 | 031                           | 031                                    |
| 034                                | 028                           | 034                                    | 014                                 | 032                           | 032                                    |
| 035                                | 029                           | 035                                    | 015                                 | 033                           | 033                                    |
| 036                                | 030                           | 036                                    | 016                                 | 034                           | 034                                    |
| 037                                | 031                           | 031                                    | 017                                 | 035                           | 035                                    |
| 038                                | 032                           | 032                                    | 018                                 | 036                           | 036                                    |
| 039                                | 033                           | 033                                    | 019                                 | 025                           | 031                                    |
| 040                                | 034                           | 034                                    | 020                                 | 026                           | 032                                    |
| 041                                | 035                           | 035                                    | 021                                 | 027                           | 033                                    |
| 042                                | 036                           | 036                                    | 022                                 | 028                           | 034                                    |
| 043                                | 025                           | 031                                    | 023                                 | 029                           | 035                                    |
| 044                                | 026                           | 032                                    | 024                                 | 030                           | 036                                    |
| 045                                | 027                           | 033                                    | ---                                 | 025                           | 031                                    |

TABLE V. Cross reference for Government logistical support - Continued.

| Superseded<br>part no.<br>M5757/89- | New<br>part no.<br>M39016/17- | Support with<br>part no.<br>M39016/17- | Superseded<br>part no.<br>M5757/89- | New<br>part no.<br>M39016/17- | Support with<br>part no.<br>M39017/17- |
|-------------------------------------|-------------------------------|--|-------------------------------------|-------------------------------|--|
| 046                                 | 028                           | 034                                    | ---                                 | 026                           | 032                                    |
| 047                                 | 029                           | 035                                    | ---                                 | 027                           | 033                                    |
| 048                                 | 030                           | 036                                    | ---                                 | 028                           | 034                                    |
| ---                                 | 025                           | 031                                    | ---                                 | 029                           | 035                                    |
| ---                                 | 026                           | 032                                    | ---                                 | 030                           | 036                                    |
| ---                                 | 027                           | 033                                    | ---                                 | 031                           | 031                                    |
| ---                                 | 028                           | 034                                    | ---                                 | 032                           | 032                                    |
| ---                                 | 029                           | 035                                    | ---                                 | 033                           | 033                                    |
| ---                                 | 030                           | 036                                    | ---                                 | 034                           | 034                                    |
| ---                                 | 031                           | 031                                    | ---                                 | 035                           | 035                                    |
| ---                                 | 032                           | 032                                    | ---                                 | 036                           | 036                                    |
| ---                                 | 033                           | 033                                    | ---                                 | 037                           | 037                                    |
| ---                                 | 034                           | 034                                    | ---                                 | 038                           | 038                                    |
| ---                                 | 035                           | 035                                    | ---                                 | 039                           | 039                                    |
| ---                                 | 036                           | 036                                    | ---                                 | 040                           | 040                                    |
| ---                                 | --                            | ---                                    | ---                                 | 041                           | 041                                    |
| ---                                 | ---                           | ---                                    | ---                                 | 042                           | 042                                    |

Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the previous issue.

Referenced documents. In addition to [MIL-PRF-39016](#), this document references the following:

[MIL-STD-1285](#)      [MIL-I-631](#)      [MIL-STD-202-204](#)      [MIL-STD-202-214](#)      [MIL-STD-202-213](#)  
[MIL-STD-750](#)      [MIL-STD-202-211](#)      [MIL-PRF-39016/18](#)      [MIL-PRF-39016/19](#)      [MIL-PRF-39016/41](#)  
[MIL-PRF-39016/42](#)      [MIL-PRF-39016/43](#)      [MIL-DTL-5757](#)

Custodians:

Army - CR  
 Navy - EC  
 Air Force - 85  
 DLA - CC

Preparing activity:

DLA - CC

Review activities:

Army - AR  
 Navy - AS, MC, OS, SH  
 Air Force - 99

(Project 5945-2017-033)

The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil/>.