INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

RELAYS IN TYPE FT11, FT21, FT22, FT31, FT32, FT41, FT42 CASES

The type FT (Flexitest) cases are dust-proof enclosures combining relay units and knife-blade test switches in the same case. This combination provides a compact flexible assembly easy to maintain, inspect, test and adjust. There are three main units of the type FT case: the case, cover, and chassis. The case is an all-steel welded housing containing the hinge half of the knife-blade test switches and the terminals for external connections. The cover is a molded phenolic frame with a clear glass window, a thumb nut, a reset lever, and a hook shaped support. The support fits over the top flange of the case. The thumb nut, which fastens to a stud on the bottom flange of the case, holds the cover securely in place on the case. The chassis is a steel frame that supports the relay elements and the contact jaw half of the test switches. This slides in and out of the case. The electrical connections between the base and chassis are completed through the closed knife-blades.

There are four different size cases available. These are designated the FT11, FT21 or 22, FT31 or 32, and the FT41 or 42. The first digit of the designation represents the physical size and the second the number of terminal blocks. One terminal block can accommodate up to ten terminals. The case may be either semi-flush or projection mounted.

REMOVING CHASSIS

To remove the chassis, first remove the cover by unscrewing the captive thumb nut at the bottom and lifting the cover support off the top flange of the case. This exposes the relay units and all the test switches for inspection and testing. The next step is to open the test switches. *Always open the red handle switches first before any of the black handle switches or the cam action latches.* This opens the trip circuit to prevent accidental tripout. Then open all the remaining switches. The order of opening the remaining switches is not important. In opening the test switches they should be moved all the way back against the stops. With all the switches fully opened, release the cam action latches and pull outward. The chassis can be set on a test bench for easy inspection, maintenance and test.

After removing the chassis a duplicate chassis may be inserted in the case or the blade portion of the switches can be closed and the cover put in place without the chassis. The chassis-operated auxiliary shorting switch remains closed with chassis out to prevent open circuiting the current transformers when the current test switches are closed. The operation of the auxiliary shorting switch is visible from the front of the relay, when the chassis is in place.

When the chassis is to be put back in the case, the above procedure is to be followed in the reversed order. *The red handle switch should not be closed until after the chassis has been latched in place and all of the black handle switches closed.*

ELECTRICAL CIRCUITS

Each terminal in the base connects through a test switch to the relay units in the chassis as shown on the internal schematic diagrams. The relay terminals are identified by numbers marked on the outside of the case. The test switch positions are identified by numbers marked on the molded blocks.

The potential and control circuits through the relay are disconnected from the external circuit by opening the associated test switches. Opening the current test switch short-circuits the current transformer secondary and disconnects one side of the relay coil but leaves the other side of the coil connected to the external circuit through the current test jack jaws. This circuit can be isolated by inserting the current test plug (without external connections), or by inserting the ten circuit test plug. Both switches of the current test switch pair must be open when using the current test plug in this manner to short-circuit the current transformer secondary.

TESTING

The relays can be tested in service, in the case

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but with the external circuits isolated or out of the case as follows:

TESTING IN SERVICE

The ammeter test plug can be inserted in the current test jaws after opening the knife-blade switch to check the current through the relay, as shown in Fig. 1. This plug consists of two conducting strips separated by an insulating strip. The ammeter is connected to these strips by terminal screws and the leads are carried out through holes in the back of the insulated handle.

Voltages between the potential circuits can be measured conveniently by clamping #2 clip leads on the projecting clip lead lug on the contact jaw.

TESTING IN CASE

With all blades in the full open position, the ten circuit test plug Fig. 4 can be inserted in the contact jaws. This connects the relay units to a set of binding posts and completely isolates the relay circuits from the external connections by means of an insulating barrier on the plug. The external test circuits are connected to these binding posts. The plug is inserted in the bottom test jaws with the binding posts up and in the top test switch jaws with the binding posts down.

The external test circuits may be made to the relay units by #2 test clip leads instead of the test plug. When connecting an external test circuit to the current elements using clip leads, care should be taken to see that the current test jack jaws are open so that the relay is completely isolated from the external circuits. Suggested means for isolating this circuit are outlined above, under "Electrical Circuits".

TESTING OUT OF CASE

With the chassis removed from the case, relay units may be tested by using the ten circuit test plug or by #2 test clip leads as described above. Any critical factory calibration is made with the chassis in the case and removing the chassis from the case may change the calibration values of these relays.

An internal schematic is available for each individual relay showing the schematic internal wiring. The outlines of the various cases are shown in Fig. 5 to Fig. 11.

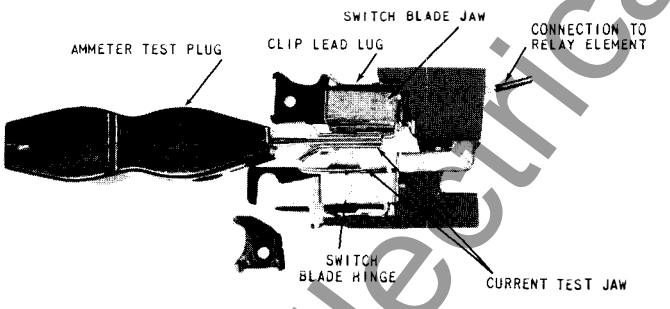

Fig. 1. Ammeter Test Plug in Testing Positions

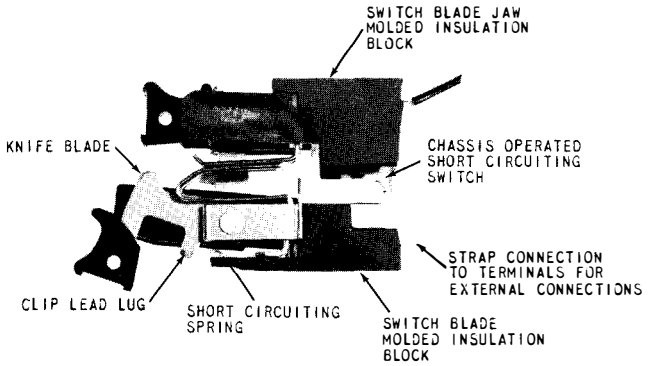

Fig. 2. Short Circuiting Switch

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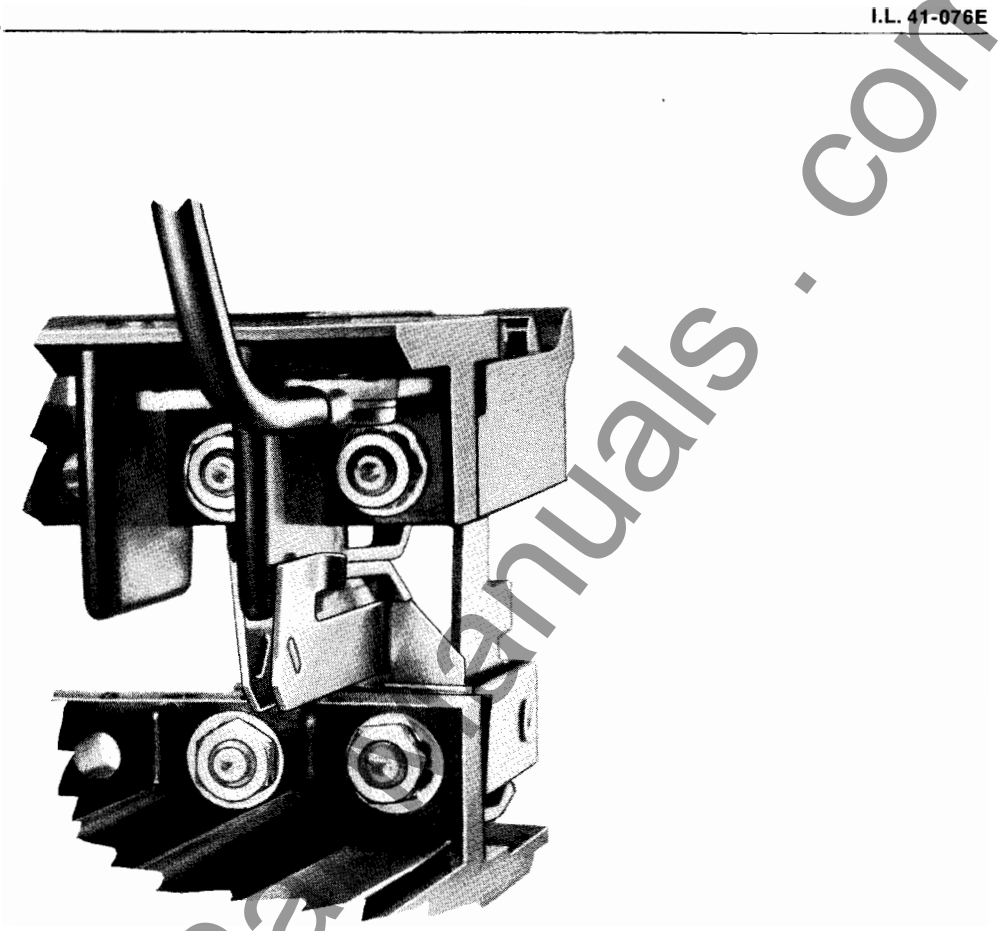

Fig. 3. Auxiliary Short Circuiting Switch (Enlarged View)

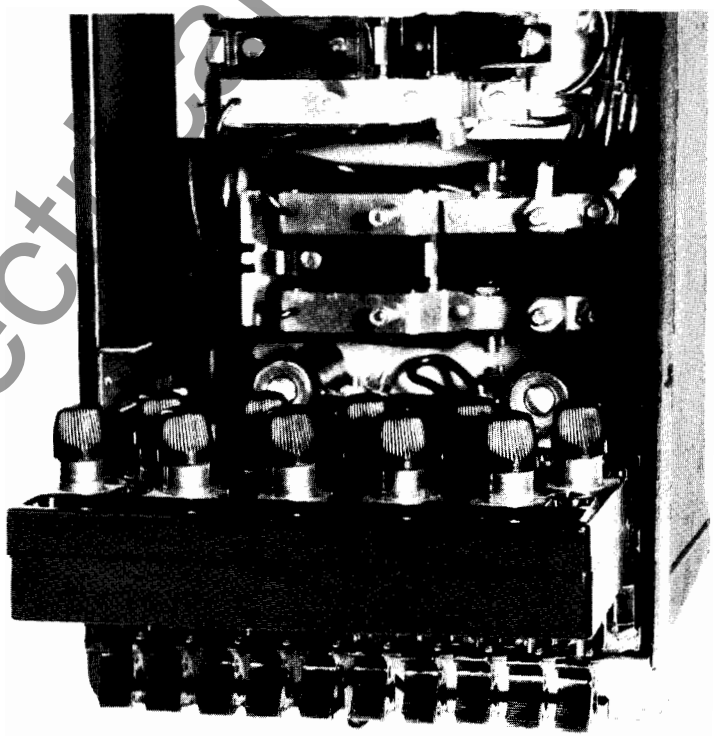

Fig. 4. Multi-Circuit Test Plug in Testing Position

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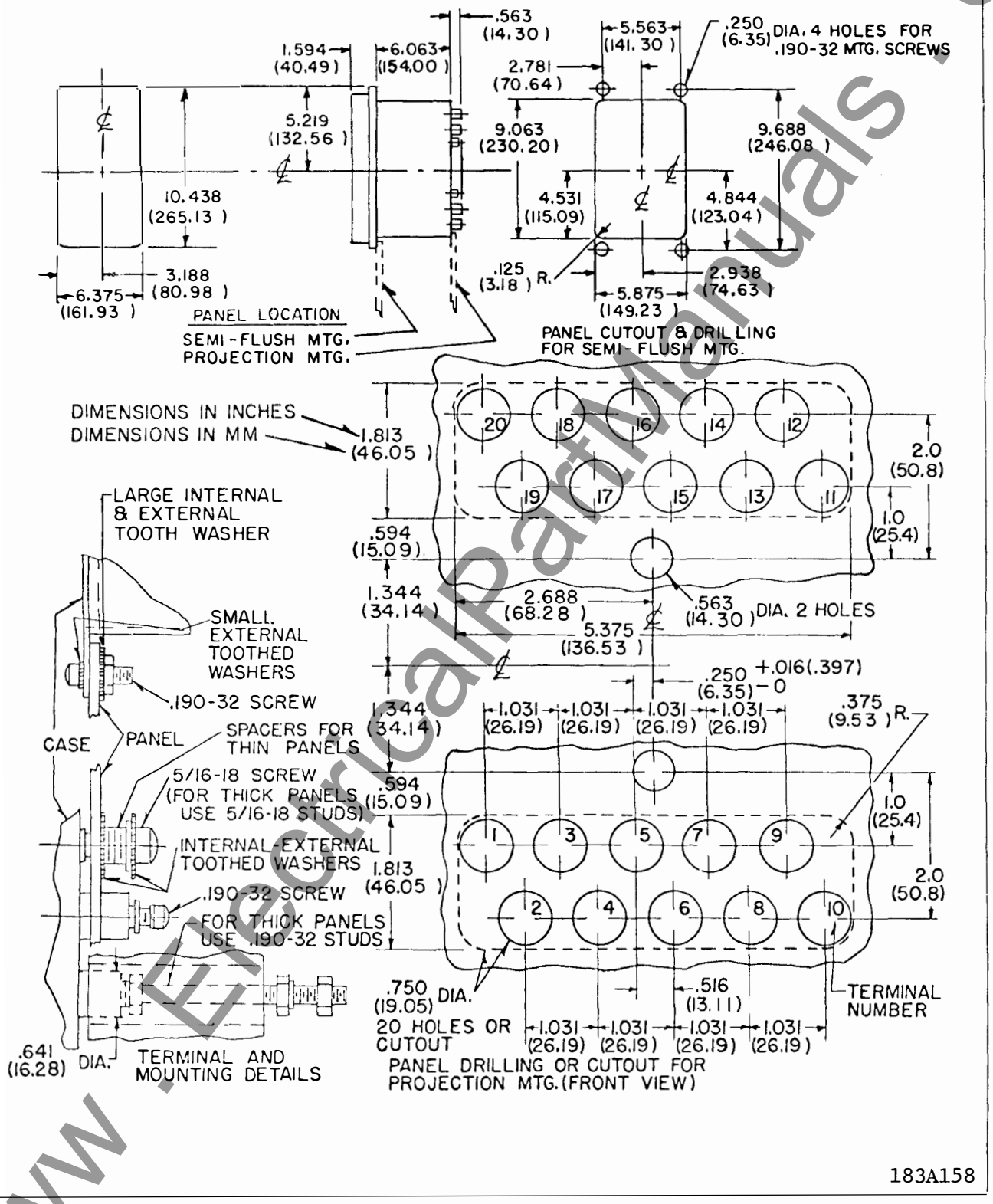

✪ *Fig. 7. Outline and Drilling Plan for the Type FT22 Case*

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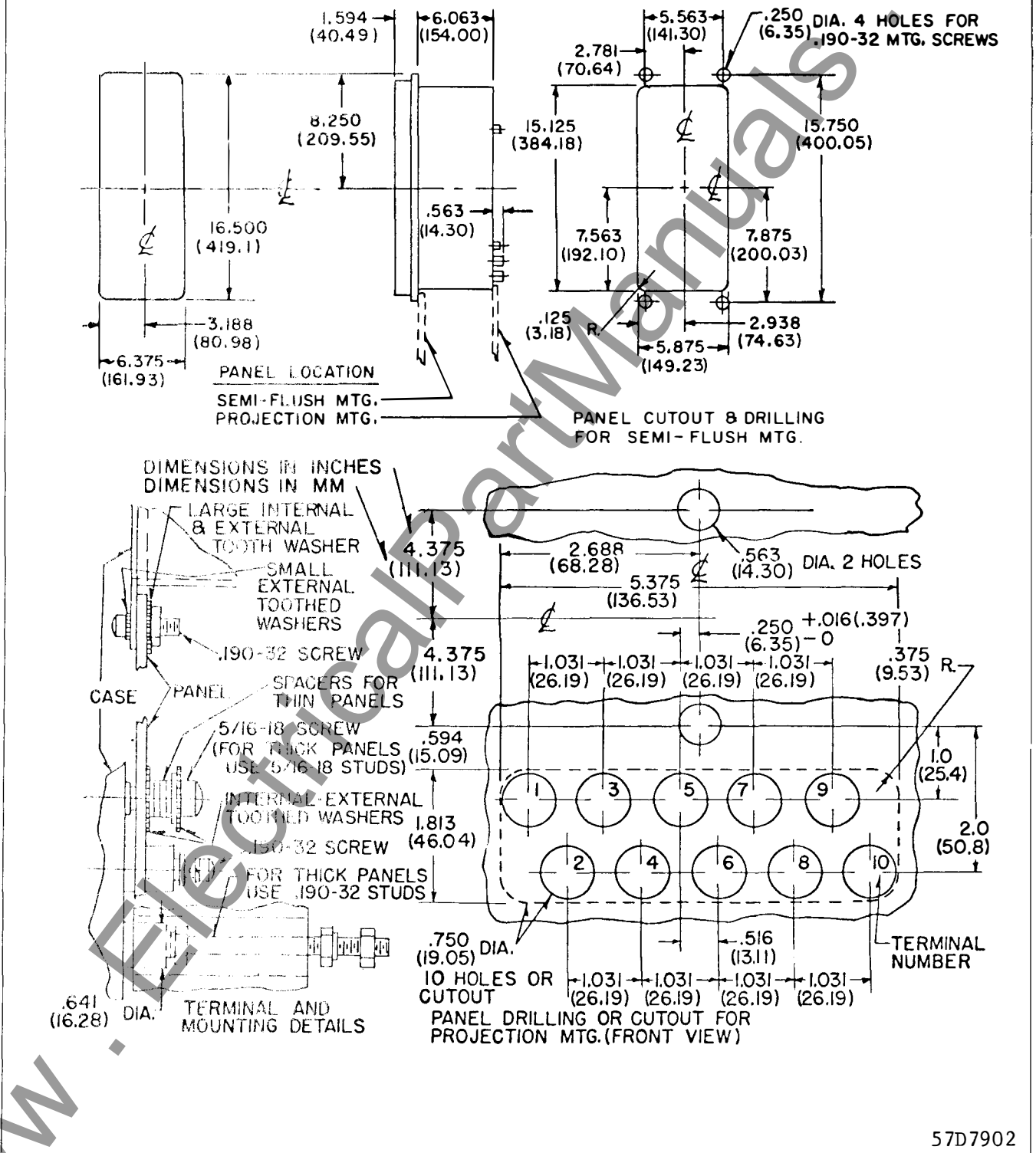

✪ *Fig. 8. Outline and Drilling Plan for the Type FT31 Case*

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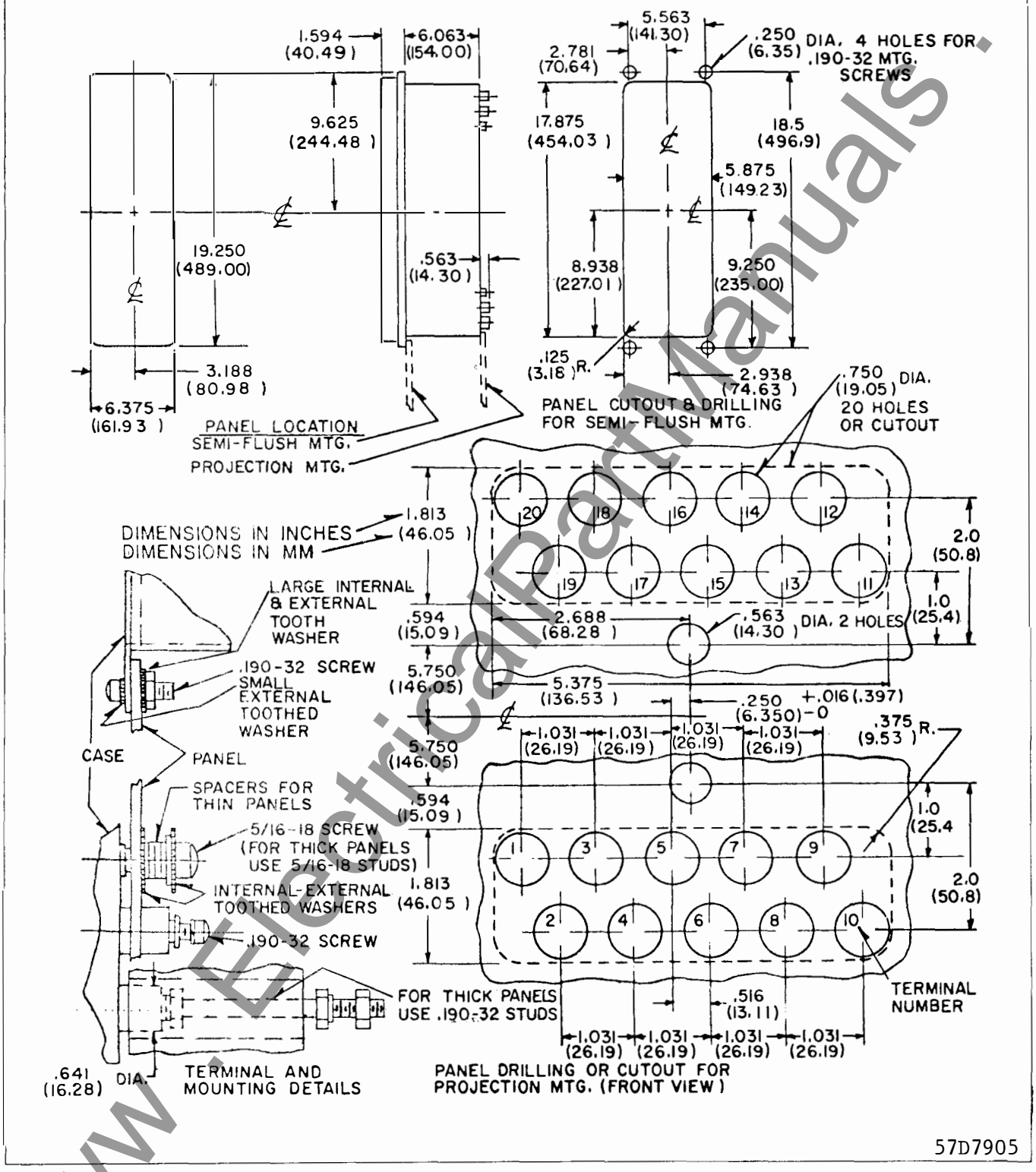

✪ *Fig. 11. Outline and Drilling Plan for the Type FT42 Case*

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WESTINGHOUSE ELECTRIC CORPORATION

RELAY-INSTRUMENT DIVISION **CORAL SPRINGS, FL.**

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INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

RELAYS IN TYPE FT11, FT21, FT22, FT31, FT32, FT41, FT42 CASES

The type FT (Flexitest) cases are dust-proof enclosures combining relay units and knife-blade test switches in the same case. This combination provides a compact flexible assembly easy to maintain, inspect, test and adjust. There are three main units of the type FT case: the case, cover, and chassis. The case is an all-steel welded housing containing the hinge half of the knife-blade test switches and the terminals for external connections. The cover is a molded phenolic frame with a clear glass window, a thumb nut, a reset lever, and a hook shaped support. The support fits over the top flange of the case. The thumb nut, which fastens to a stud on the bottom flange of the case, holds the cover securely in place on the case. The chassis is a steel frame that supports the relay elements and the contact jaw half of the test switches. This slides in and out of the case. The electrical connections between the base and chassis are completed through the closed knife-blades.

There are four different size cases available. These are designated the FT11, FT21 or 22, FT31 or 32, and the FT41 or 42. The first digit of the designation represents the physical size and the second the number of terminal blocks. One terminal block can accommodate up to ten terminals. The case may be either semi-flush or projection mounted.

REMOVING CHASSIS

To remove the chassis, first remove the cover by unscrewing the captive thumb nut at the bottom and lifting the cover support off the top flange of the case. This exposes the relay units and all the test switches for inspection and testing. The next step is to open the test switches. *Always open the red handle switches first before any of the black handle switches or the cam action latches.* This opens the trip circuit to prevent accidental tripout. Then open all the remaining switches. The order of opening the remaining switches is not important. In opening the test switches they should be moved all the way back against the stops. With all the switches fully opened, release the cam action latches and pull outward. The chassis can be set on a test bench for easy inspection, maintenance and test.

After removing the chassis a duplicate chassis may be inserted in the case or the blade portion of the switches can be closed and the cover put in place without the chassis. The chassis-operated auxiliary shorting switch remains closed with chassis out to prevent open circuiting the current transformers when the current test switches are closed. The operation of the auxiliary shorting switch is visible from the front of the relay, when the chassis is in place.

When the chassis is to be put back in the case, the above procedure is to be followed in the reversed order. *The red handle switch should not be closed until after the chassis has been latched in place and all of the black handle switches closed.*

ELECTRICAL CIRCUITS

Each terminal in the base connects through a test switch to the relay units in the chassis as shown on the internal schematic diagrams. The relay terminals are identified by numbers marked on the outside of the case. The test switch positions are identified by numbers marked on the molded blocks.

The potential and control circuits through the relay are disconnected from the external circuit by opening the associated test switches. Opening the current test switch short-circuits the current transformer secondary and disconnects one side of the relay coil but leaves the other side of the coil connected to the external circuit through the current test jack jaws. This circuit can be isolated by inserting the current test plug (without external connections), or by inserting the ten circuit test plug. Both switches of the current test switch pair must be open when using the current test plug in this manner to short-circuit the current transformer secondary.

TESTING

The relays can be tested in service, in the case

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TESTING IN SERVICE

The ammeter test plug can be inserted in the current test jaws after opening the knife-blade switch to check the current through the relay, as shown in Fig. 1. This plug consists of two conducting strips separated by an insulating strip. The ammeter is connected to these strips by terminal screws and the leads are carried out through holes in the back of the insulated handle.

Voltages between the potential circuits can be measured conveniently by clamping #2 clip leads on the projecting clip lead lug on the contact jaw.

TESTING IN CASE

With all blades in the full open position, the ten circuit test plug Fig. 4 can be inserted in the contact jaws. This connects the relay units to a set of binding posts and completely isolates the relay circuits from the external connections by means of an insulating barrier on the plug. The external test circuits are connected to these binding posts. The plug is inserted in the bottom test jaws with the binding posts up and in the top test switch jaws with the binding posts down.

The external test circuits may be made to the relay units by #2 test clip leads instead of the test plug. When connecting an external test circuit to the current elements using clip leads, care should be taken to see that the current test jack jaws are open so that the relay is completely isolated from the external circuits. Suggested means for isolating this circuit are outlined above, under "Electrical Circuits".

TESTING OUT OF CASE

With the chassis removed from the case, relay units may be tested by using the ten circuit test plug or by #2 test clip leads as described above. Any critical factory calibration is made with the chassis in the case and removing the chassis from the case may change the calibration values of these relays.

An internal schematic is available for each individual relay showing the schematic internal wiring. The outlines of the various cases are shown in Fig. 5 to Fig. 11.

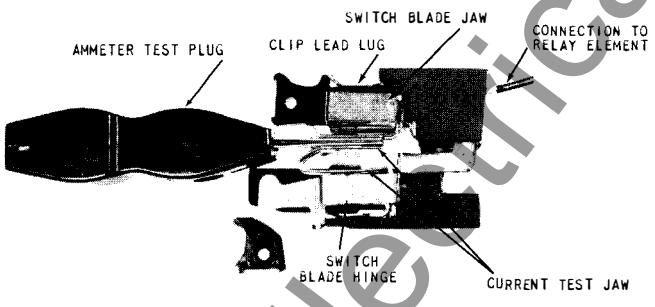

Fig. 1. Ammeter Test Plug in Testing Positions

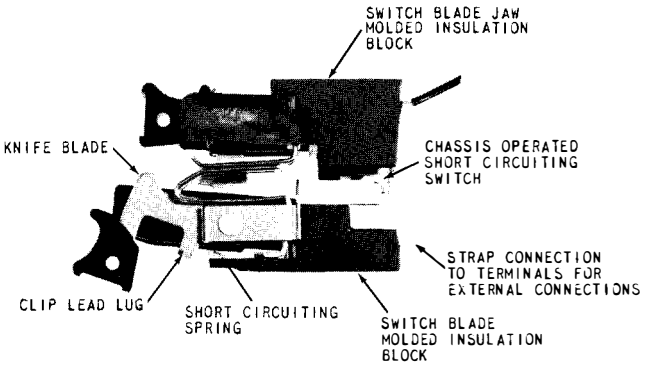

Fig. 2. Short Circuiting Switch

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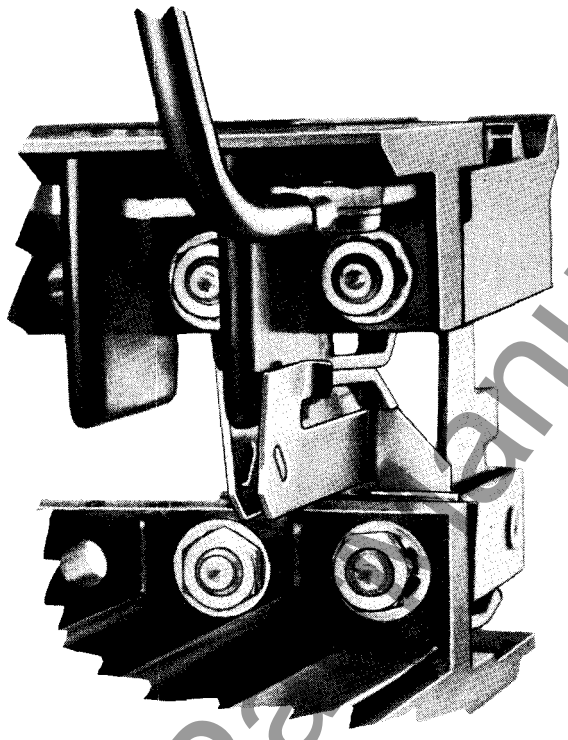

Fig. 3. Auxiliary Short Circuiting Switch (Enlarged View)

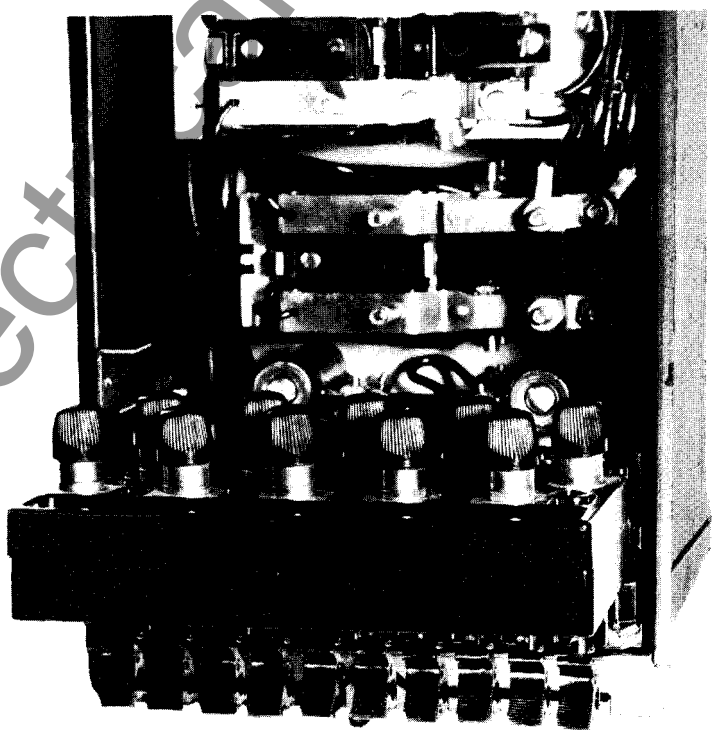

Fig. 4. Multi-Circuit Test Plug in Testing Position

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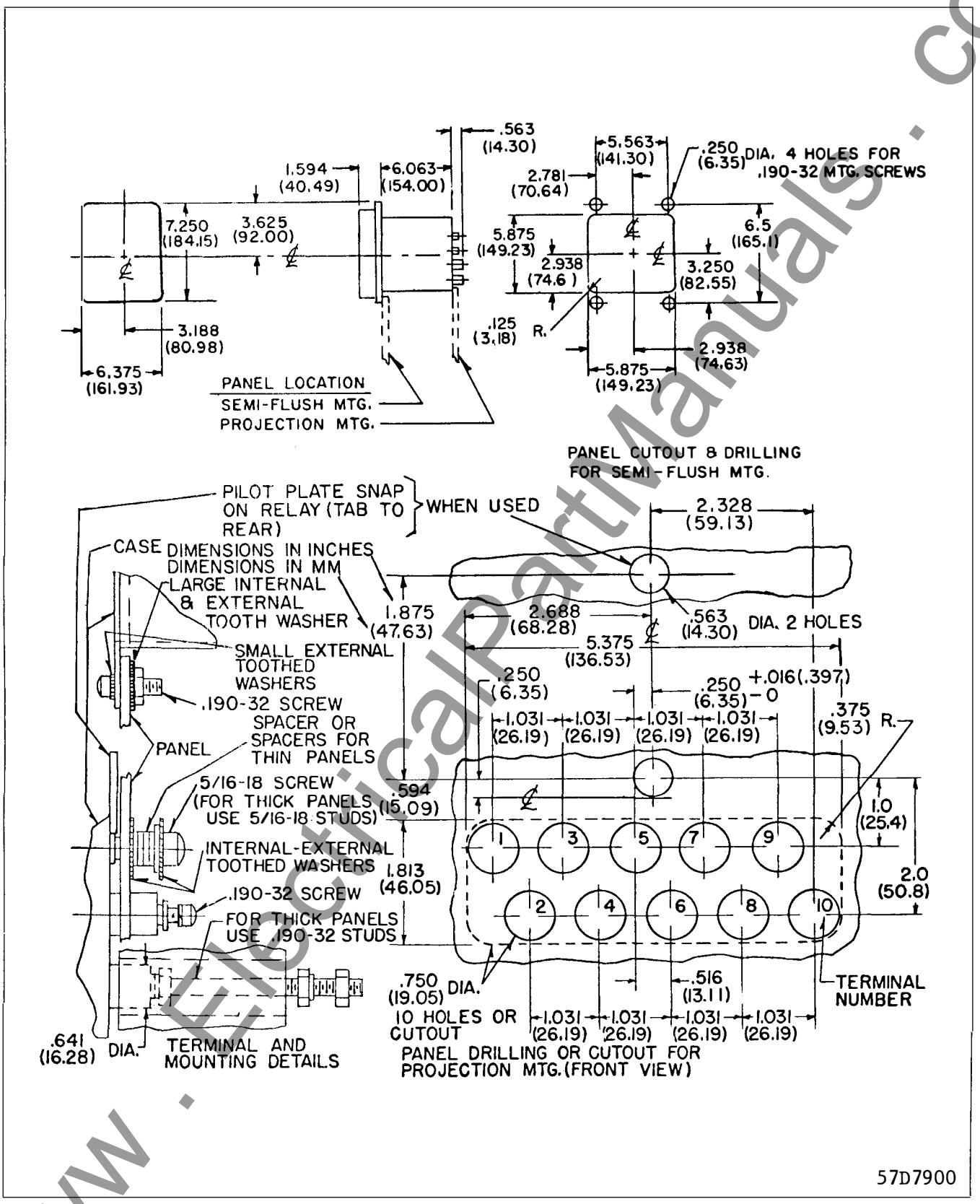

Fig. 5. Outline and Drilling Plan for the Type FT11 Case

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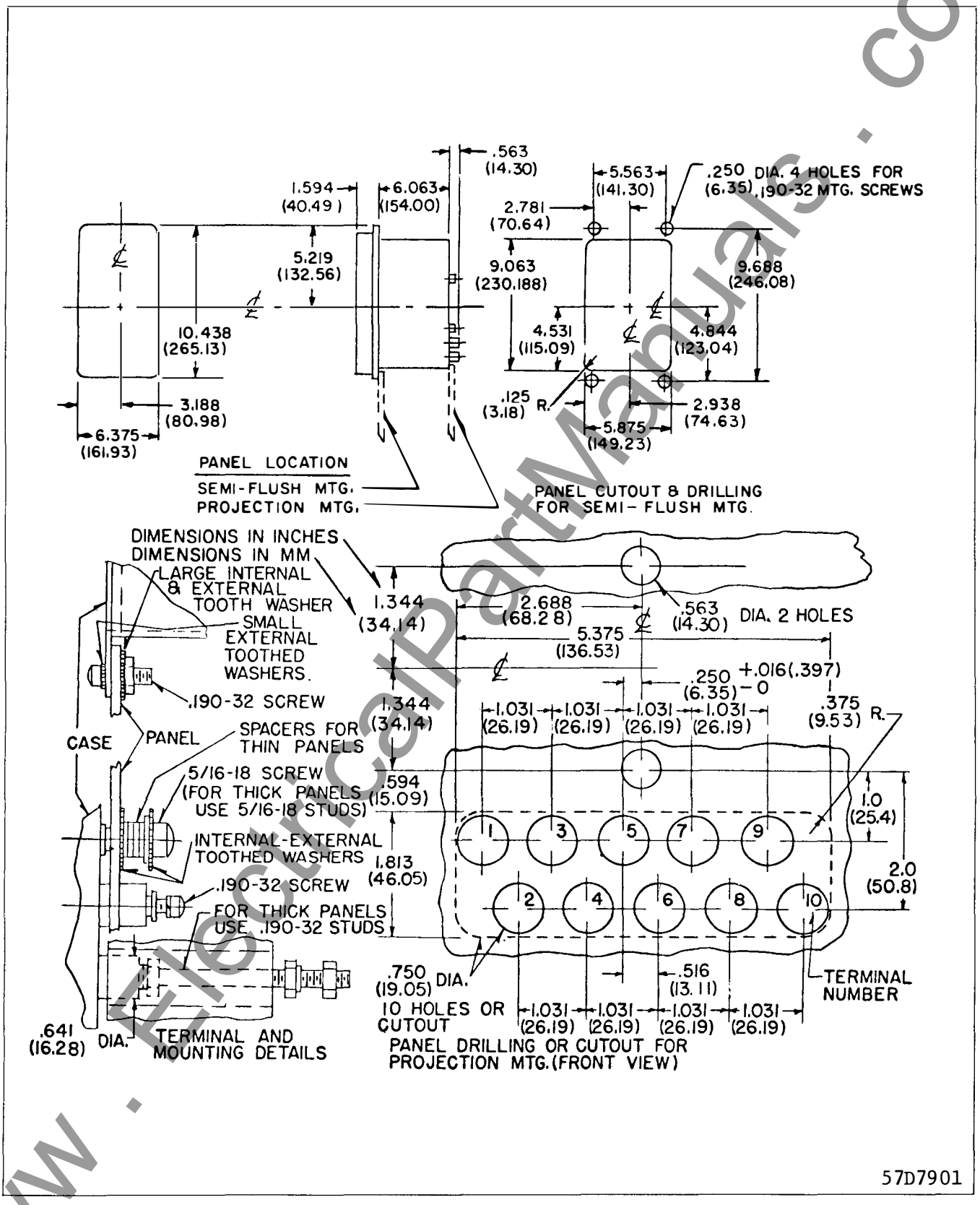

Fig. 6. Outline and Drilling Plan for the Type FT21 Case

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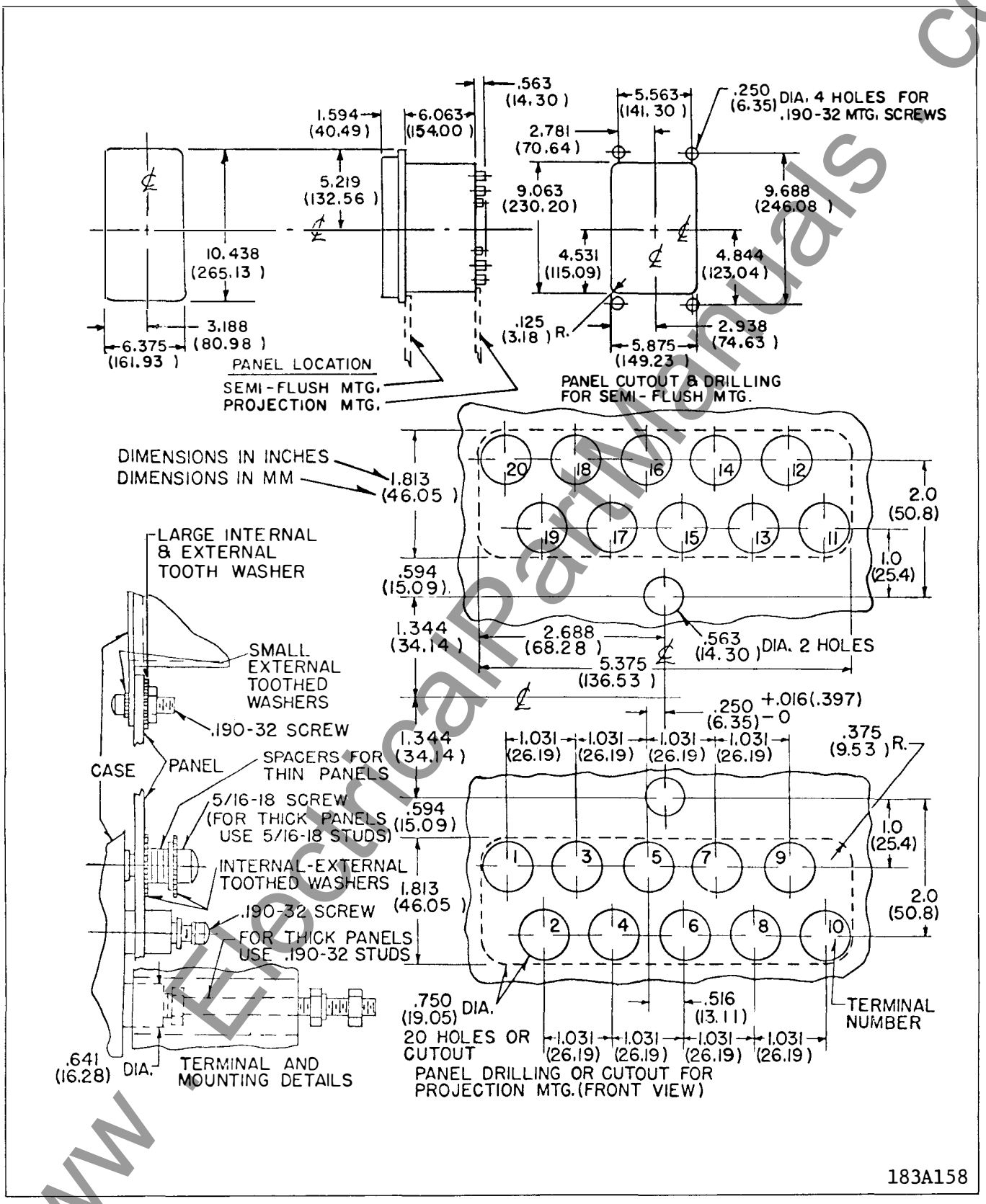

✪ *Fig. 7. Outline and Drilling Plan for the Type FT22 Case*

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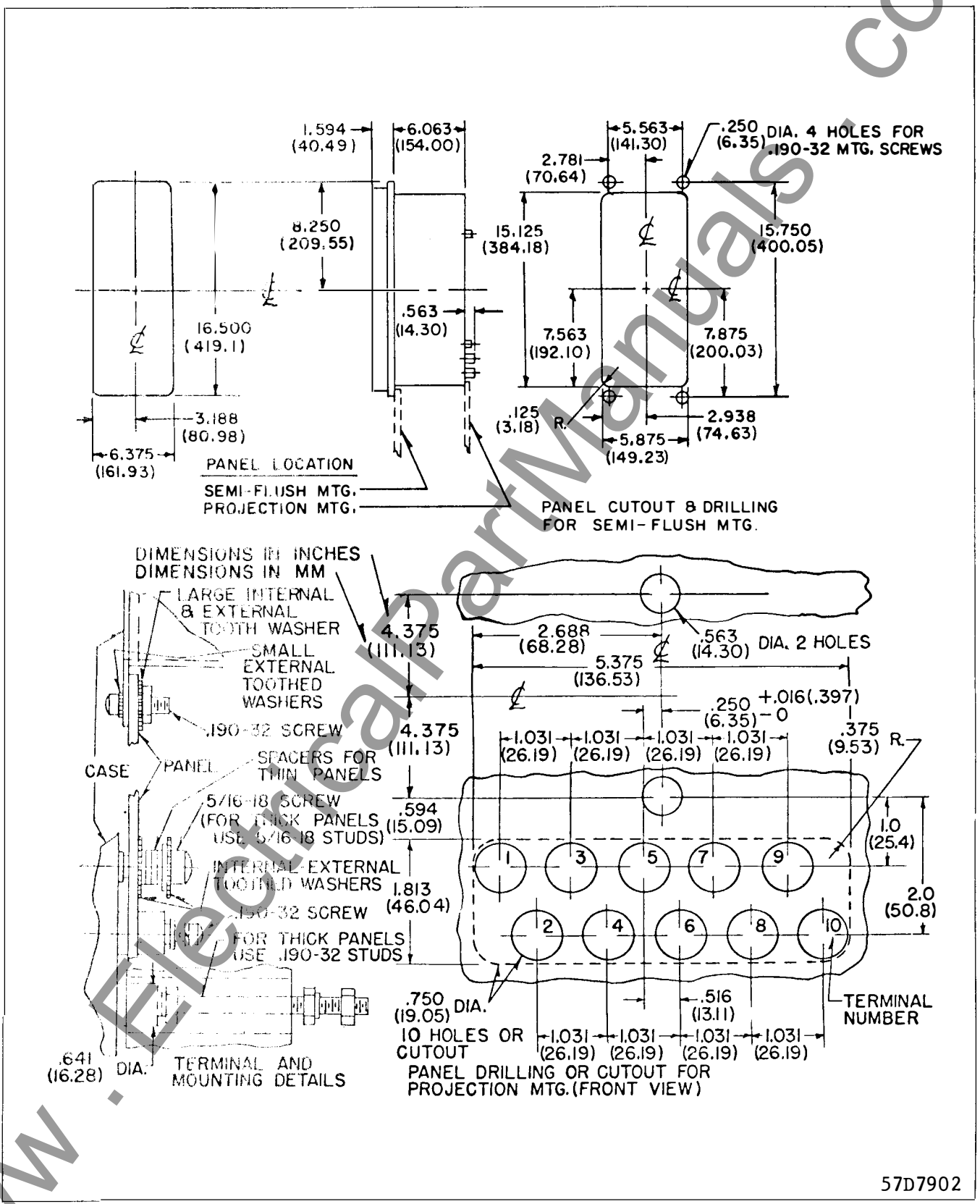

✪ *Fig. 8. Outline and Drilling Plan for the Type FT31 Case*

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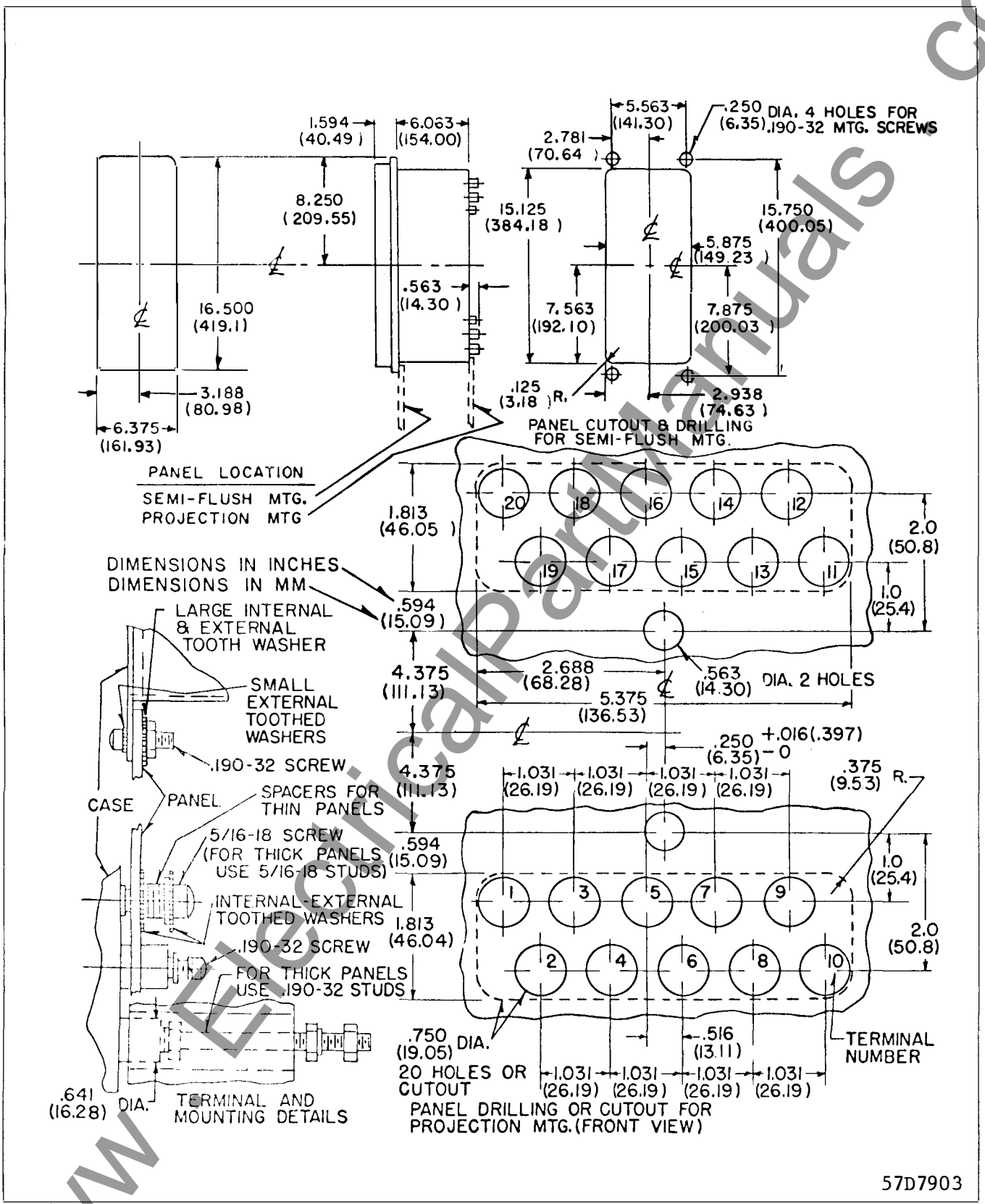

Fig. 9. Outline and Drilling Plan for the Type FT32 Case

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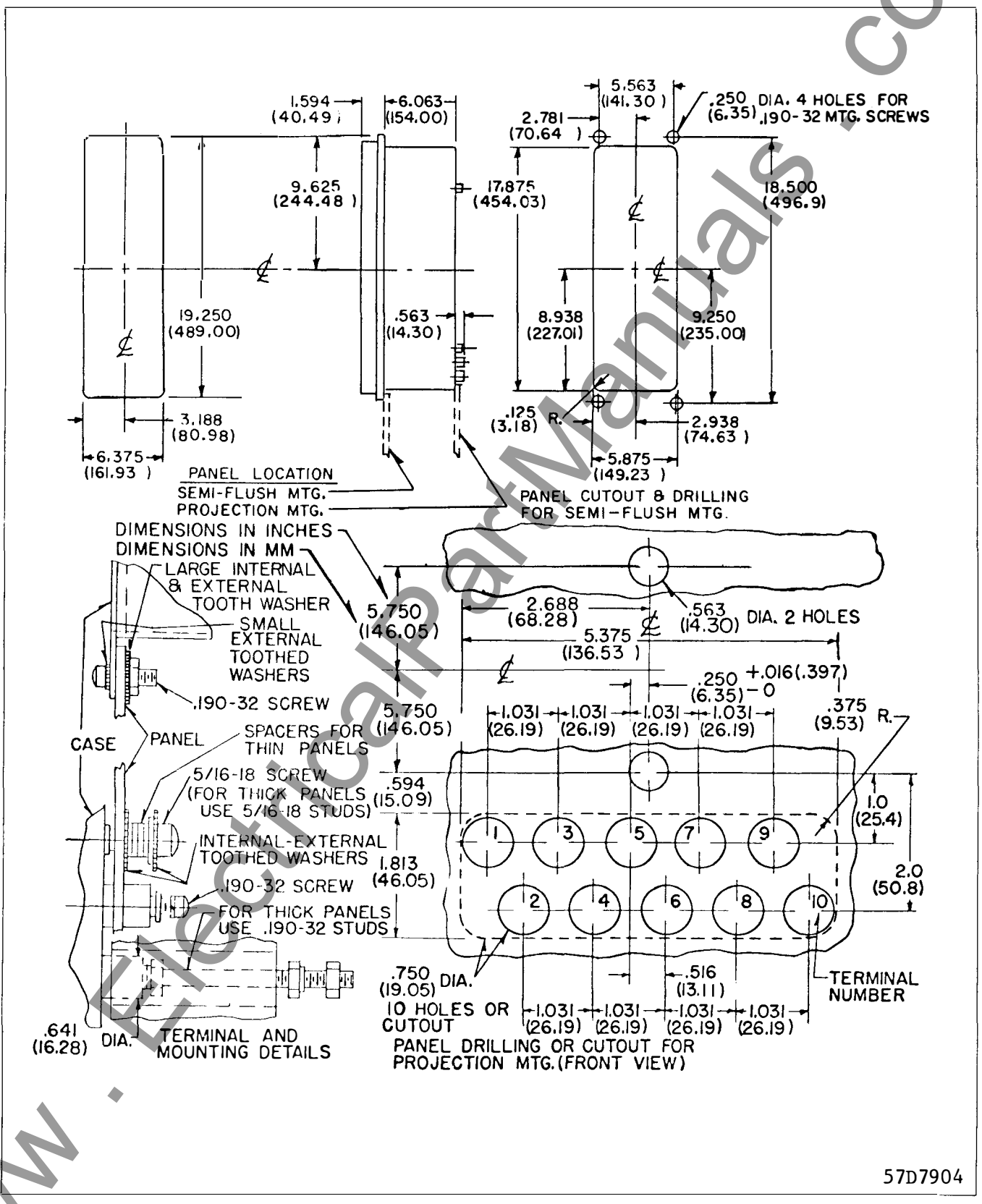

Fig. 10. Outline and Drilling Plan for the Type FT41 Case

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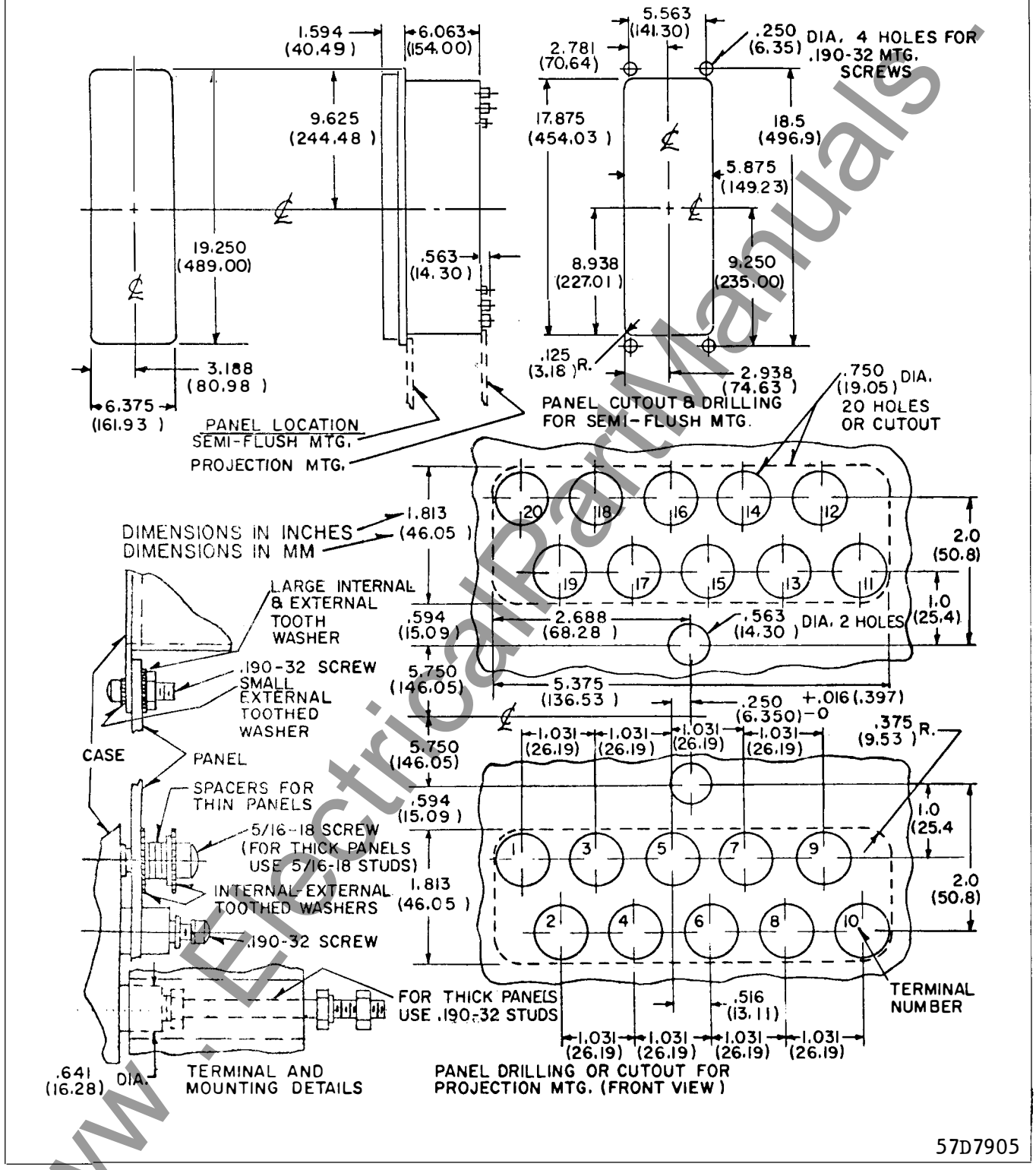

Fig. 11. Outline and Drilling Plan for the Type FT42 Case

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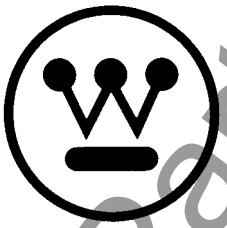

WESTINGHOUSE ELECTRIC CORPORATION

RELAY-INSTRUMENT DIVISION **NEWARK, N. J.**

Printed in U.S.A.

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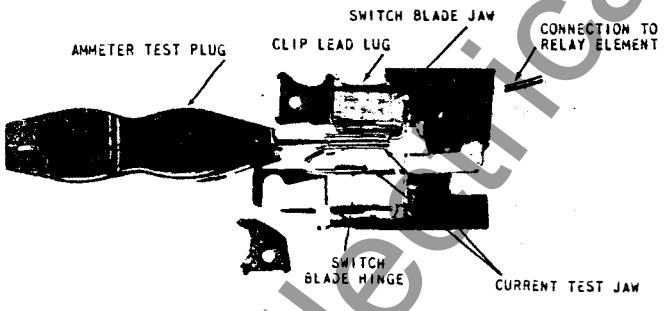

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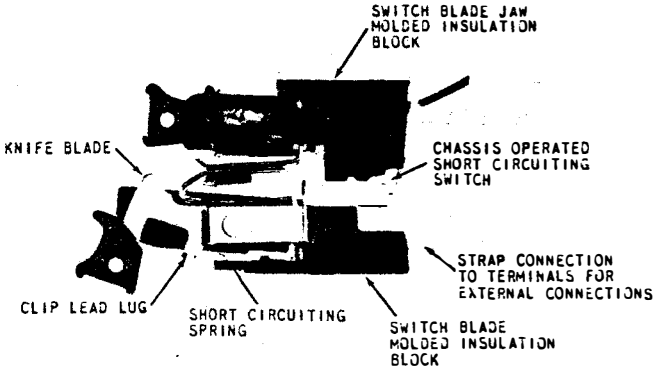

Fig. 2. Short Circuiting Switch

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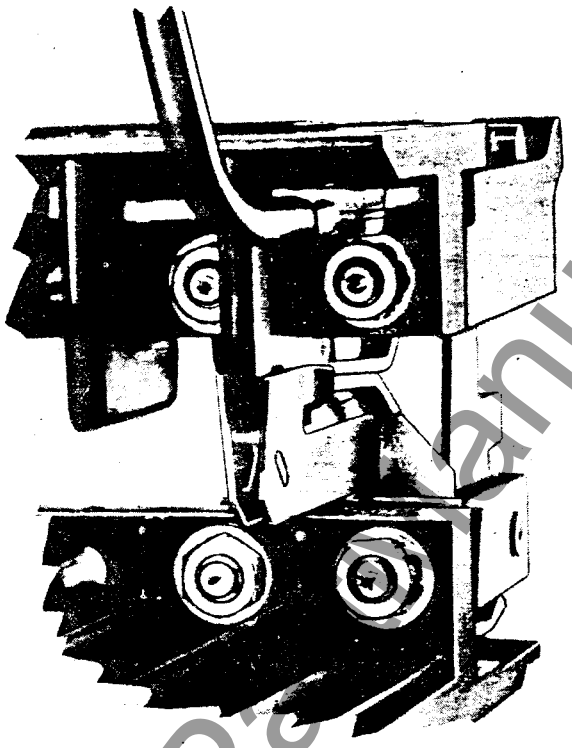

Fig. 3. Auxiliary Short Circuiting Switch (Enlarged View)

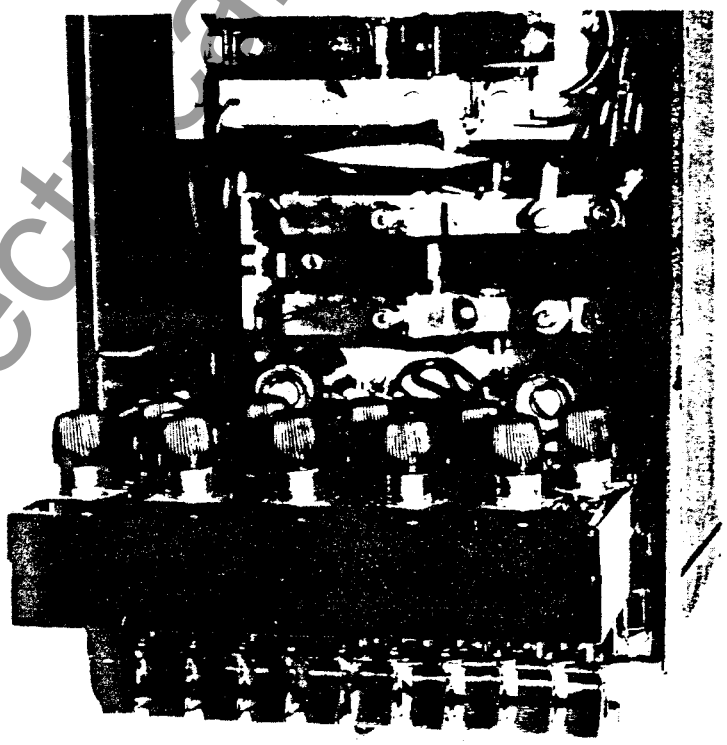

Fig. 4. Multi-Circuit Test Plug in Testing Position

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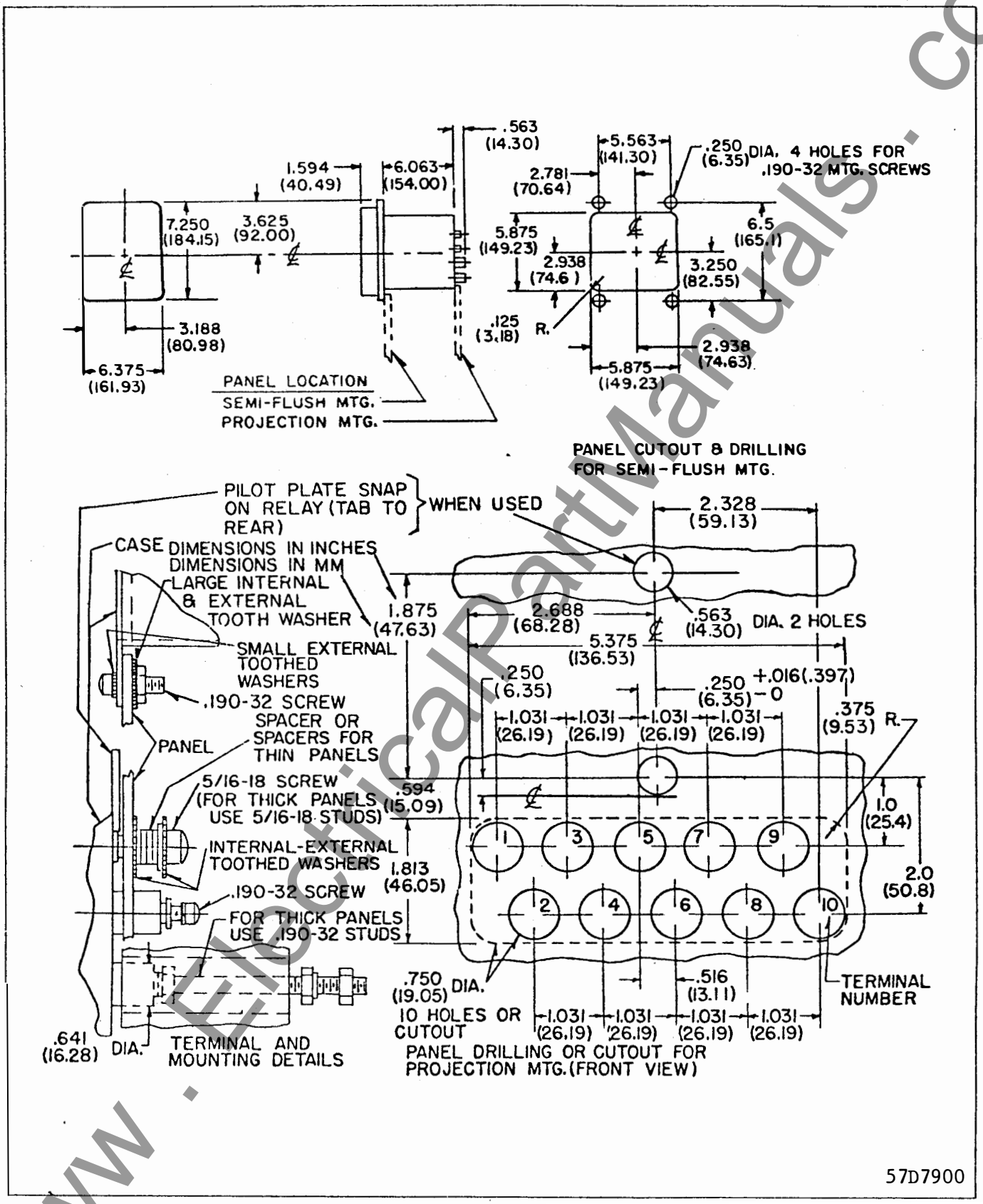

Fig. 5. Outline and Drilling Plan for the Type FT11 Case

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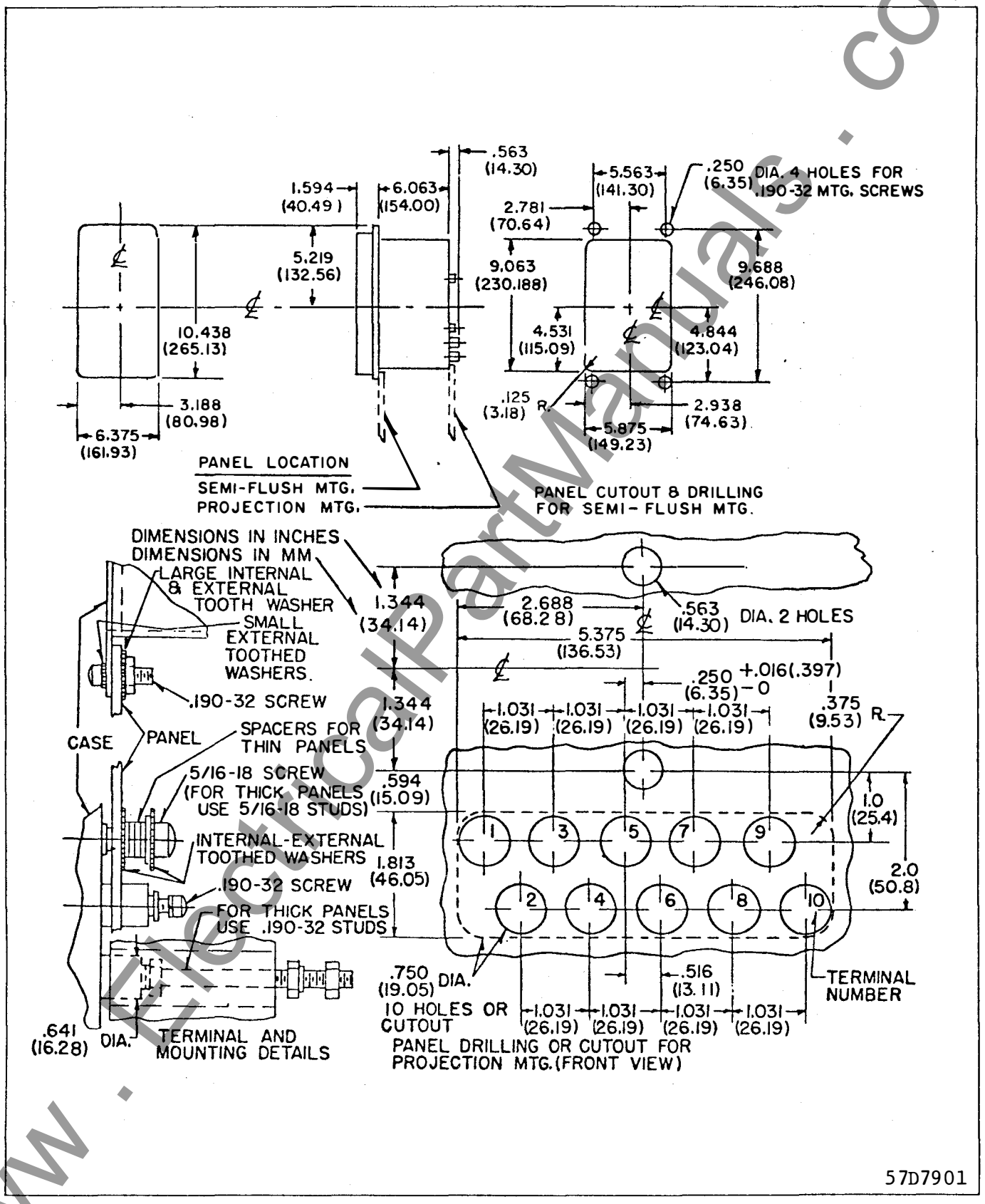

Fig. 6. Outline and Drilling Plan for the Type FT21 Case

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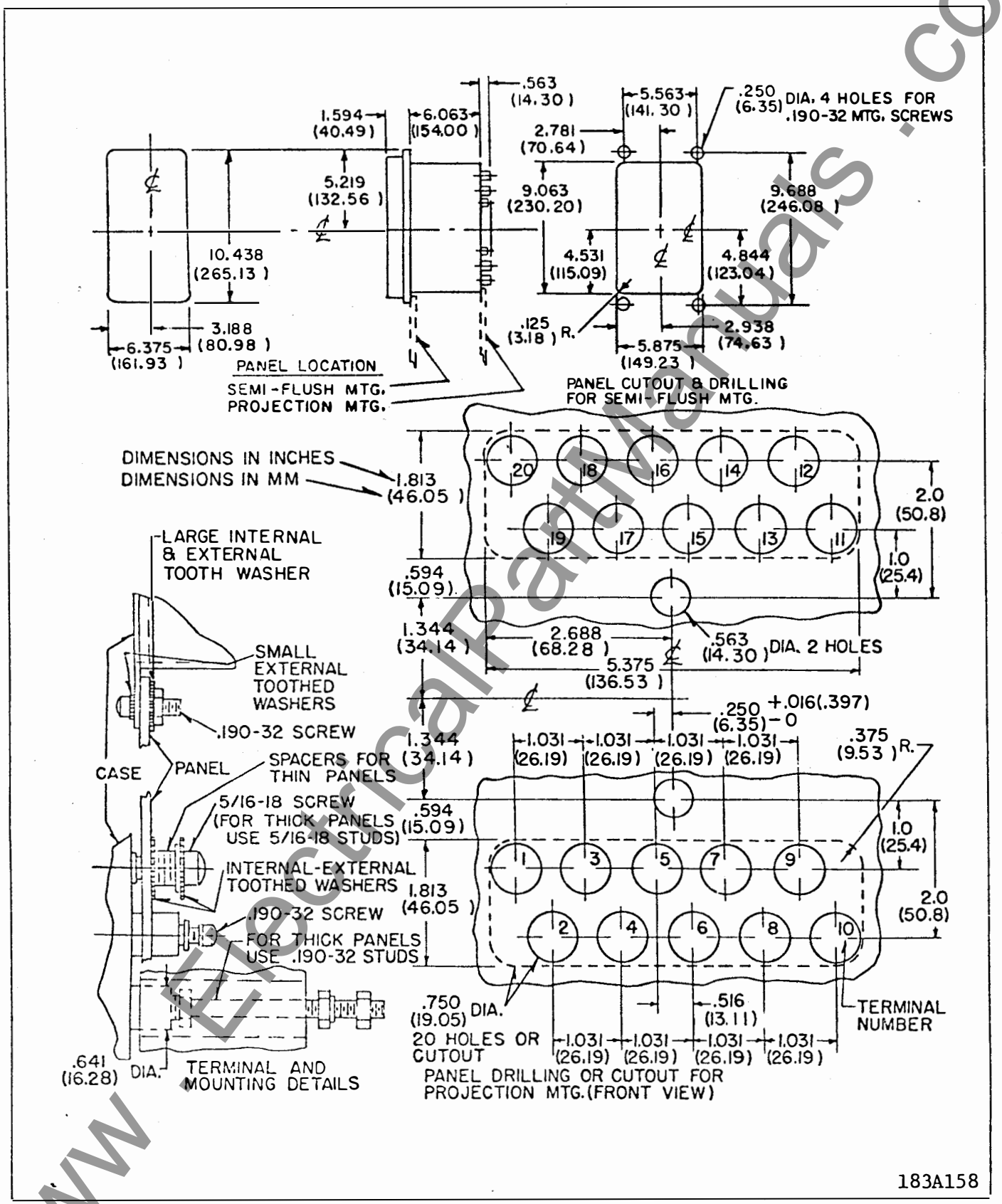

✪ *Fig. 7. Outline and Drilling Plan for the Type FT22 Case*

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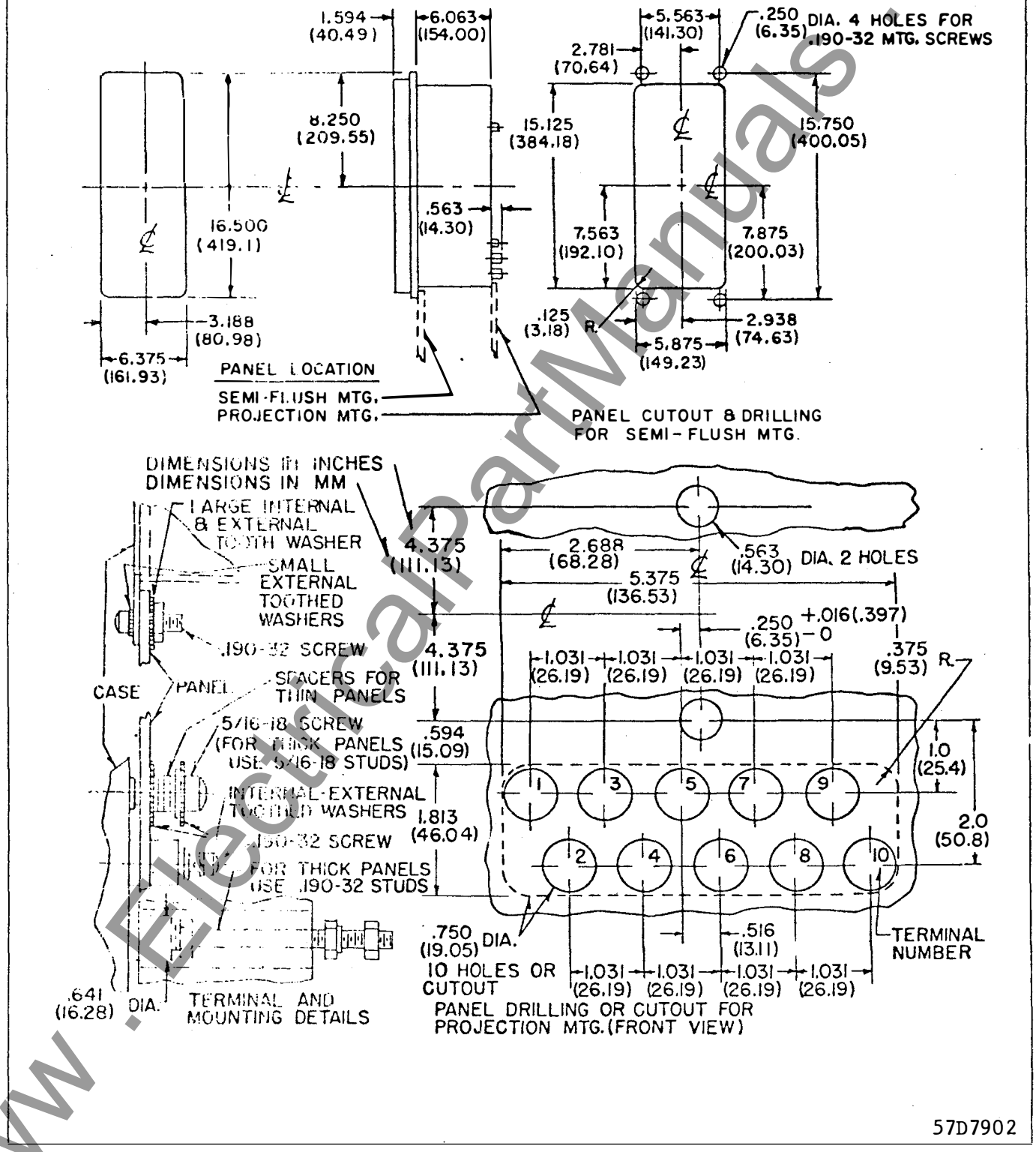

✪ *Fig. 8. Outline and Drilling Plan for the Type FT31 Case*

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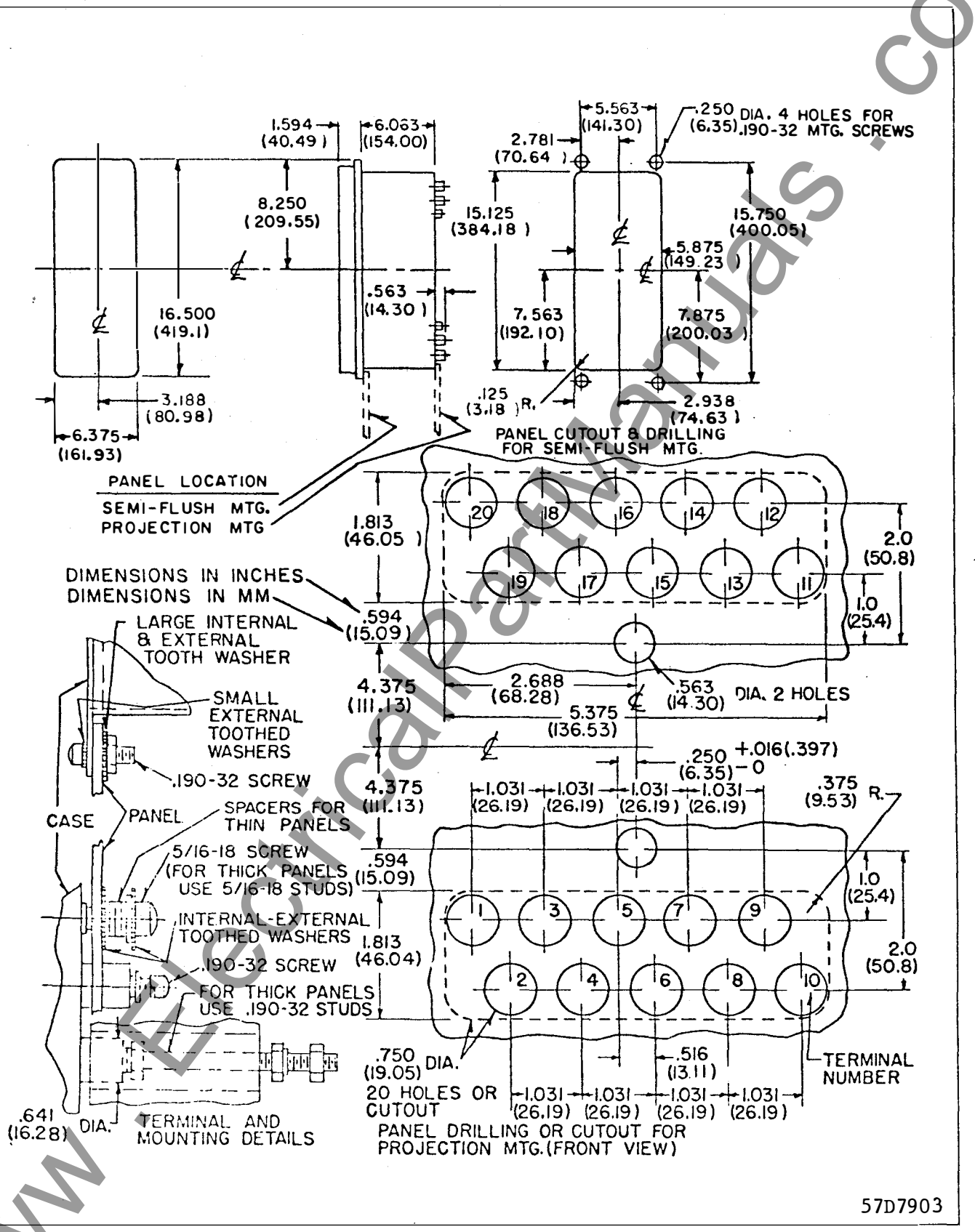

Fig. 9. Outline and Drilling Plan for the Type FT32 Case

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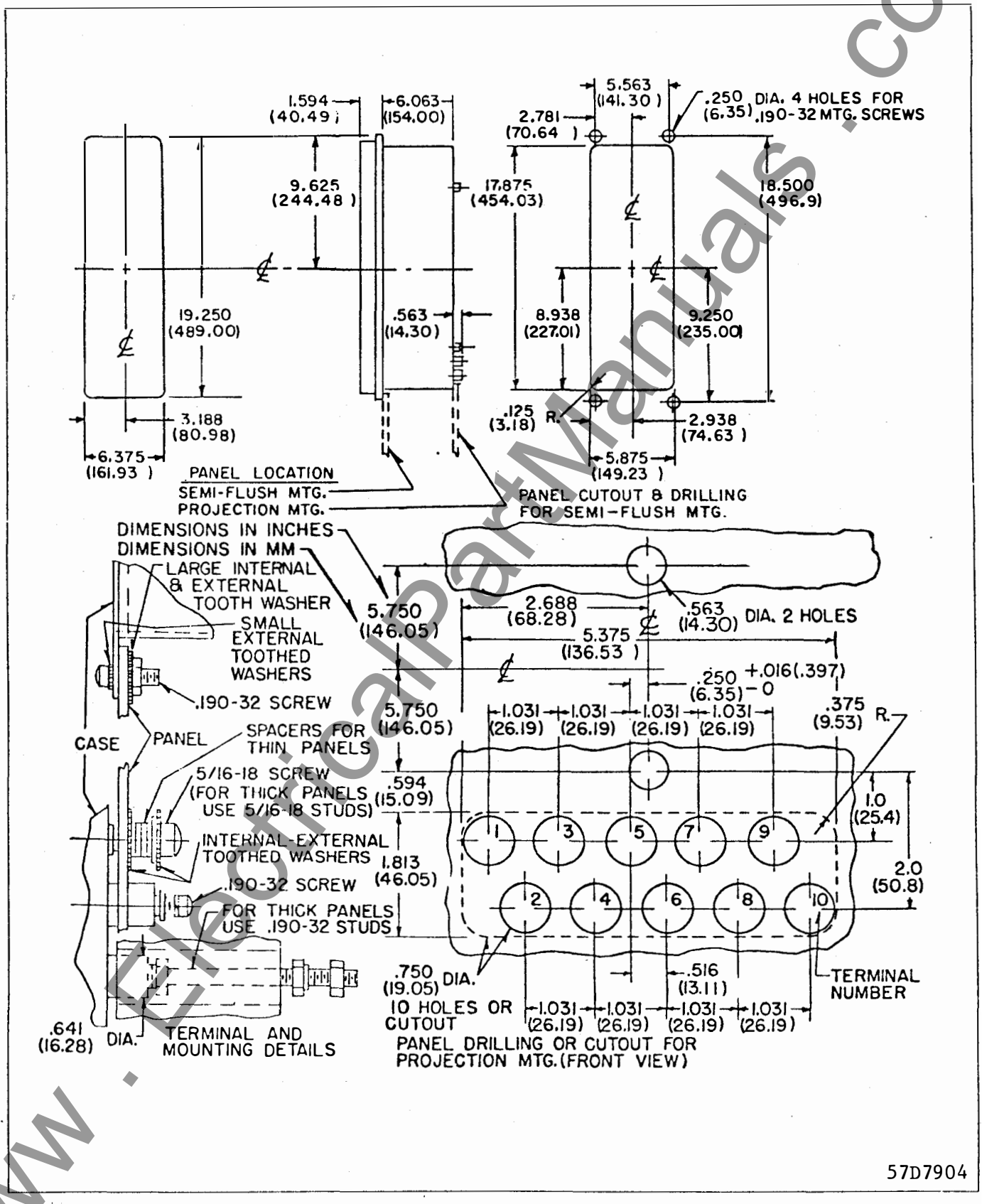

Fig. 10. Outline and Drilling Plan for the Type FT41 Case

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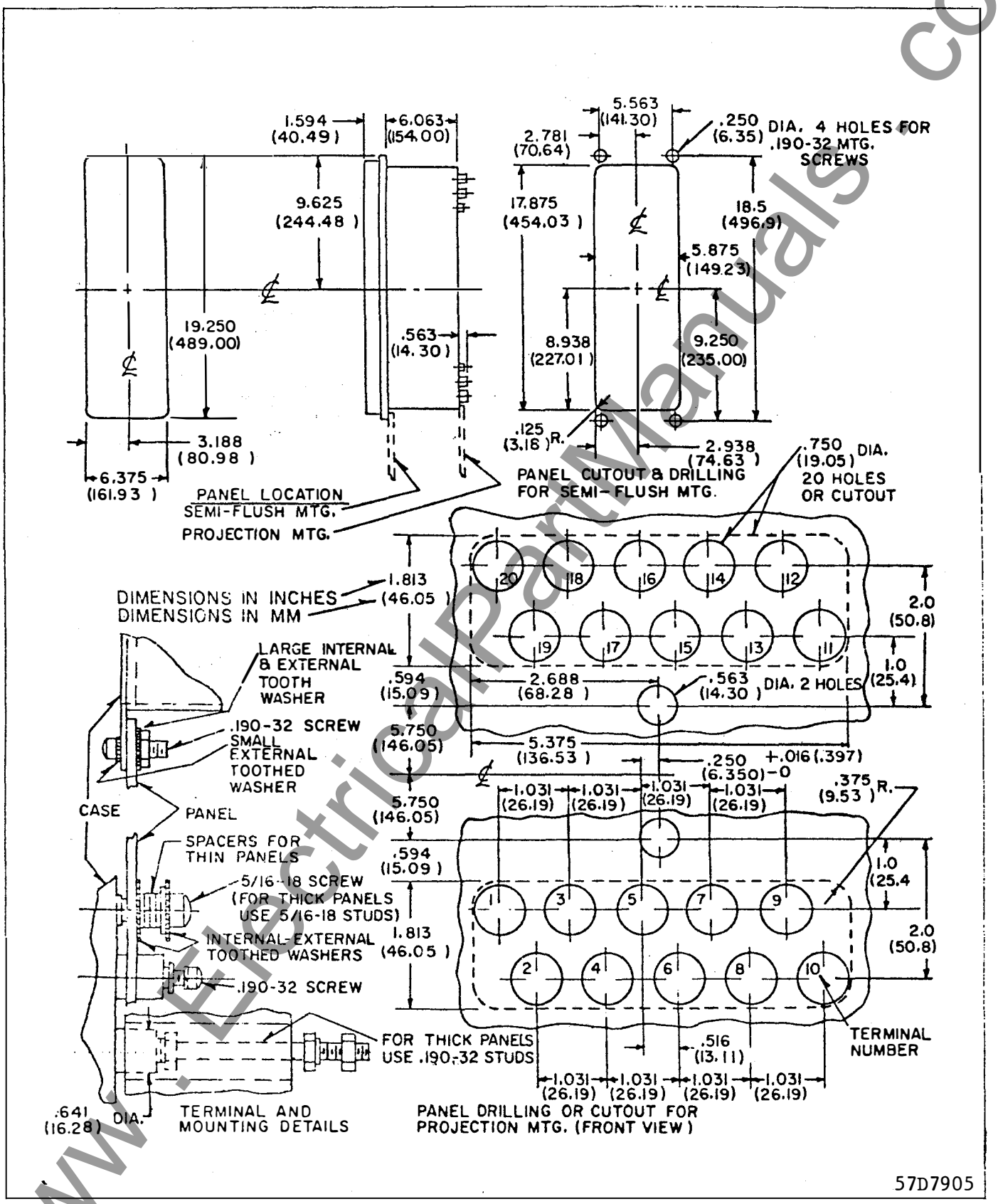

Fig. 11. *Outline and Drilling Plan for the Type FT42 Case*

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INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

RELAYS IN TYPE FT11, FT21, FT22, FT31, FT32, FT41, FT42 CASES

The type FT (Flexitest) cases are dust-proof enclosures combining relay units and knife-blade test switches in the same case. This combination provides a compact flexible assembly easy to maintain, inspect, test and adjust. There are three main units of the type FT case: the case, cover, and chassis. The case is an all-steel welded housing containing the hinge half of the knife-blade test switches and the terminals for external connections. The cover is a molded phenolic frame with a clear glass window, a thumb nut, a reset lever, and a hook shaped support. The support fits over the top flange of the case. The thumb nut, which fastens to a stud on the bottom flange of the case, holds the cover securely in place on the case. The chassis is a steel frame that supports the relay elements and the contact jaw half of the test switches. This slides in and out of the case. The electrical connections between the base and chassis are completed through the closed knife-blades.

There are four different size cases available. These are designated the FT11, FT21 or 22, FT31 or 32, and the FT41 or 42. The first digit of the designation represents the physical size and the second the number of terminal blocks. One terminal block can accommodate up to ten terminals. The case may be either semi-flush or projection mounted.

REMOVING CHASSIS

To remove the chassis, first remove the cover by unscrewing the captive thumb nut at the bottom and lifting the cover support off the top flange of the case. This exposes the relay units and all the test switches for inspection and testing. The next step is to open the test switches. *Always open the red handle switches first before any of the black handle switches or the cam action latches.* This opens the trip circuit to prevent accidental tripout. Then open all the remaining switches. The order of opening the remaining switches is not important. In opening the test switches they should be moved all the way back against the stops. With all the switches fully opened, release the cam action latches and pull outward. The chassis can be set on a test bench for easy inspection, maintenance and test.

After removing the chassis a duplicate chassis may be inserted in the case or the blade portion of the switches can be closed and the cover put in place without the chassis. The chassis-operated auxiliary shorting switch remains closed with chassis out to prevent open circuiting the current transformers when the current test switches are closed. The operation of the auxiliary shorting switch is visible from the front of the relay, when the chassis is in place.

When the chassis is to be put back in the case, the above procedure is to be followed in the reversed order. *The red handle switch should not be closed until after the chassis has been latched in place and all of the black handle switches closed.*

ELECTRICAL CIRCUITS

Each terminal in the base connects through a test switch to the relay units in the chassis as shown on the internal schematic diagrams. The relay terminals are identified by numbers marked on the outside of the case. The test switch positions are identified by numbers marked on the molded blocks.

The potential and control circuits through the relay are disconnected from the external circuit by opening the associated test switches. Opening the current test switch short-circuits the current transformer secondary and disconnects one side of the relay coil but leaves the other side of the coil connected to the external circuit through the current test jack jaws. This circuit can be isolated by inserting the current test plug (without external connections), or by inserting the ten circuit test plug. Both switches of the current test switch pair must be open when using the current test plug in this manner to short-circuit the current transformer secondary.

TESTING

The relays can be tested in service, in the case

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but with the external circuits isolated or out of the case as follows:

TESTING IN SERVICE

The ammeter test plug can be inserted in the current test jaws after opening the knife-blade switch to check the current through the relay, as shown in Fig. 1. This plug consists of two conducting strips separated by an insulating strip. The ammeter is connected to these strips by terminal screws and the leads are carried out through holes in the back of the insulated handle.

Voltages between the potential circuits can be measured conveniently by clamping #2 clip leads on the projecting clip lead lug on the contact jaw.

TESTING IN CASE

With all blades in the full open position, the ten circuit test plug Fig. 4 can be inserted in the contact jaws. This connects the relay units to a set of binding posts and completely isolates the relay circuits from the external connections by means of an insulating barrier on the plug. The external test circuits are connected to these binding posts. The plug is inserted in the bottom test jaws with the binding posts up and in the top test switch jaws with the binding posts down.

The external test circuits may be made to the relay units by #2 test clip leads instead of the test plug. When connecting an external test circuit to the current elements using clip leads, care should be taken to see that the current test jack jaws are open so that the relay is completely isolated from the external circuits. Suggested means for isolating this circuit are outlined above, under "Electrical Circuits".

TESTING OUT OF CASE

With the chassis removed from the case, relay units may be tested by using the ten circuit test plug or by #2 test clip leads as described above. Any critical factory calibration is made with the chassis in the case and removing the chassis from the case may change the calibration values of these relays.

An internal schematic is available for each individual relay showing the schematic internal wiring. The outlines of the various cases are shown in Fig. 5 to Fig. 11.

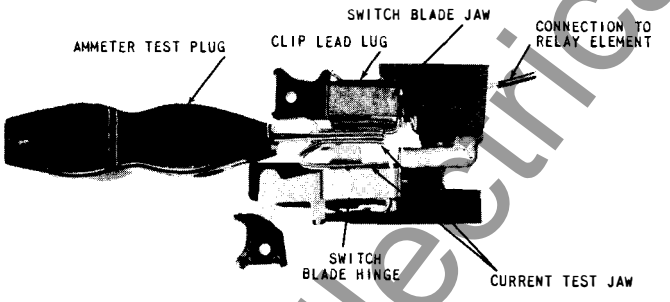

Fig. 1. Ammeter Test Plug in Testing Positions

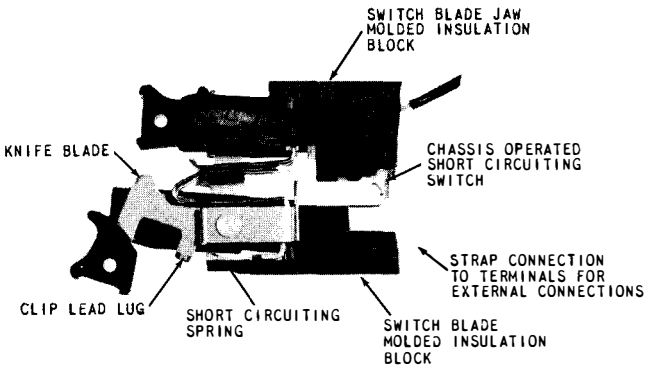

Fig. 2. Short Circuiting Switch

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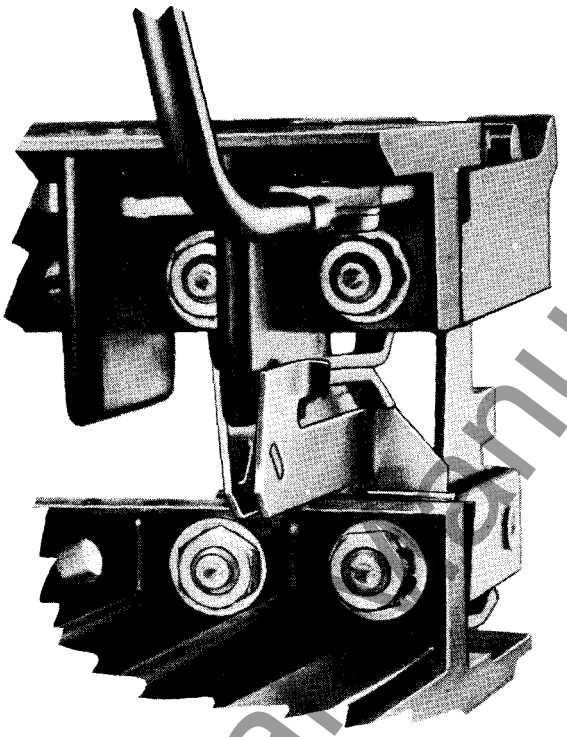

Fig. 3. Auxiliary Short Circuiting Switch (Enlarged View)

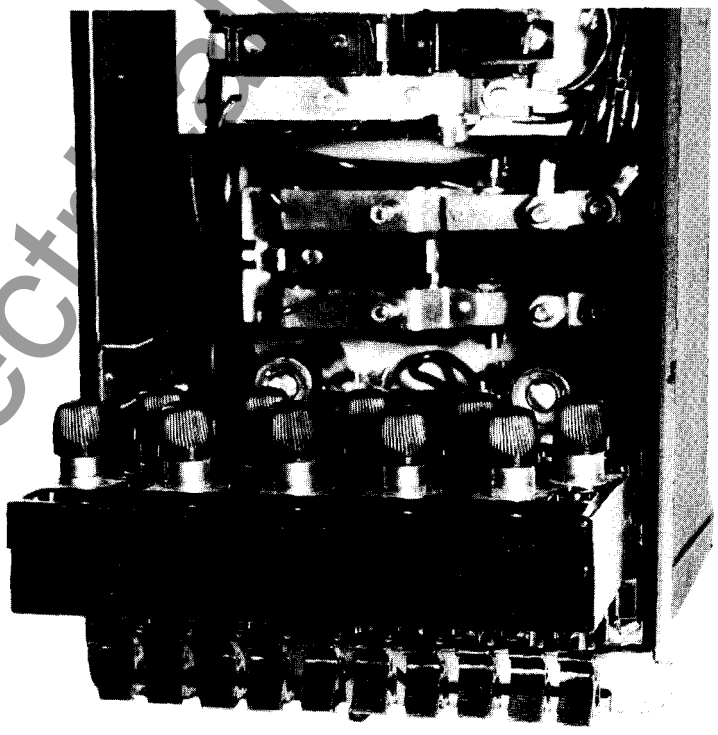

Fig. 4. Multi-Circuit Test Plug in Testing Position

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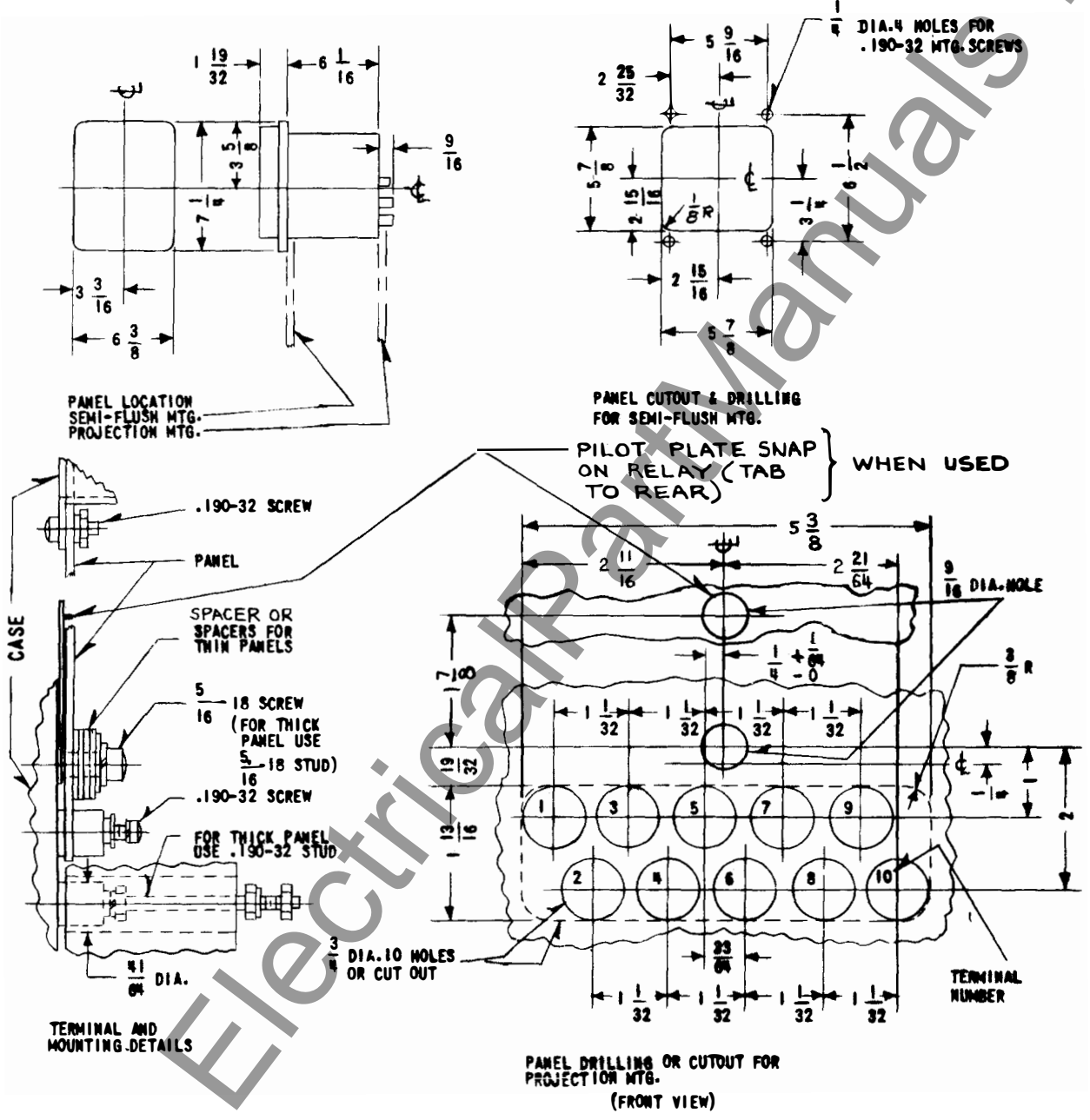

* *Fig. 5. Outline and Drilling Plan for the Type FT11 Case*

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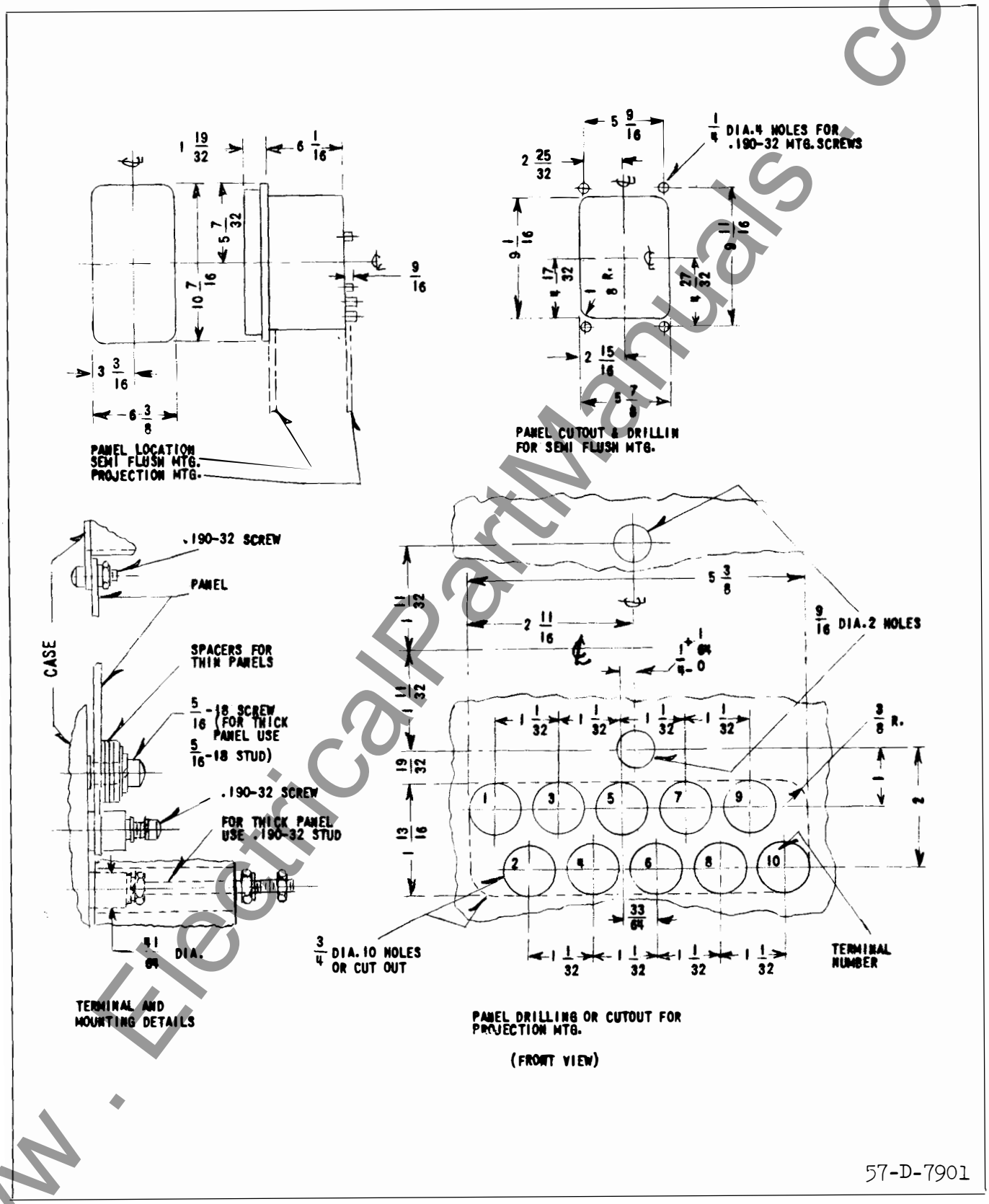

Fig. 6. Outline and Drilling Plan for the Type FT21 Case

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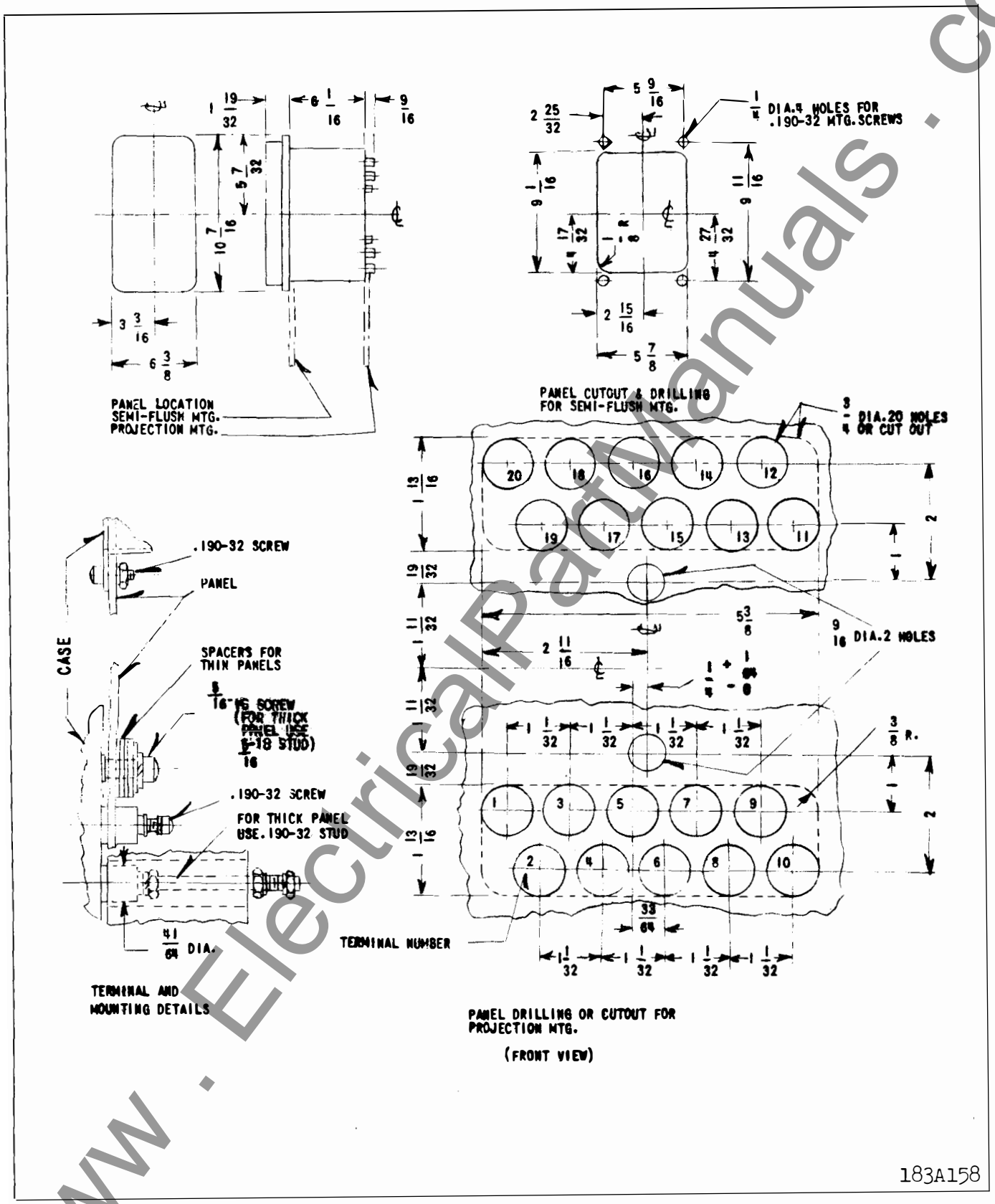

Fig. 7. Outline and Drilling Plan for the Type FT22 Case

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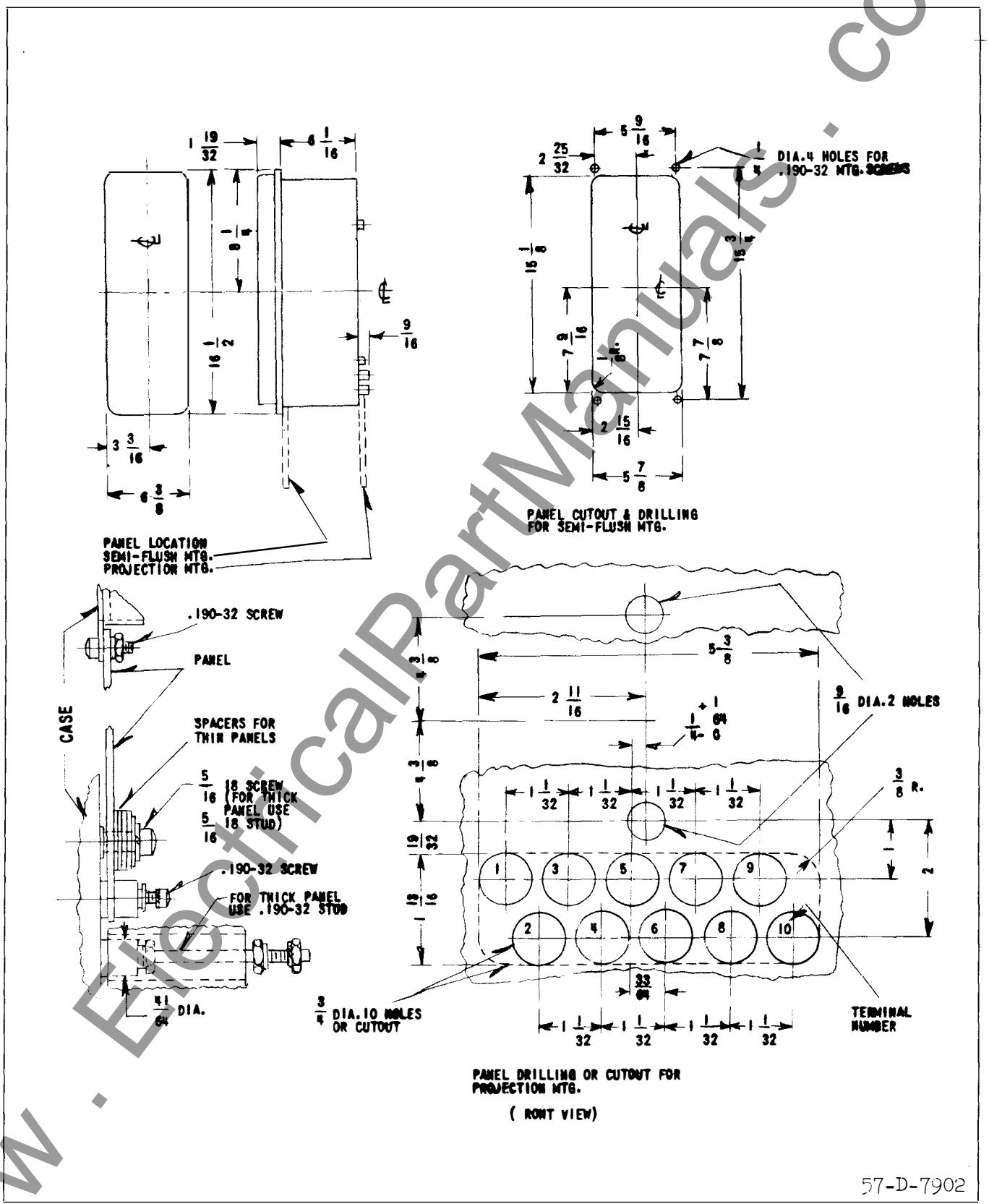

* *Fig. 8. Outline and Drilling Plan for the Type FT31 Case*

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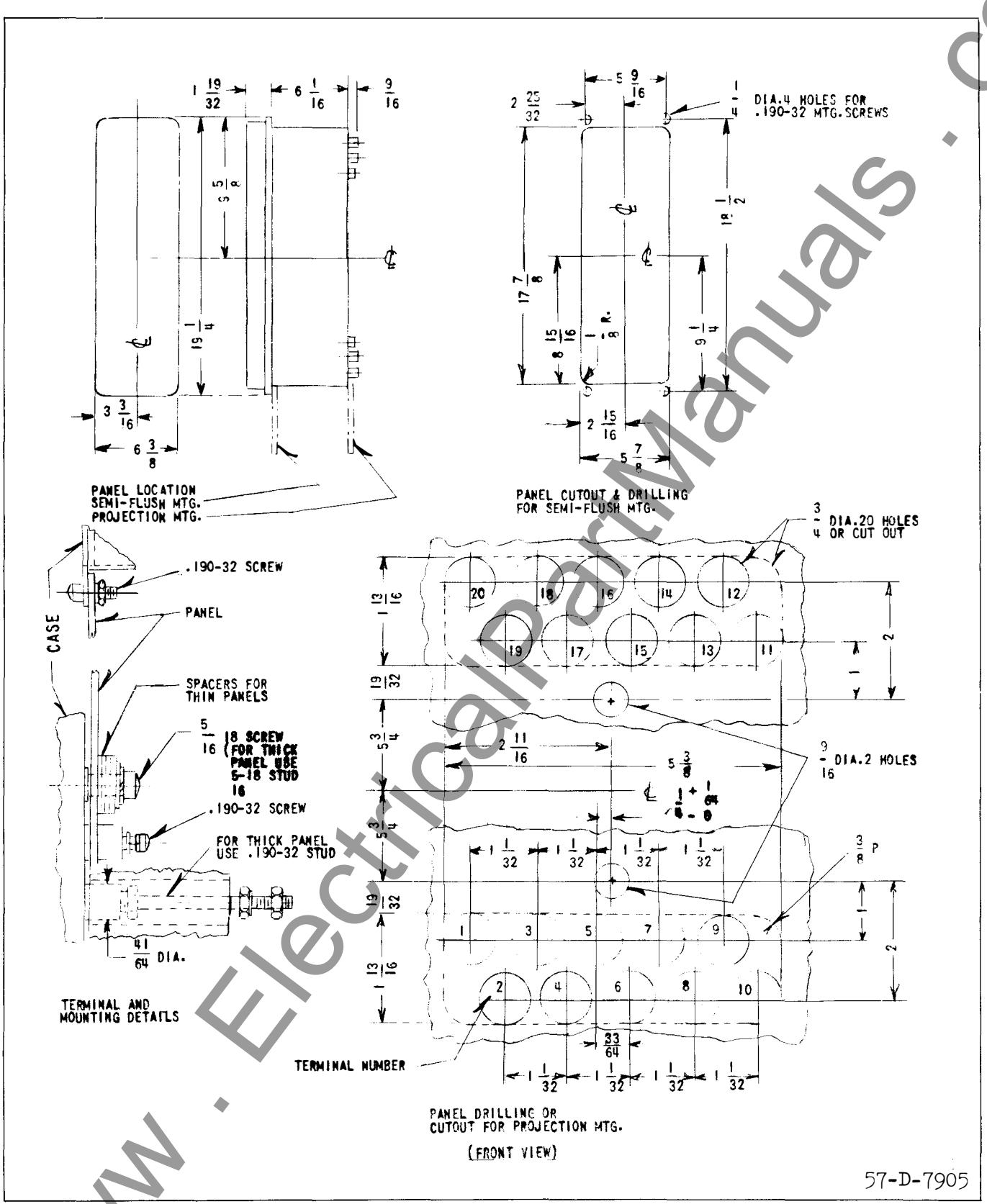

Fig. 11. Outline and Drilling Plan for the Type FT42 Case

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WESTINGHOUSE ELECTRIC CORPORATION

RELAY-INSTRUMENT DIVISION **NEWARK, N. J.**

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INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

RELAYS IN TYPE FT11, FT21, FT22, FT31, FT32, FT41, FT42 CASES

The type FT (Flexitest) cases are dust-proof enclosures combining relay units and knife-blade test switches in the same case. This combination provides a compact flexible assembly easy to maintain, inspect, test and adjust. There are three main units of the type FT case: the case, cover, and chassis. The case is an all-steel welded housing containing the hinge half of the knife-blade test switches and the terminals for external connections. The cover is a molded phenolic frame with a clear glass window, a thumb nut, a reset lever, and a hook shaped support. The support fits over the top flange of the case. The thumb nut, which fastens to a stud on the bottom flange of the case, holds the cover securely in place on the case. The chassis is a steel frame that supports the relay elements and the contact jaw half of the test switches. This slides in and out of the case. The electrical connections between the base and chassis are completed through the closed knife-blades.

There are four different size cases available. These are designated the FT11, FT21 or 22, FT31 or 32, and the FT41 or 42. The first digit of the designation represents the physical size and the second the number of terminal blocks. One terminal block can accommodate up to ten terminals. The case may be either semi-flush or projection mounted.

REMOVING CHASSIS

To remove the chassis, first remove the cover by unscrewing the captive thumb nut at the bottom and lifting the cover support off the top flange of the case. This exposes the relay units and all the test switches for inspection and testing. The next step is to open the test switches. *Always open the red handle switches first before any of the black handle switches or the cam action latches.* This opens the trip circuit to prevent accidental tripout. Then open all the remaining switches. The order of opening the remaining switches is not important. In opening the test switches they should be moved all the way back against the stops. With all the switches fully opened, release the cam action latches and pull outward. The chassis can be set on a test bench for easy inspection, maintenance and test.

After removing the chassis a duplicate chassis may be inserted in the case or the blade portion of the switches can be closed and the cover put in place without the chassis. The chassis-operated auxiliary shorting switch remains closed with chassis out to prevent open circuiting the current transformers when the current test switches are closed. The operation of the auxiliary shorting switch is visible from the front of the relay, when the chassis is in place.

When the chassis is to be put back in the case, the above procedure is to be followed in the reversed order. *The red handle switch should not be closed until after the chassis has been latched in place and all of the black handle switches closed.*

ELECTRICAL CIRCUITS

Each terminal in the base connects through a test switch to the relay units in the chassis as shown on the internal schematic diagrams. The relay terminals are identified by numbers marked on the outside of the case. The test switch positions are identified by numbers marked on the molded blocks.

The potential and control circuits through the relay are disconnected from the external circuit by opening the associated test switches. Opening the current test switch short-circuits the current transformer secondary and disconnects one side of the relay coil but leaves the other side of the coil connected to the external circuit through the current test jack jaws. This circuit can be isolated by inserting the current test plug (without external connections), or by inserting the ten circuit test plug. Both switches of the current test switch pair must be open when using the current test plug in this manner to short-circuit the current transformer secondary.

TESTING

The relays can be tested in service, in the case

All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding his particular installation, operation or maintenance of his equipment, the local Westinghouse Electric Corporation representative should be contacted.

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but with the external circuits isolated or out of the case as follows:

TESTING IN SERVICE

The ammeter test plug can be inserted in the current test jaws after opening the knife-blade switch to check the current through the relay, as shown in Fig. 1. This plug consists of two conducting strips separated by an insulating strip. The ammeter is connected to these strips by terminal screws and the leads are carried out through holes in the back of the insulated handle.

Voltages between the potential circuits can be measured conveniently by clamping #2 clip leads on the projecting clip lead lug on the contact jaw.

TESTING IN CASE

With all blades in the full open position, the ten circuit test plug Fig. 4 can be inserted in the contact jaws. This connects the relay units to a set of binding posts and completely isolates the relay circuits from the external connections by means of an insulating barrier on the plug. The external test circuits are connected to these binding posts. The plug is inserted in the bottom test jaws with the binding posts up and in the top test switch jaws with the binding posts down.

The external test circuits may be made to the relay units by #2 test clip leads instead of the test plug. When connecting an external test circuit to the current elements using clip leads, care should be taken to see that the current test jack jaws are open so that the relay is completely isolated from the external circuits. Suggested means for isolating this circuit are outlined above, under "Electrical Circuits".

TESTING OUT OF CASE

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An internal schematic is available for each individual relay showing the schematic internal wiring. The outlines of the various cases are shown in Fig. 5 to Fig. 11.

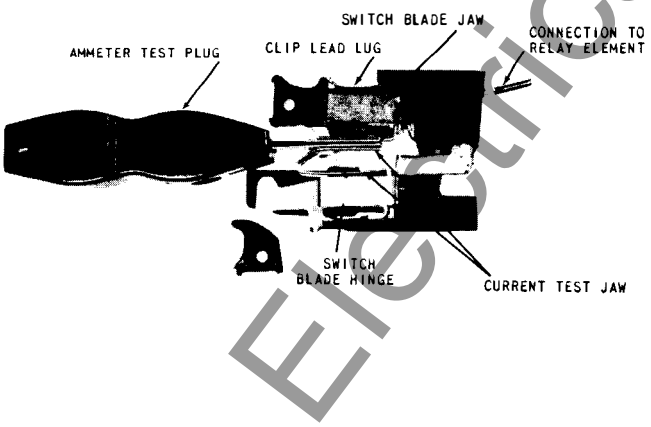

Fig. 1. Ammeter Test Plug in Testing Positions

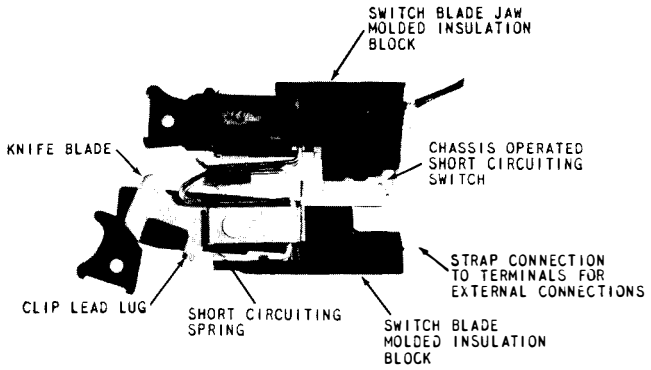

Fig. 2. Short Circuiting Switch

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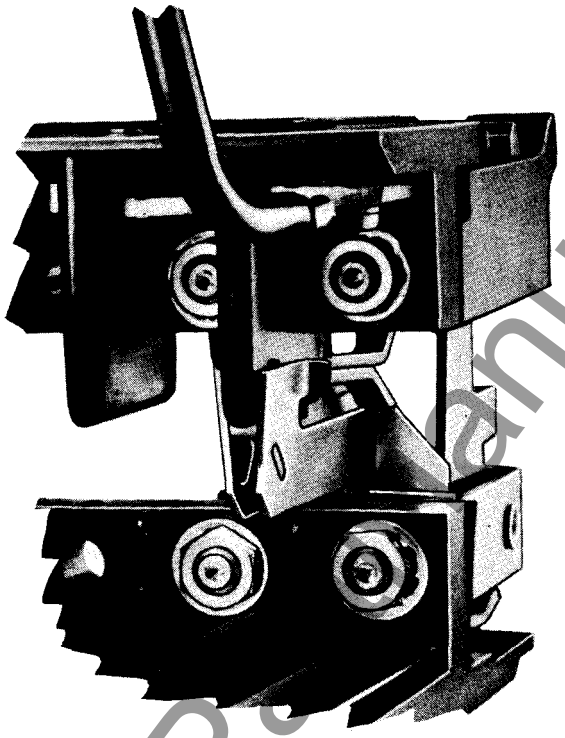

Fig. 3. Auxiliary Short Circuiting Switch (Enlarged View)

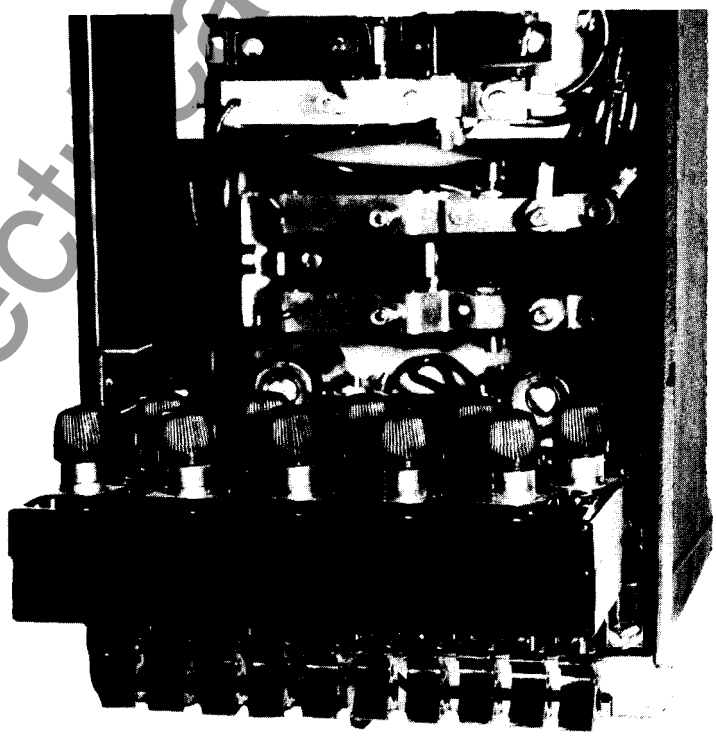

Fig. 4. Multi-Circuit Test Plug in Testing Position

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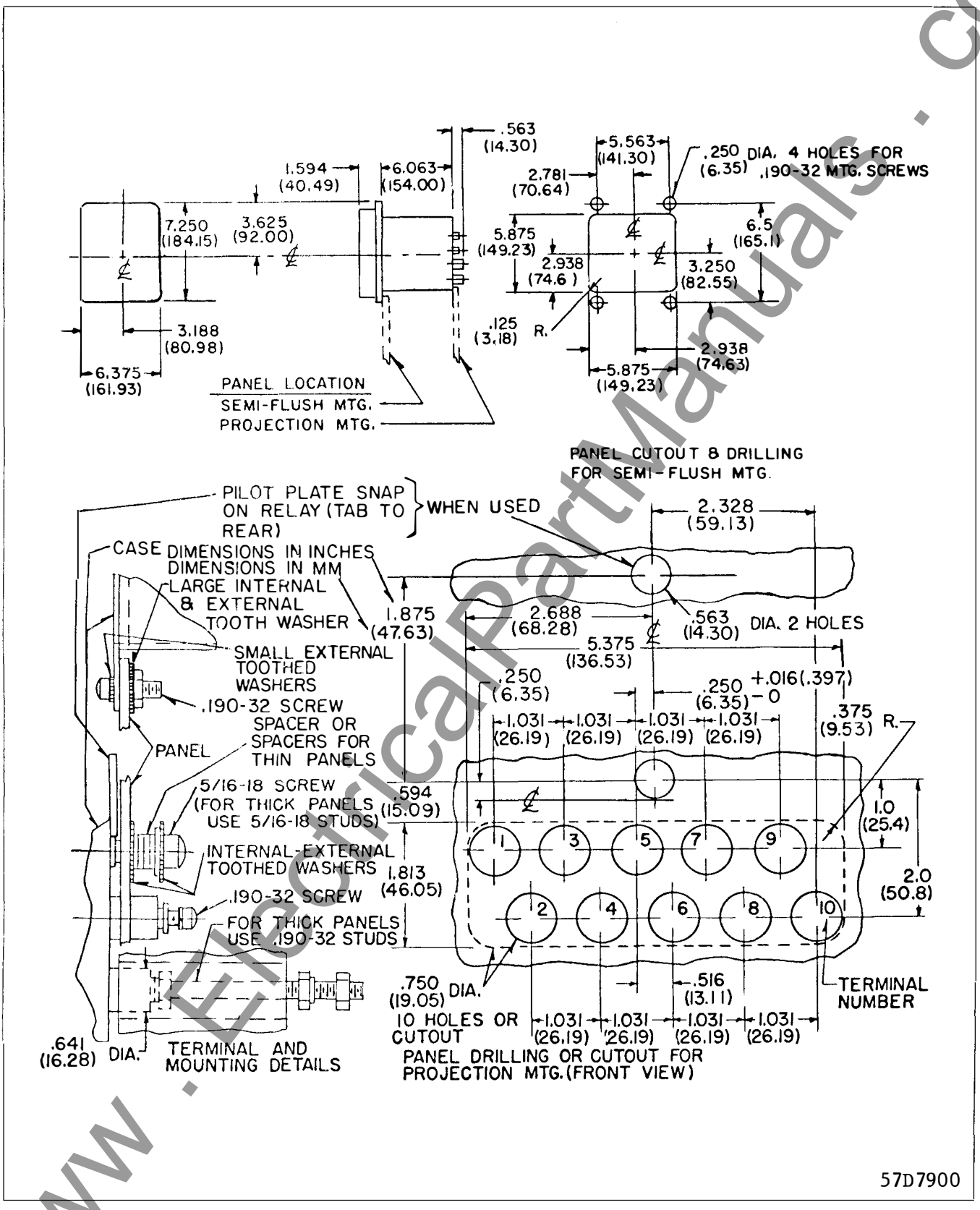

✪ *Fig. 5. Outline and Drilling Plan for the Type FT11 Case*

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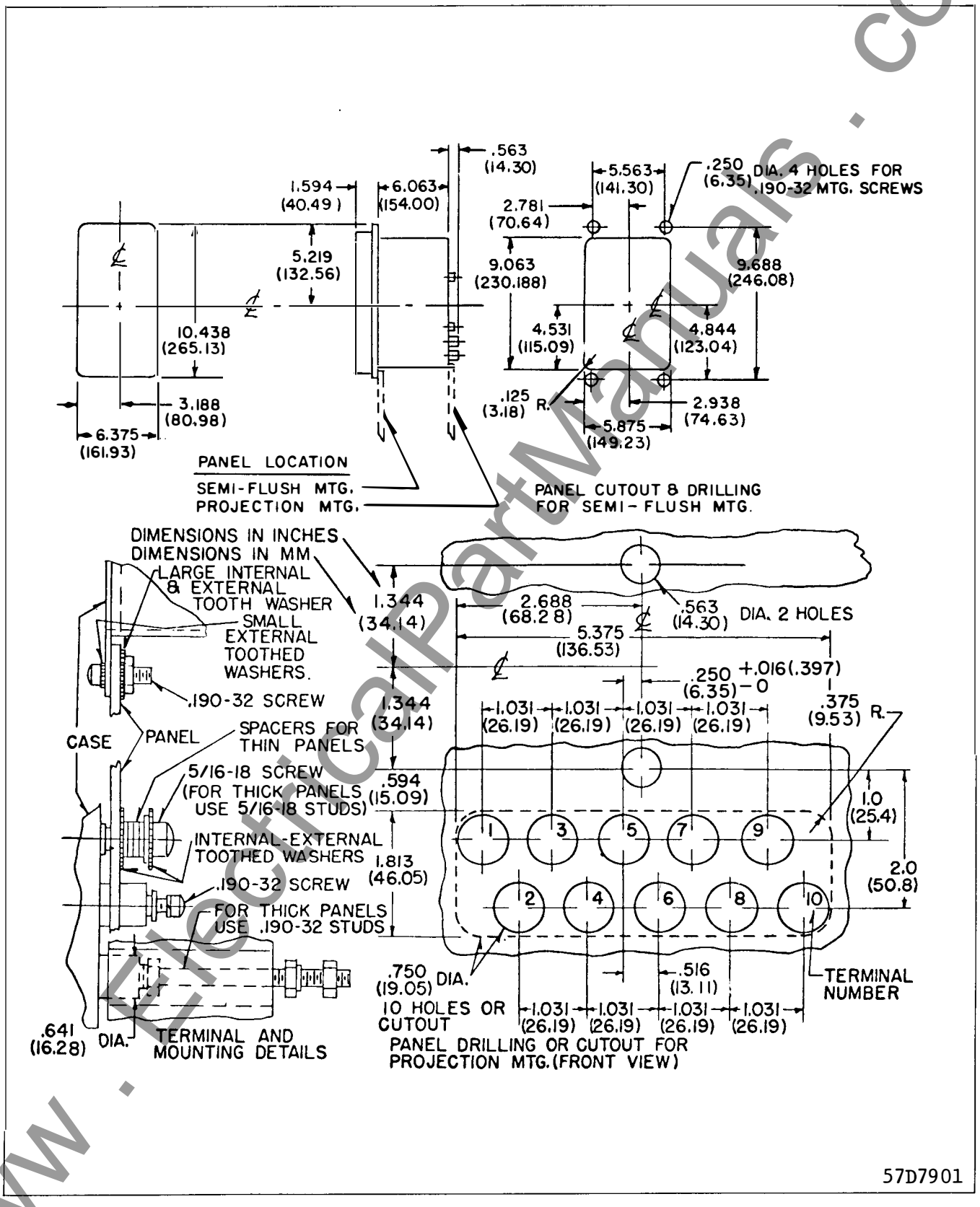

Fig. 6. Outline and Drilling Plan for the Type FT21 Case

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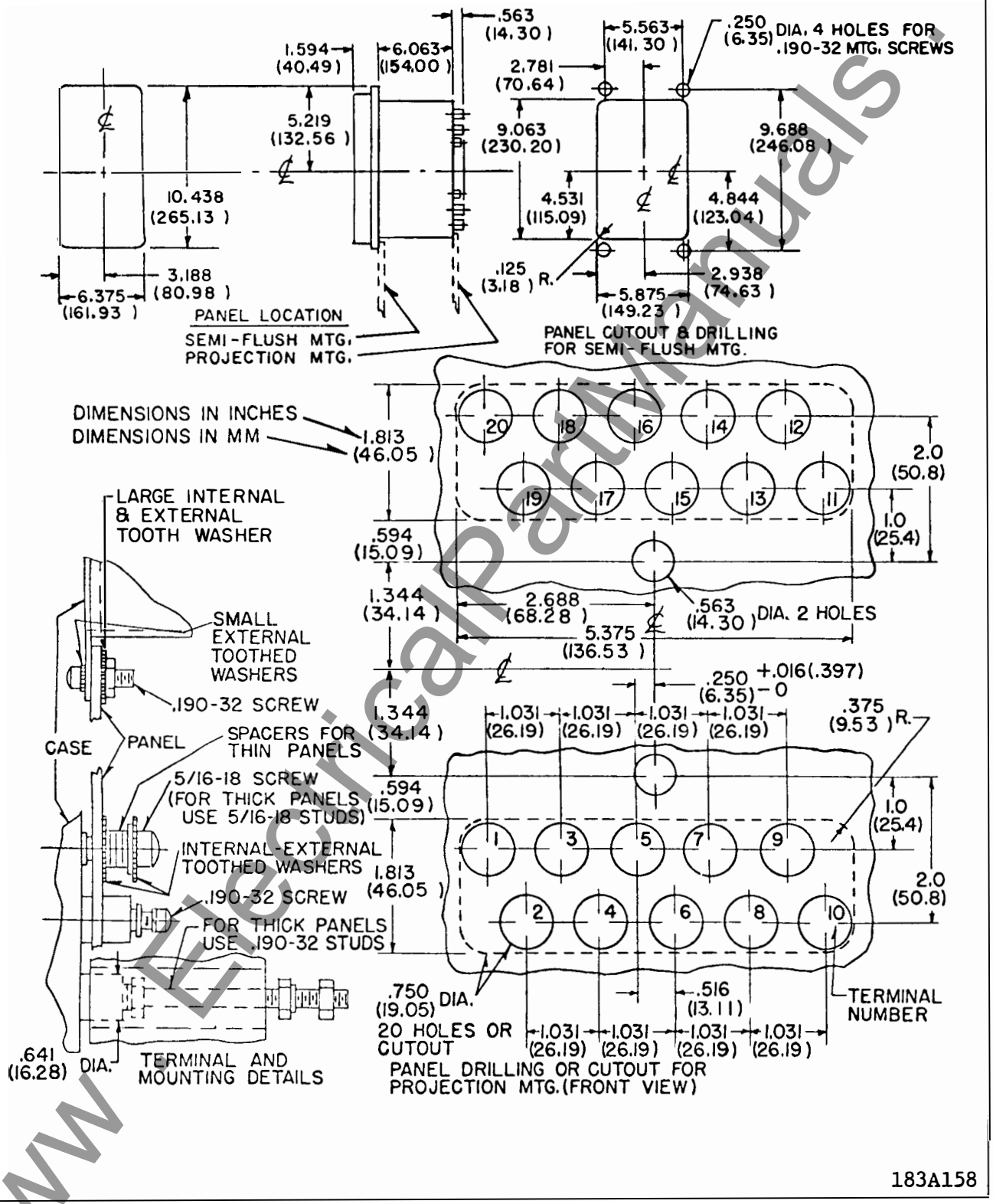

✪ *Fig. 7. Outline and Drilling Plan for the Type FT22 Case*

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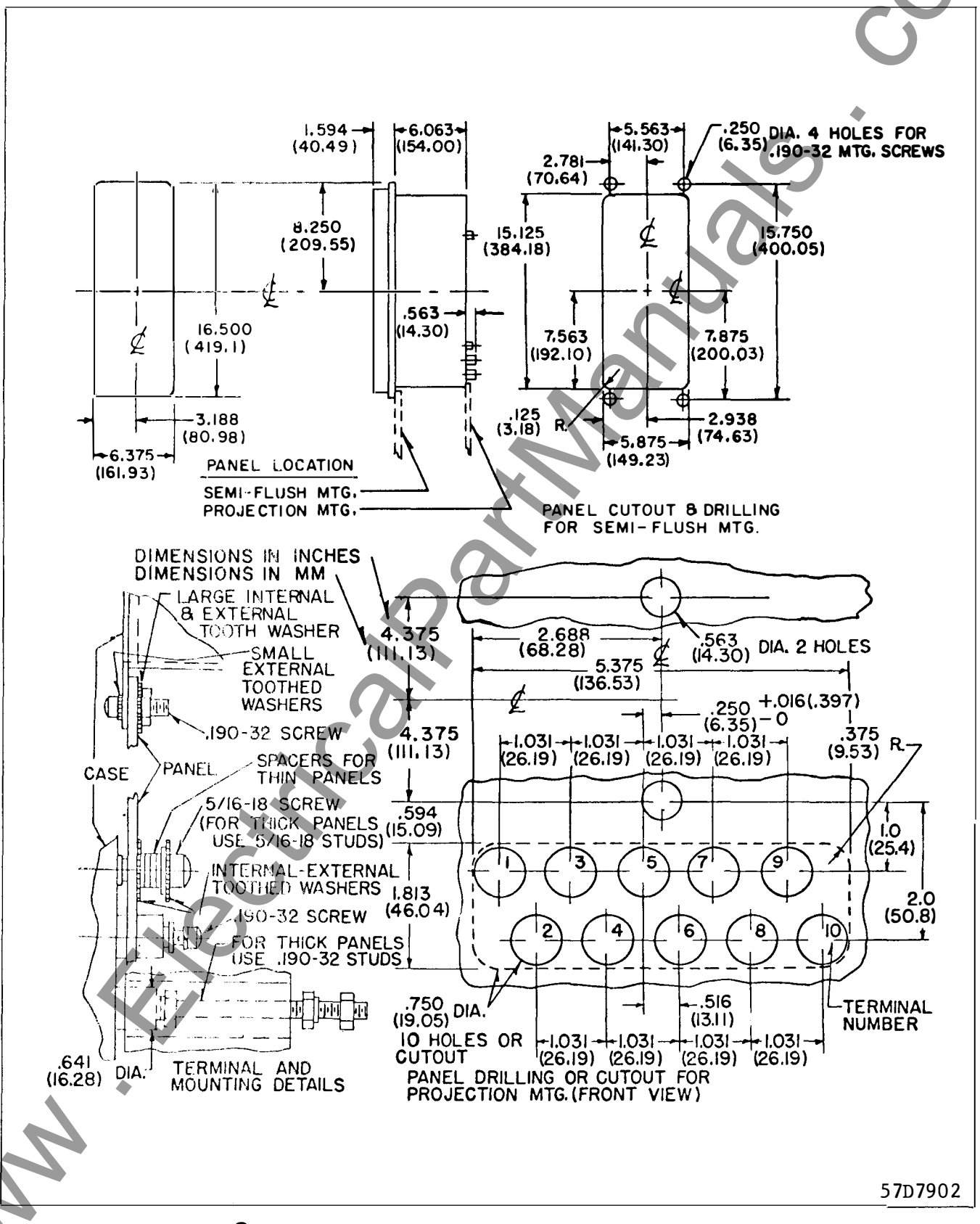

✪ *Fig. 8. Outline and Drilling Plan for the Type FT31 Case*

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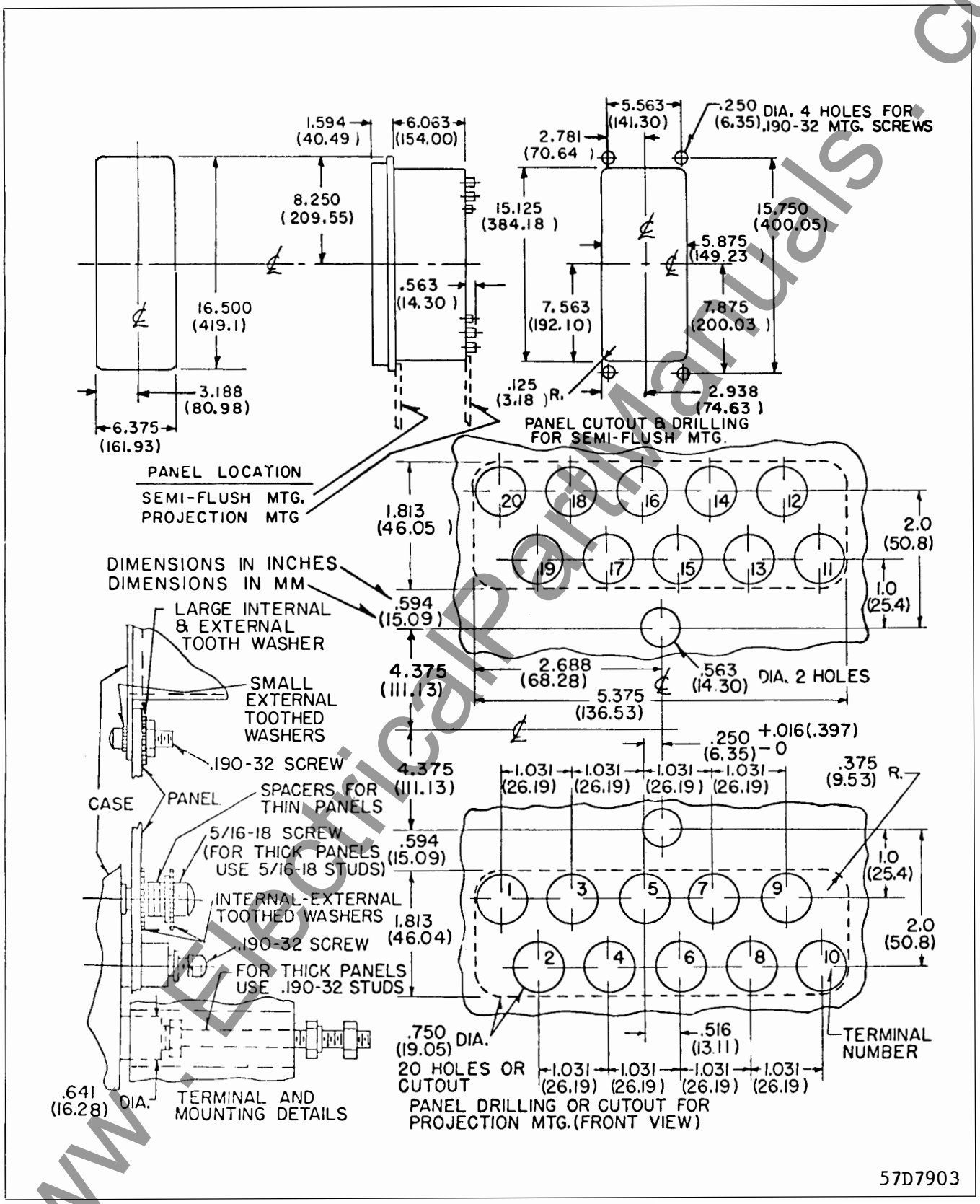

Fig. 9. Outline and Drilling Plan for the Type FT32 Case

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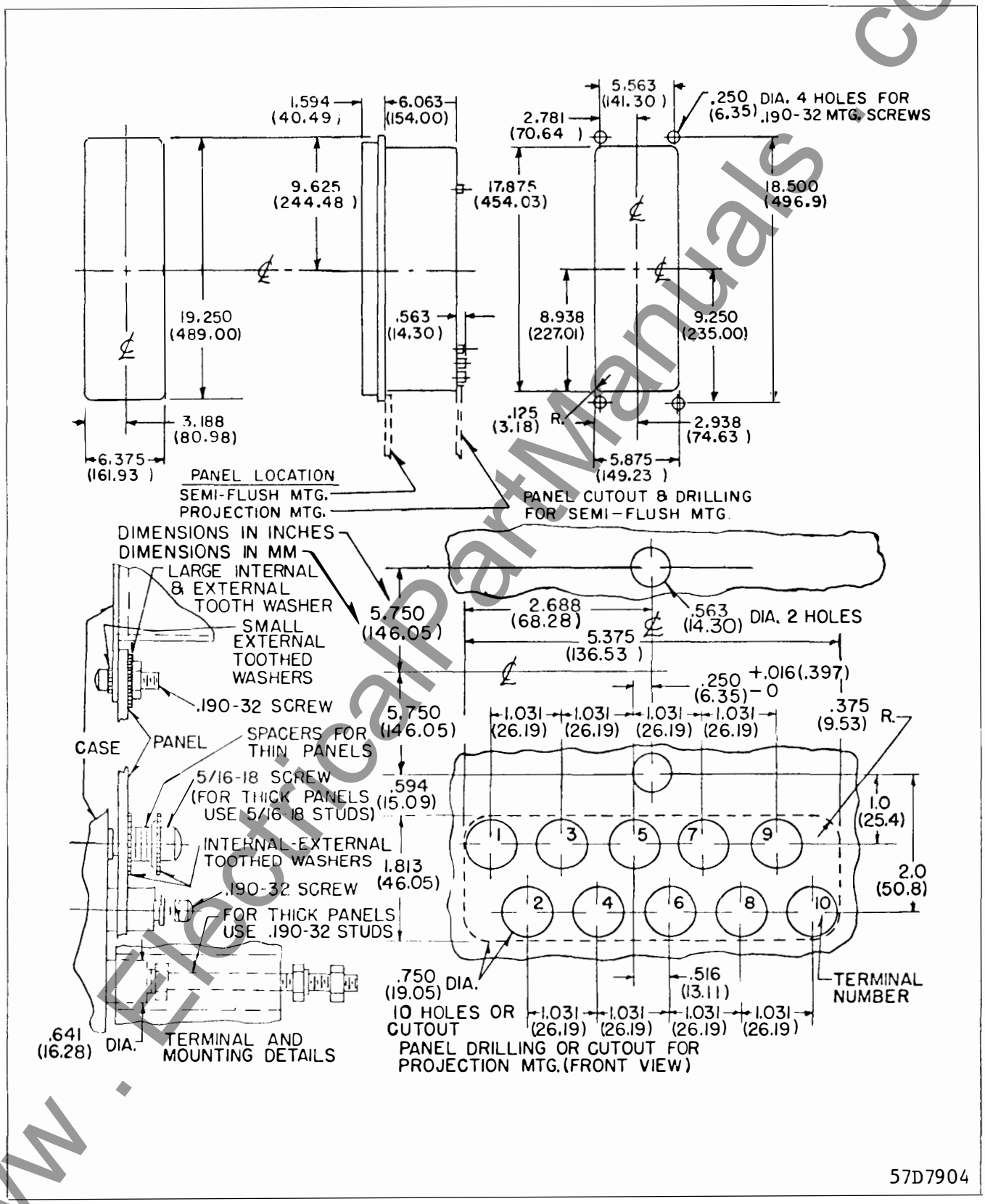

Fig. 10. Outline and Drilling Plan for the Type FT41 Case

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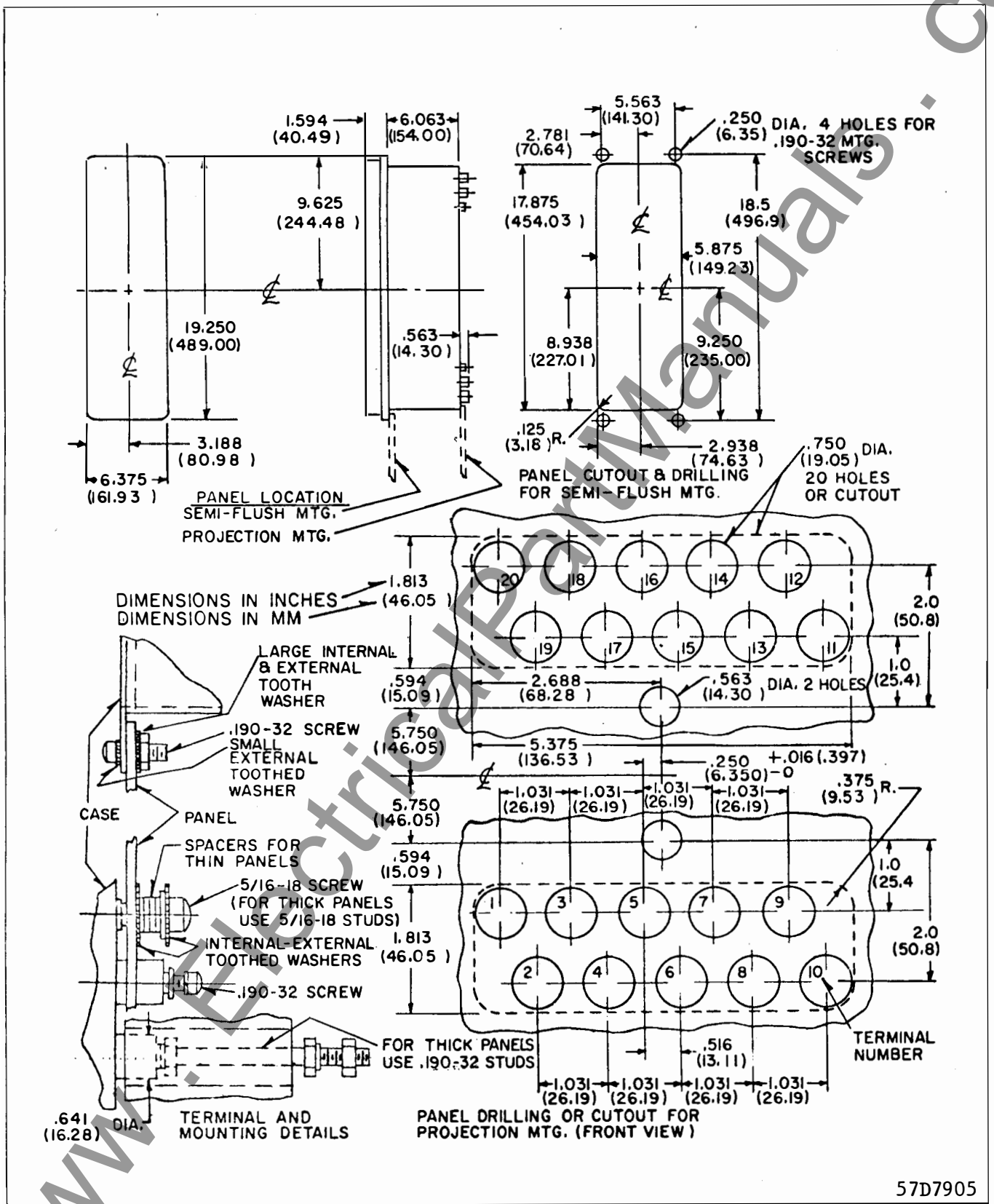

✪ *Fig. 11. Outline and Drilling Plan for the Type FT42 Case*

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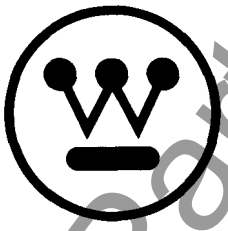

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RELAY-INSTRUMENT DIVISION **CORAL SPRINGS, FL.**

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INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

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REMOVING CHASSIS

To remove the chassis, first remove the cover by unscrewing the captive thumb nut at the bottom and lifting the cover support off the top flange of the case. This exposes the relay units and all the test switches for inspection and testing. The next step is to open the test switches. *Always open the red handle switches first before any of the black handle switches or the cam action latches.* This opens the trip circuit to prevent accidental tripout. Then open all the remaining switches. The order of opening the remaining switches is not important. In opening the test switches they should be moved all the way back against the stops. With all the switches fully opened, release the cam action latches and pull outward. The chassis can be set on a test bench for easy inspection, maintenance and test.

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TESTING

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TESTING IN SERVICE

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TESTING IN CASE

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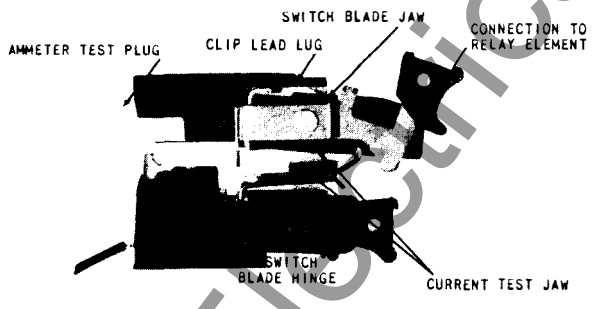

Fig. 1. Ammeter Test Plug in Testing Positions

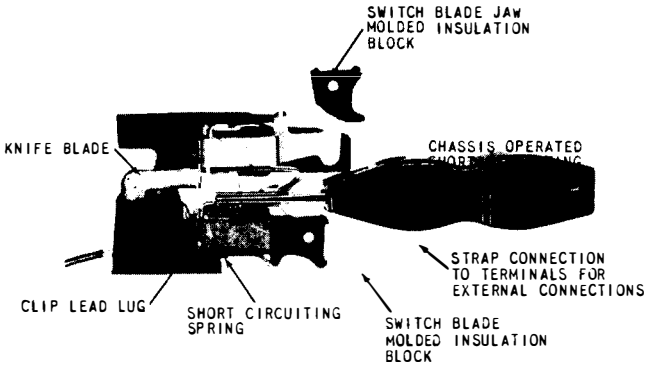

Fig. 2. Short Circuiting Switch

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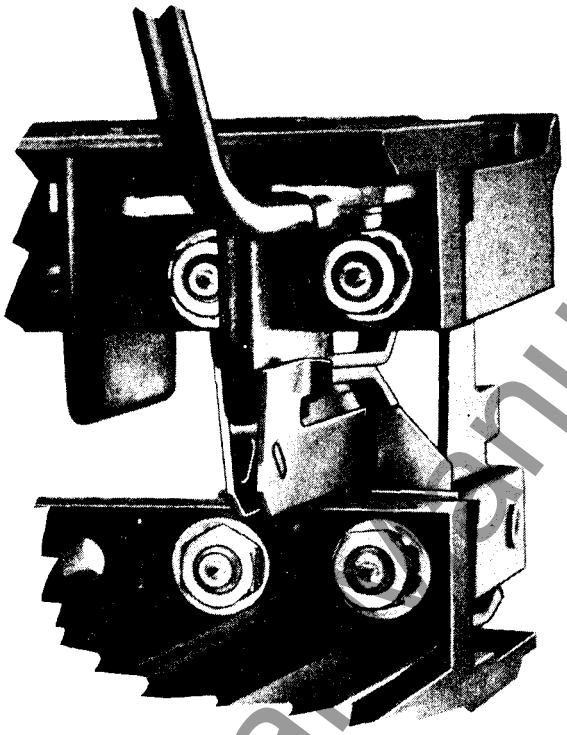

Fig. 3. Auxiliary Short Circuiting Switch (Enlarged View)

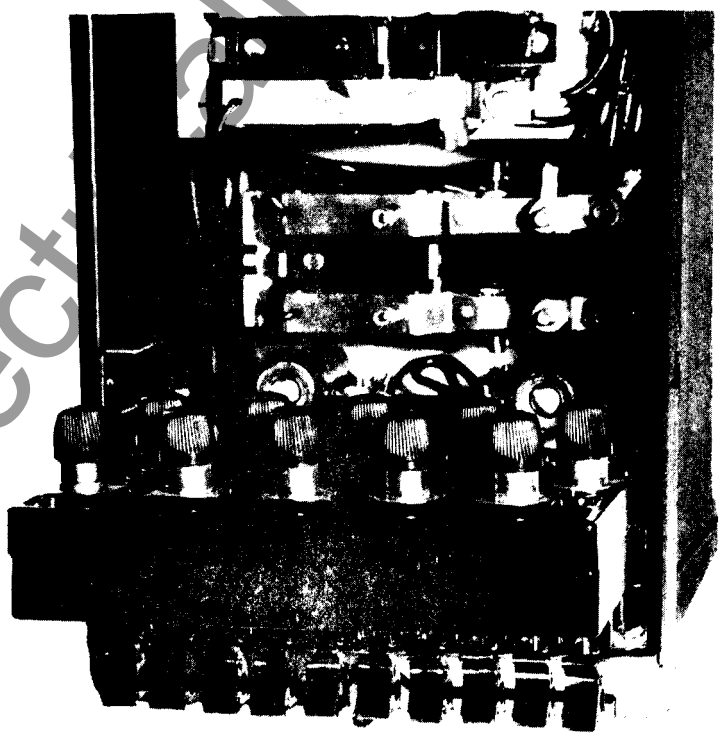

Fig. 4. Multi-Circuit Test Plug in Testing Position

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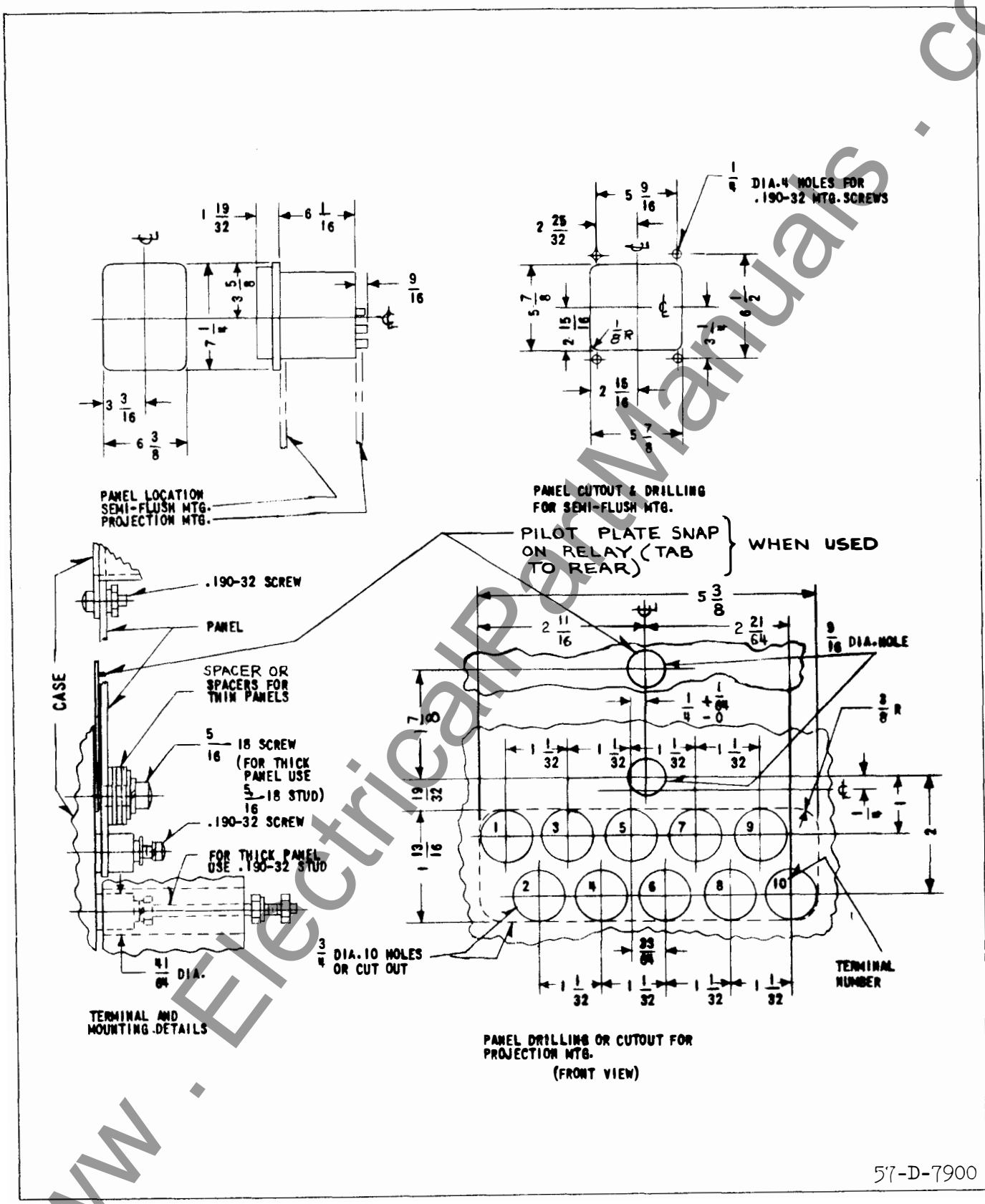

* *Fig. 5. Outline and Drilling Plan for the Type FT11 Case*

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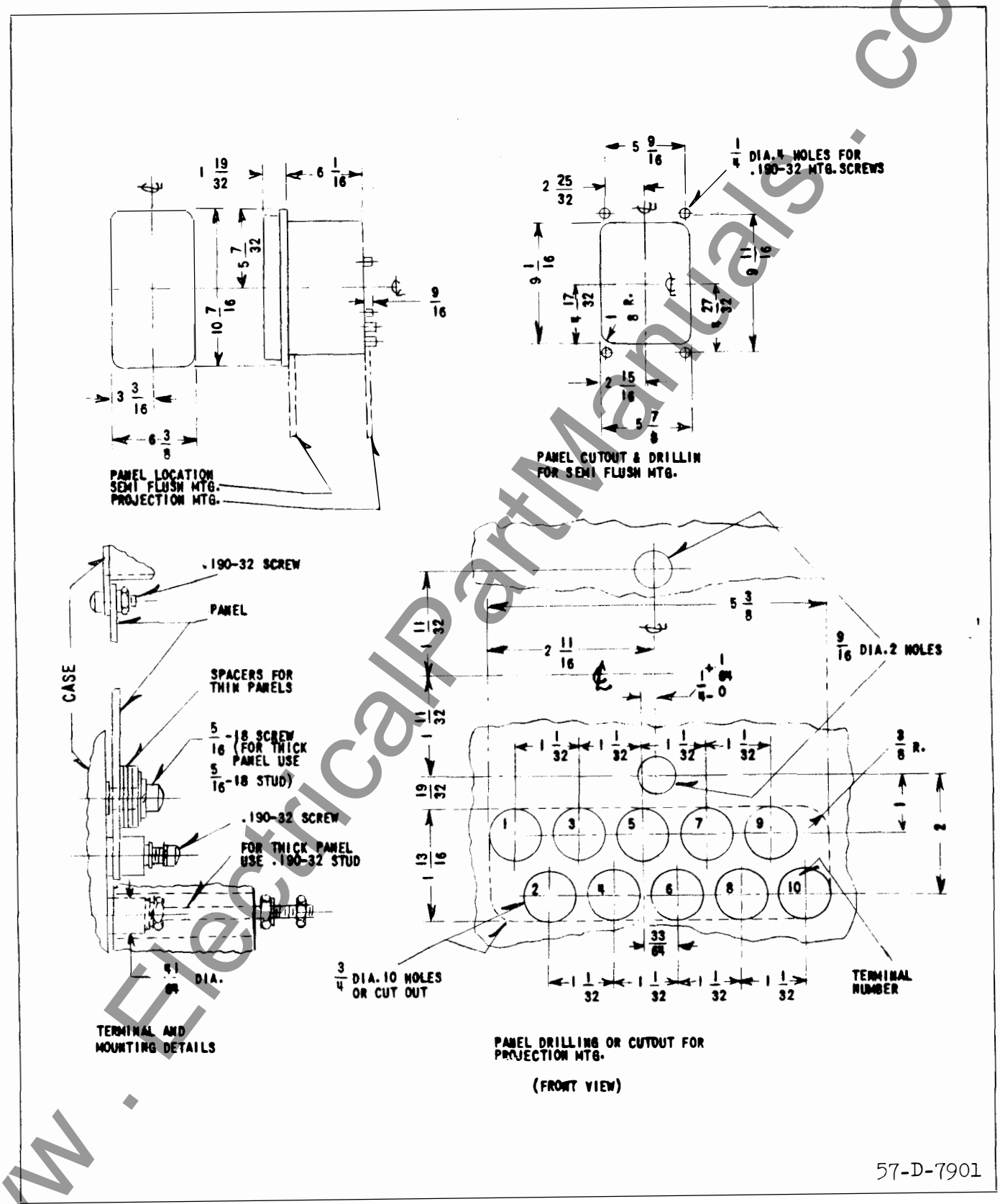

Fig. 6. Outline and Drilling Plan for the Type FT21 Case

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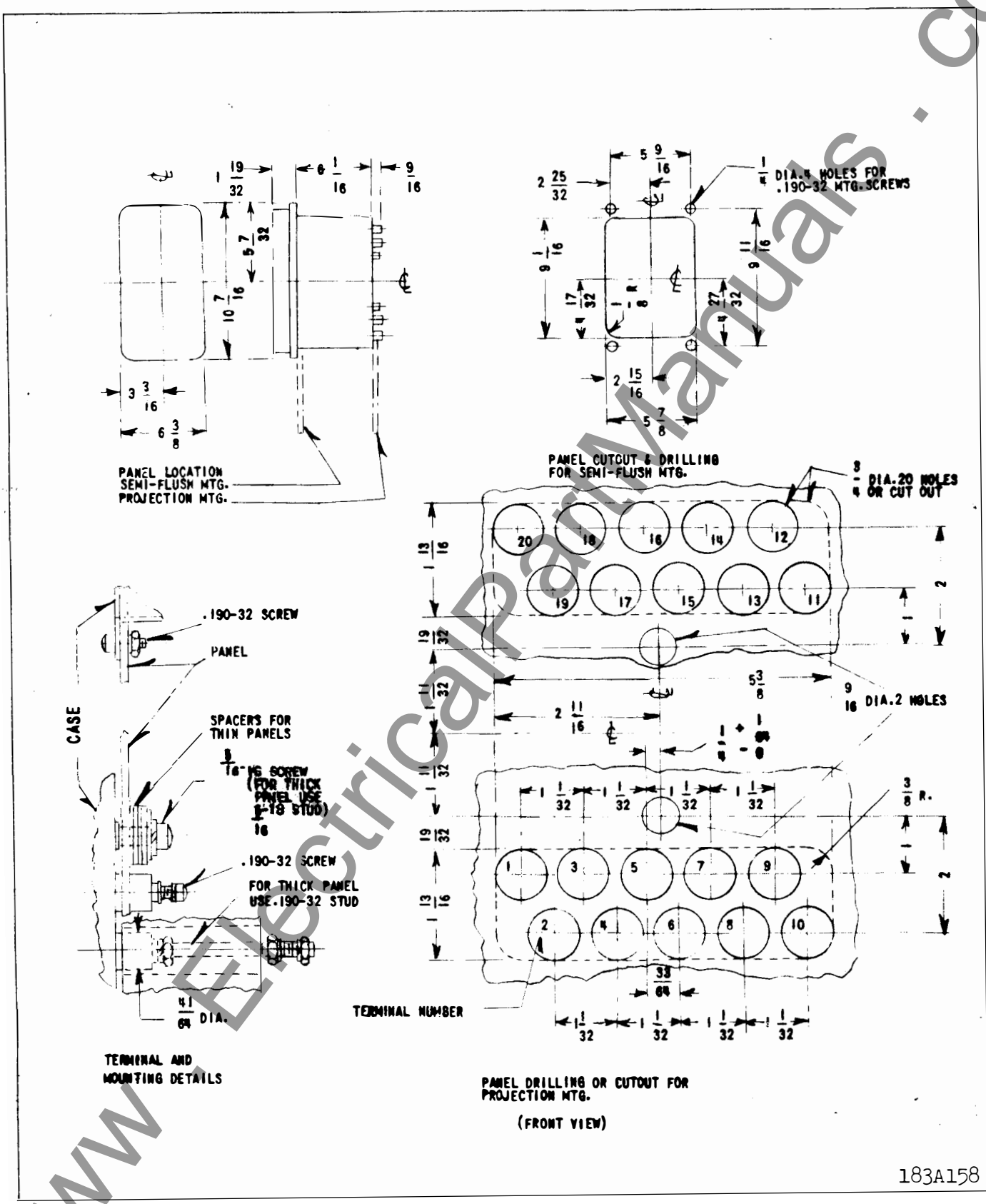

Fig. 7. Outline and Drilling Plan for the Type FT22 Case

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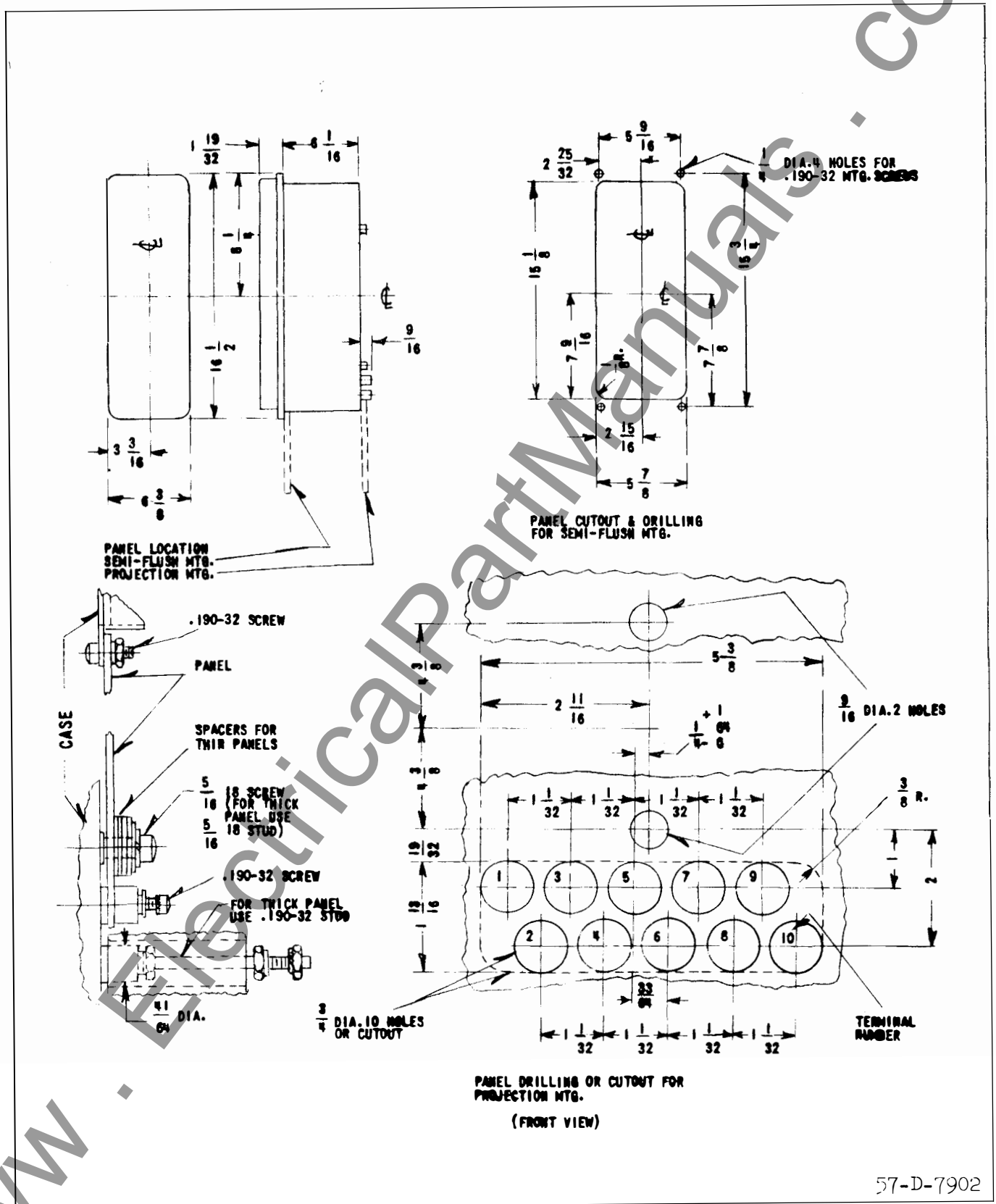

* *Fig. 8. Outline and Drilling Plan for the Type FT31 Case*

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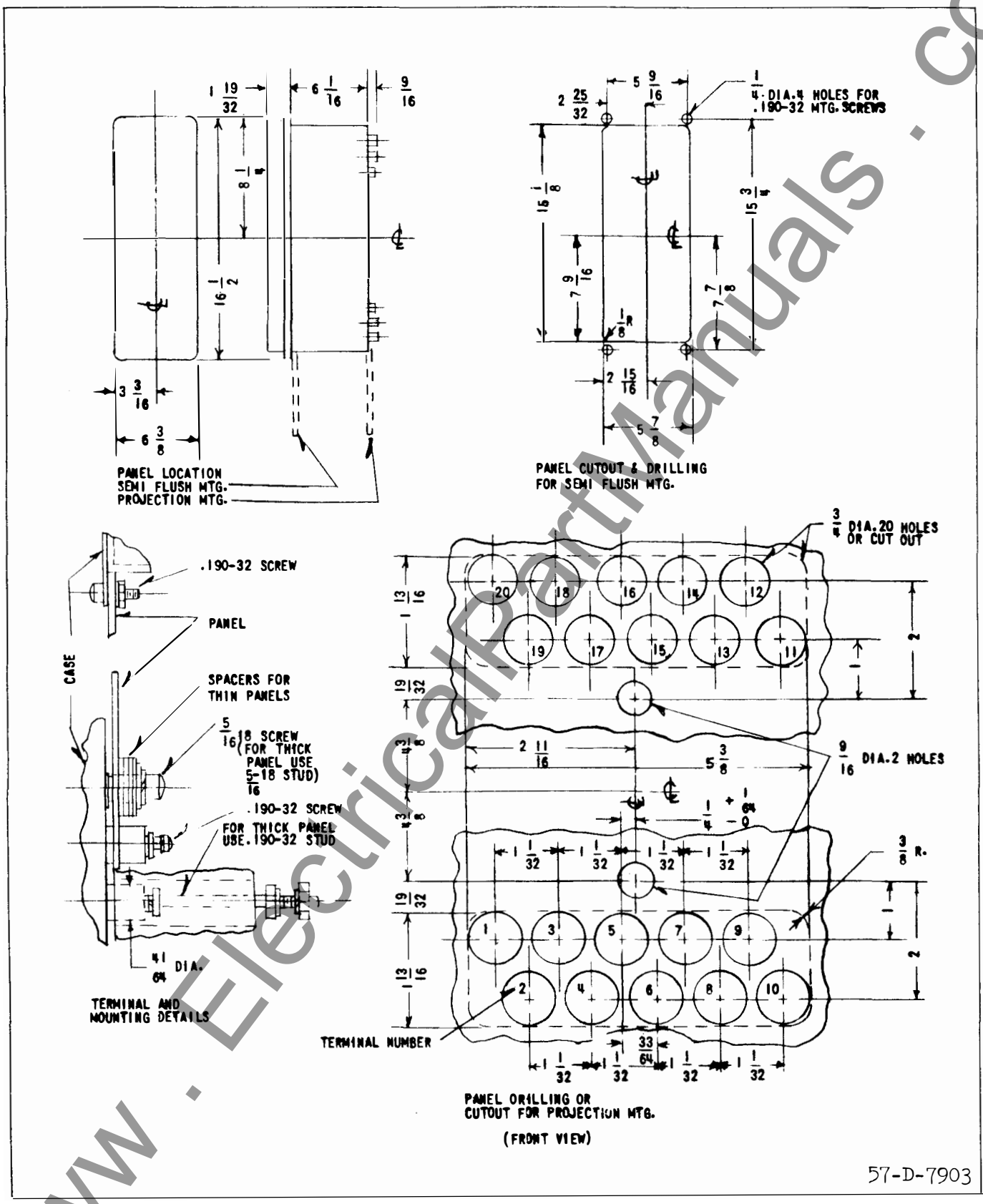

Fig. 9. Outline and Drilling Plan for the Type FT32 Case

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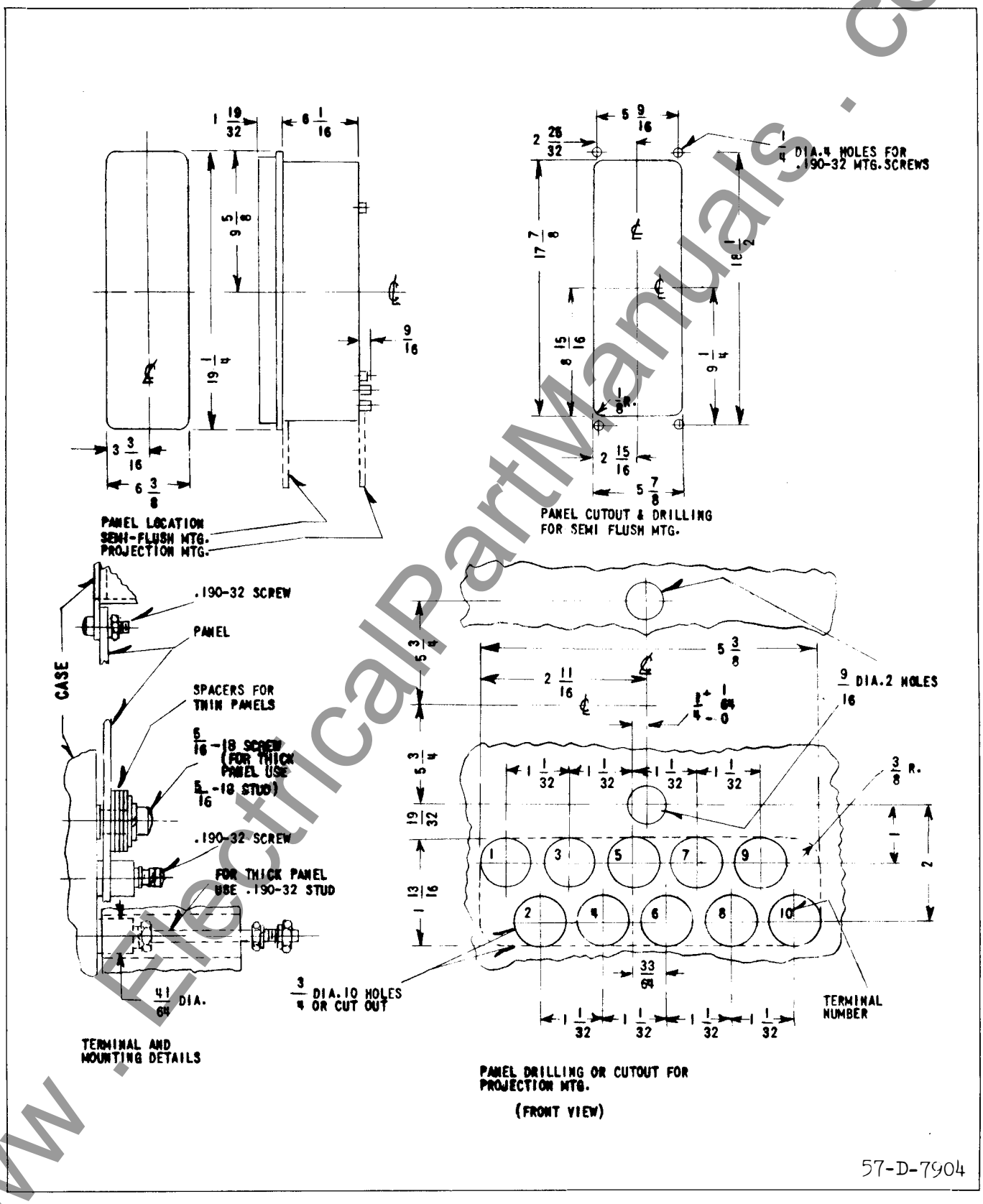

Fig. 10. Outline and Drilling Plan for the Type FT41 Case

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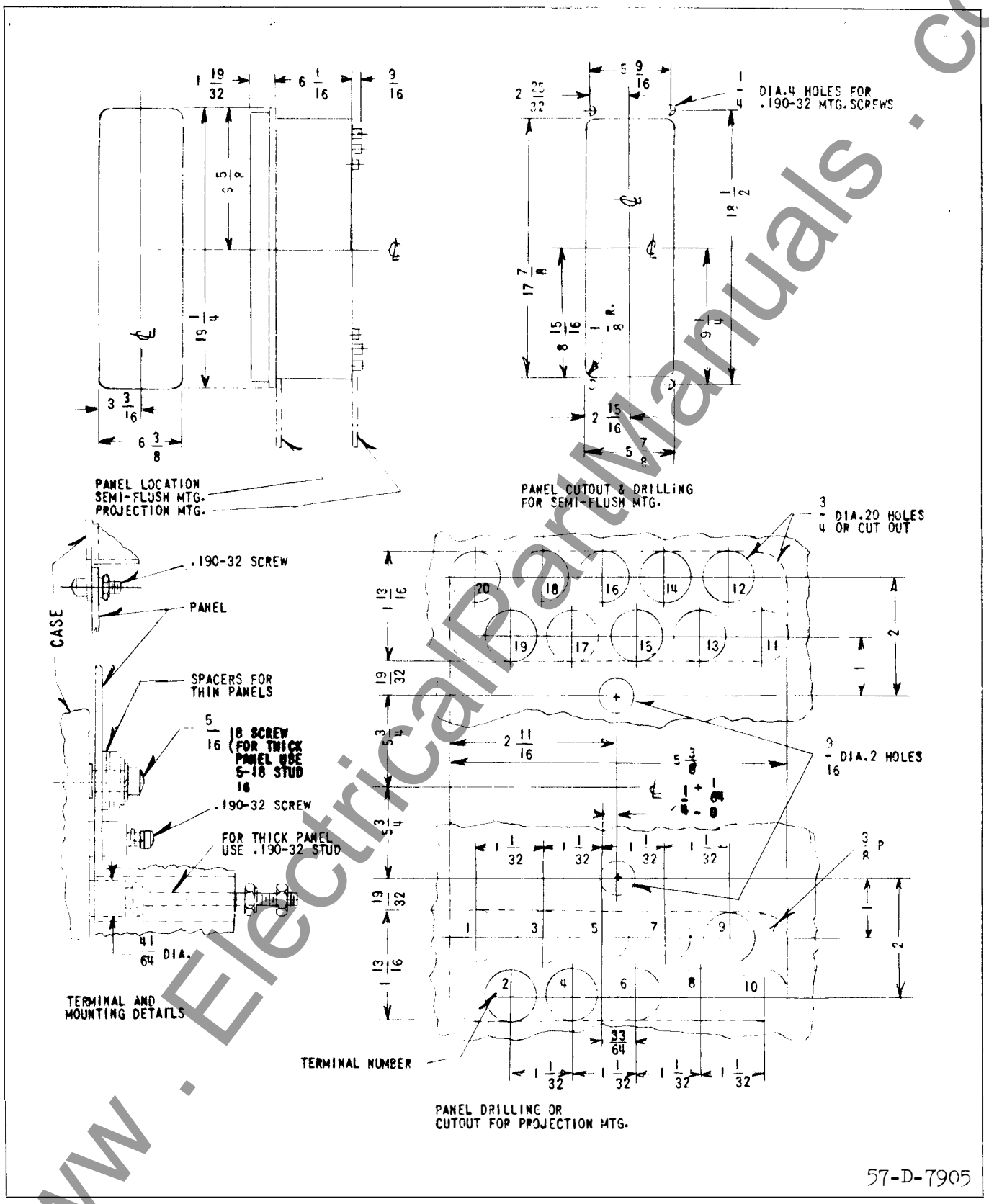

Fig. 11. Outline and Drilling Plan for the Type FT42 Case

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RELAYS IN TYPE FT11, FT21, FT22, FT31, FT32, FT41, FT42 CASES

The type FT (Flexitest) cases are dust-proof enclosures combining relay units and knife-blade test switches in the same case. This combination provides a compact flexible assembly easy to maintain, inspect, test and adjust. There are three main units of the type FT case: the case, cover, and chassis. The case is an all-steel welded housing containing the hinge half of the knife-blade test switches and the terminals for external connections. The cover is a molded phenolic frame with a clear glass window, a thumb nut, a reset lever, and a hook shaped support. The support fits over the top flange of the case. The thumb nut, which fastens to a stud on the bottom flange of the case, holds the cover securely in place on the case. The chassis is a steel frame that supports the relay elements and the contact jaw half of the test switches. This slides in and out of the case. The electrical connections between the base and chassis are completed through the closed knife-blades.

There are four different size cases available. These are designated the FT11, FT21 or 22, FT31 or 32, and the FT41 or 42. The first digit of the designation represents the physical size and the second the number of terminal blocks. One terminal block can accommodate up to ten terminals. The case may be either semi-flush or projection mounted.

REMOVING CHASSIS

To remove the chassis, first remove the cover by unscrewing the captive thumb nut at the bottom and lifting the cover support off the top flange of the case. This exposes the relay units and all the test switches for inspection and testing. The next step is to open the test switches. *Always open the red handle switches first before any of the black handle switches or the cam action latches.* This opens the trip circuit to prevent accidental tripout. Then open all the remaining switches. The order of opening the remaining switches is not important. In opening the test switches they should be moved all the way back against the stops. With all the switches fully opened, release the cam action latches and pull outward. The chassis can be set on a test bench for easy inspection, maintenance and test.

After removing the chassis a duplicate chassis may be inserted in the case or the blade portion of the switches can be closed and the cover put in place without the chassis. The chassis-operated auxiliary shorting switch remains closed with chassis out to prevent open circuiting the current transformers when the current test switches are closed. The operation of the auxiliary shorting switch is visible from the front of the relay, when the chassis is in place.

When the chassis is to be put back in the case, the above procedure is to be followed in the reversed order. *The red handle switch should not be closed until after the chassis has been latched in place and all of the black handle switches closed.*

ELECTRICAL CIRCUITS

Each terminal in the base connects through a test switch to the relay units in the chassis as shown on the internal schematic diagrams. The relay terminals are identified by numbers marked on the outside of the case. The test switch positions are identified by numbers marked on the molded blocks.

The potential and control circuits through the relay are disconnected from the external circuit by opening the associated test switches. Opening the current test switch short-circuits the current transformer secondary and disconnects one side of the relay coil but leaves the other side of the coil connected to the external circuit through the current test jack jaws. This circuit can be isolated by inserting the current test plug (without external connections), or by inserting the ten circuit test plug. Both switches of the current test switch pair must be open when using the current test plug in this manner to short-circuit the current transformer secondary.

TESTING

The relays can be tested in service, in the case

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*Denotes change from superseded issue.

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but with the external circuits isolated or out of the case as follows:

TESTING IN SERVICE

The ammeter test plug can be inserted in the current test jaws after opening the knife-blade switch to check the current through the relay, as shown in Fig. 1. This plug consists of two conducting strips separated by an insulating strip. The ammeter is connected to these strips by terminal screws and the leads are carried out through holes in the back of the insulated handle.

Voltages between the potential circuits can be measured conveniently by clamping #2 clip leads on the projecting clip lead lug on the contact jaw.

TESTING IN CASE

With all blades in the full open position, the ten circuit test plug Fig. 4 can be inserted in the contact jaws. This connects the relay units to a set of binding posts and completely isolates the relay circuits from the external connections by means of an insulating barrier on the plug. The external test circuits are connected to these binding posts. The plug is inserted in the bottom test jaws with the binding posts up and in the top test switch jaws with the binding posts down.

The external test circuits may be made to the relay units by #2 test clip leads instead of the test plug. When connecting an external test circuit to the current elements using clip leads, care should be taken to see that the current test jack jaws are open so that the relay is completely isolated from the external circuits. Suggested means for isolating this circuit are outlined above, under "Electrical Circuits".

TESTING OUT OF CASE

With the chassis removed from the case, relay units may be tested by using the ten circuit test plug or by #2 test clip leads as described above. Any critical factory calibration is made with the chassis in the case and removing the chassis from the case may change the calibration values of these relays.

An internal schematic is available for each individual relay showing the schematic internal wiring. The outlines of the various cases are shown in Fig. 5 to Fig. 11.

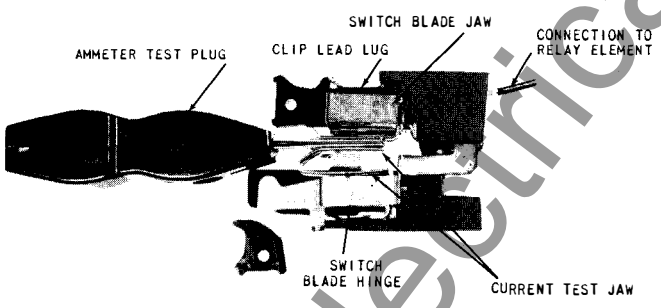

Fig. 1. Ammeter Test Plug in Testing Positions

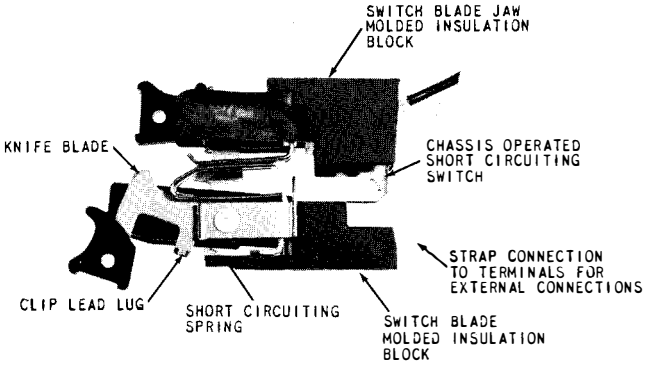

Fig. 2. Short Circuiting Switch

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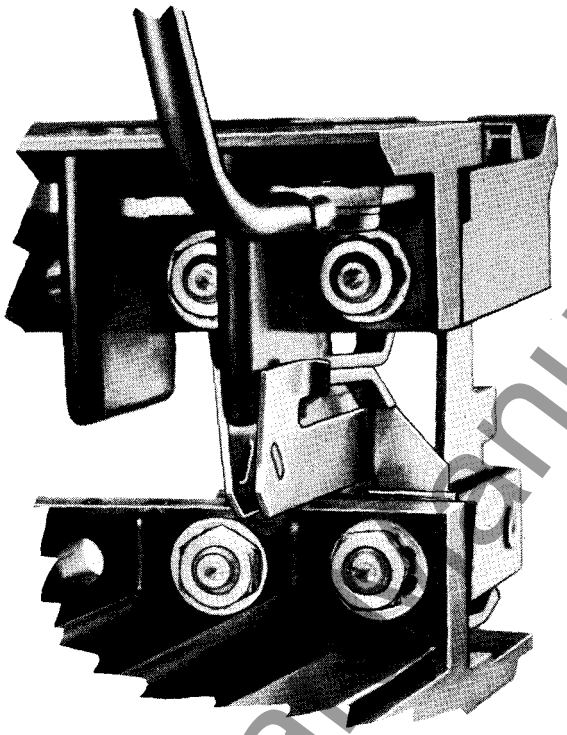

Fig. 3. Auxiliary Short Circuiting Switch (Enlarged View)

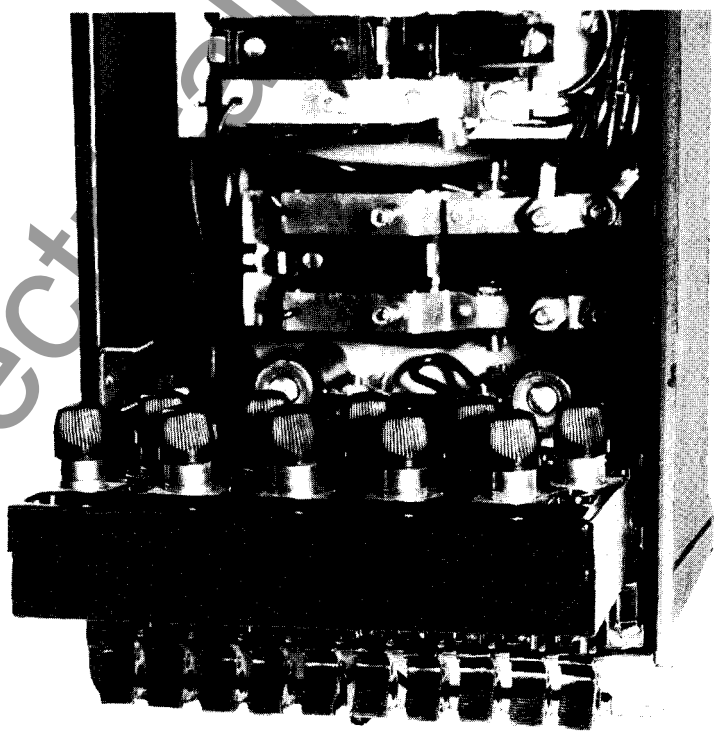

Fig. 4. Multi-Circuit Test Plug in Testing Position

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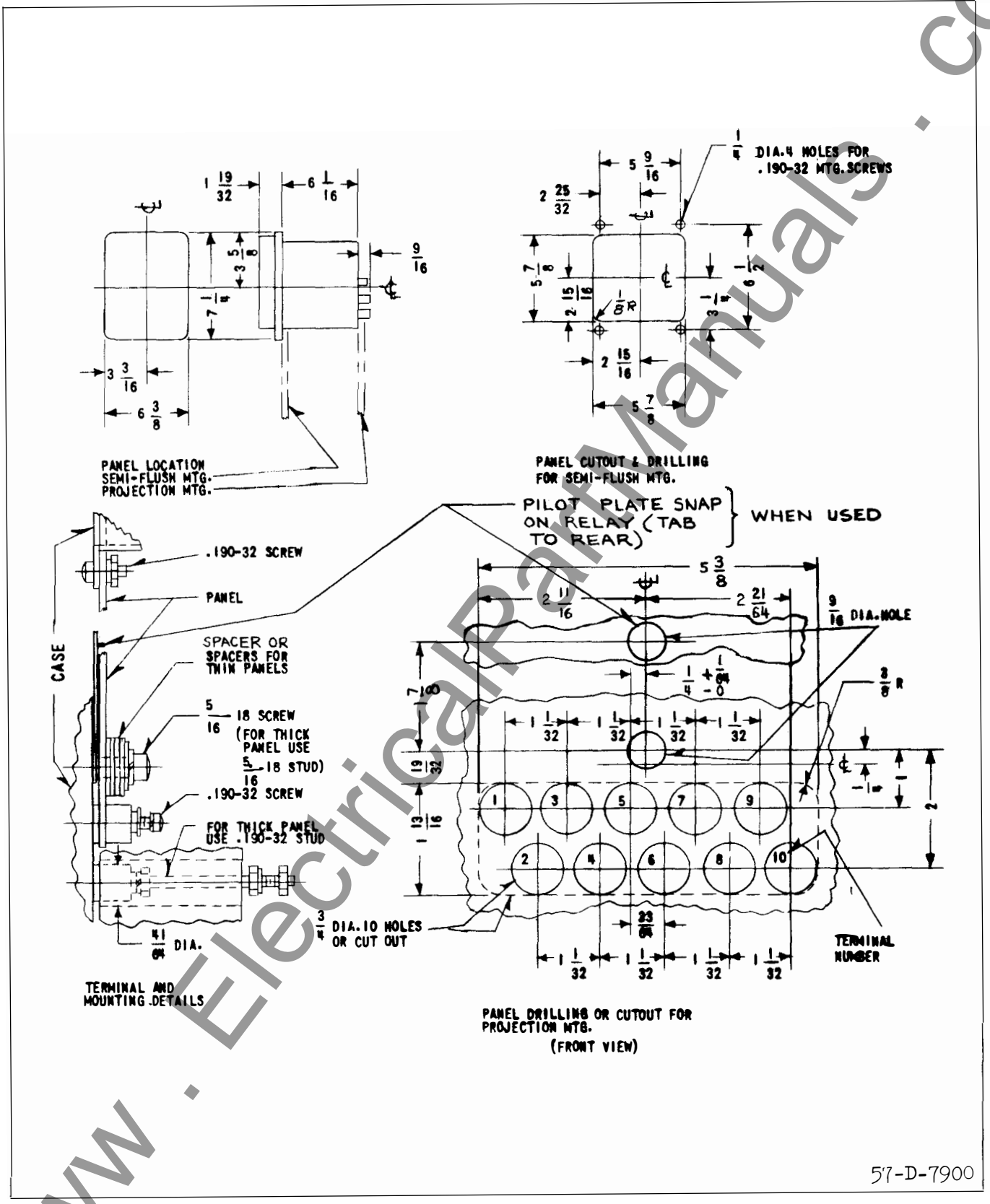

* *Fig. 5. Outline and Drilling Plan for the Type FT11 Case*

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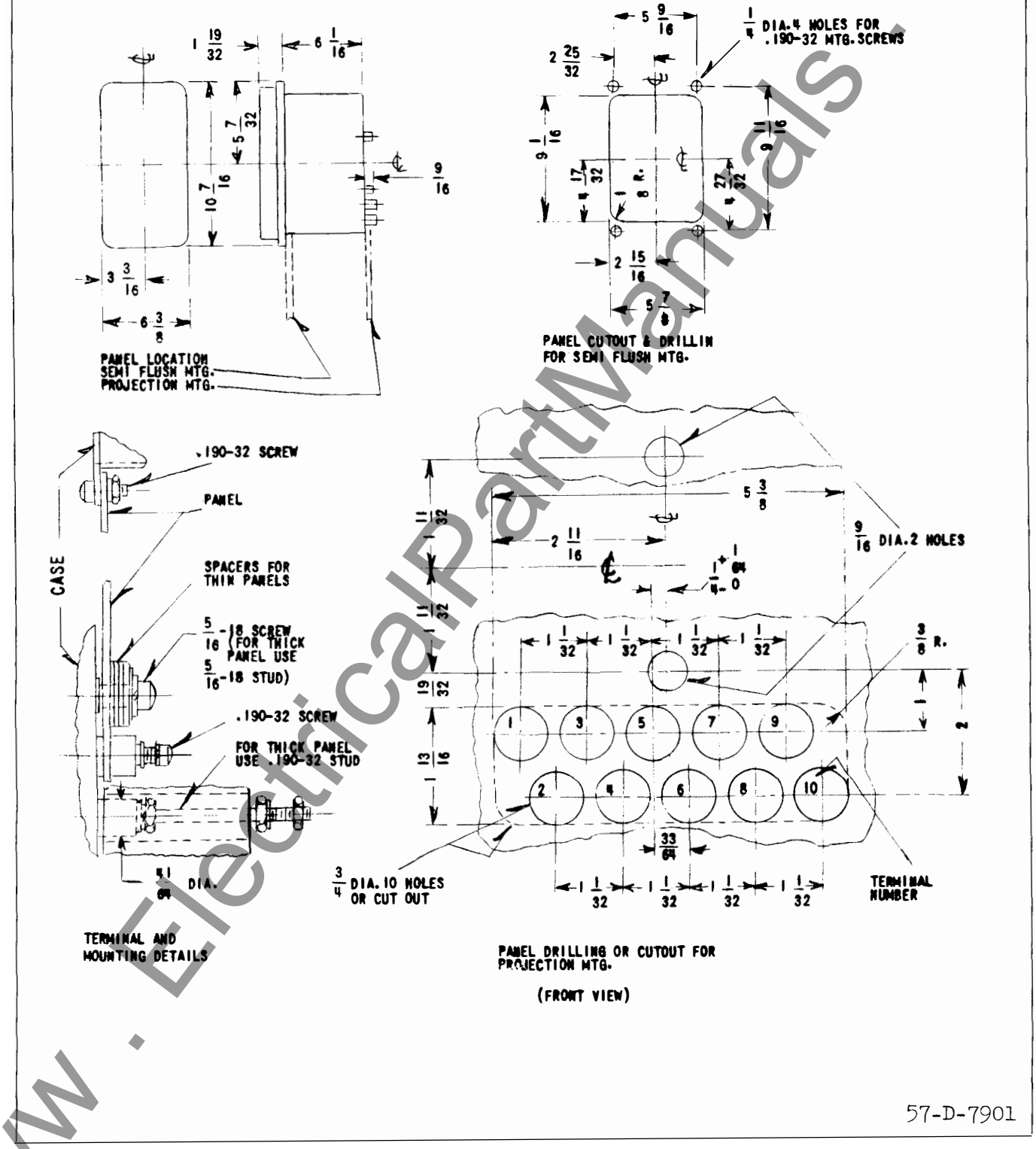

Fig. 6. Outline and Drilling Plan for the Type FT21 Case

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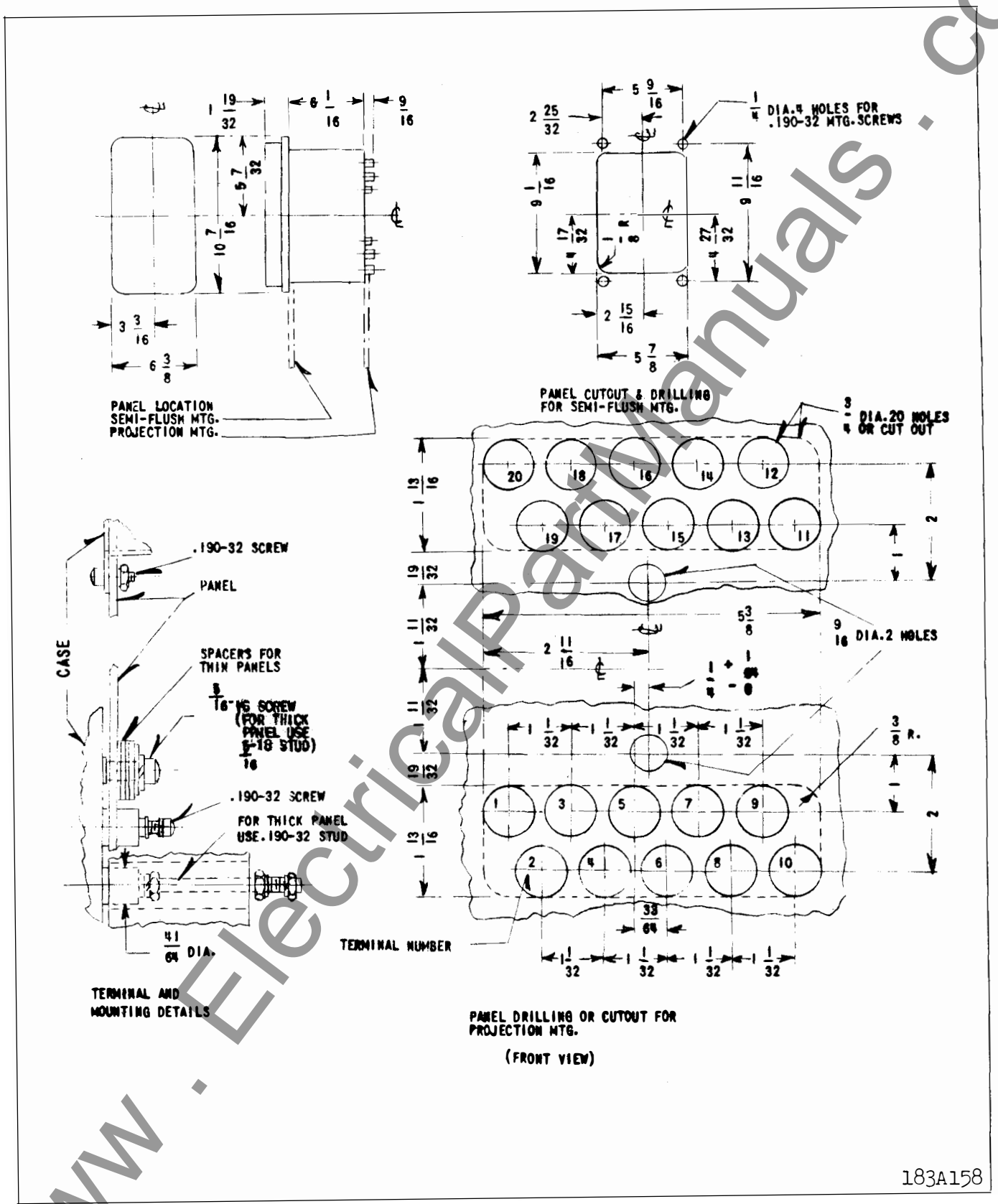

Fig. 7. Outline and Drilling Plan for the Type FT22 Case

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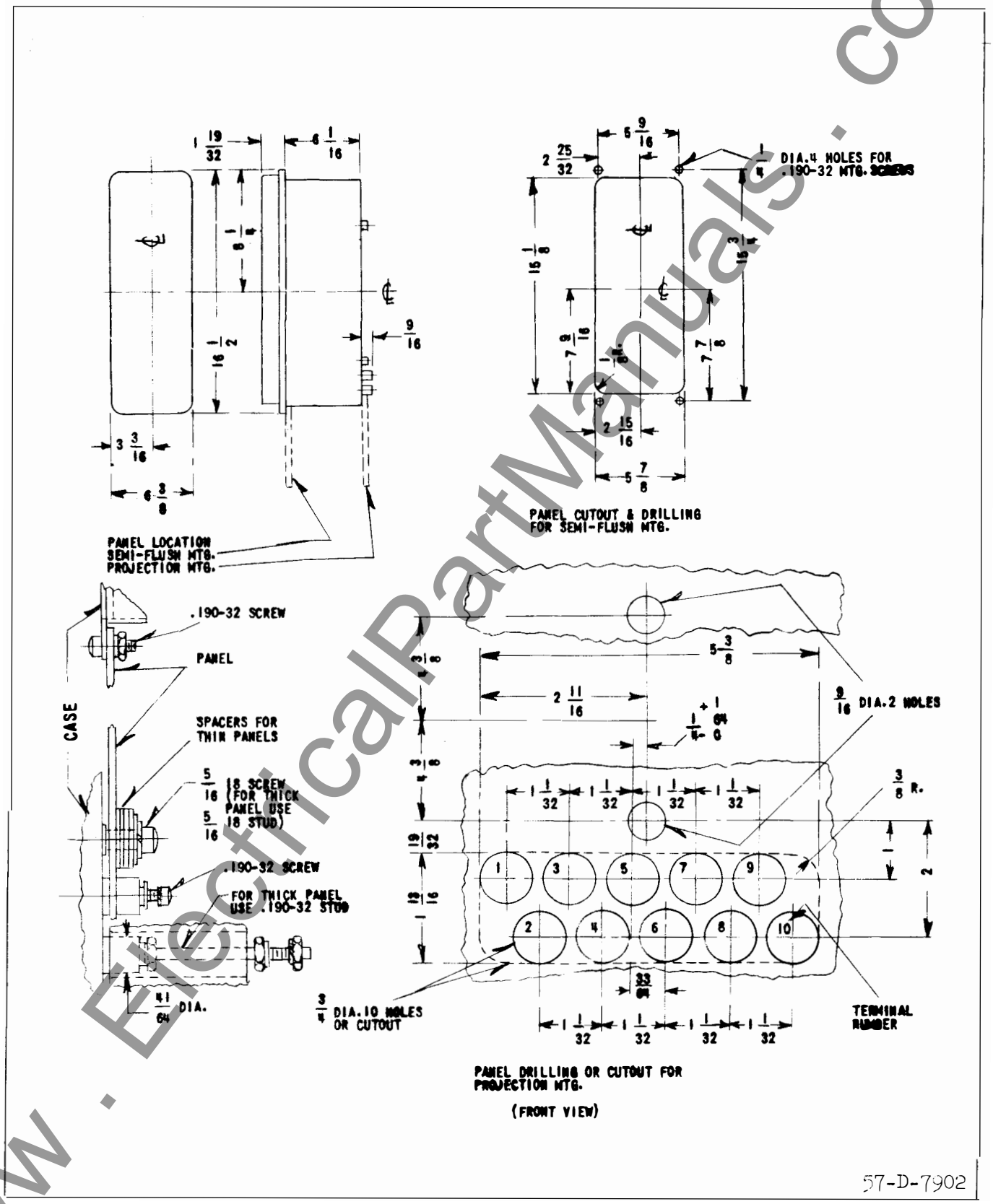

* *Fig. 8. Outline and Drilling Plan for the Type FT31 Case*

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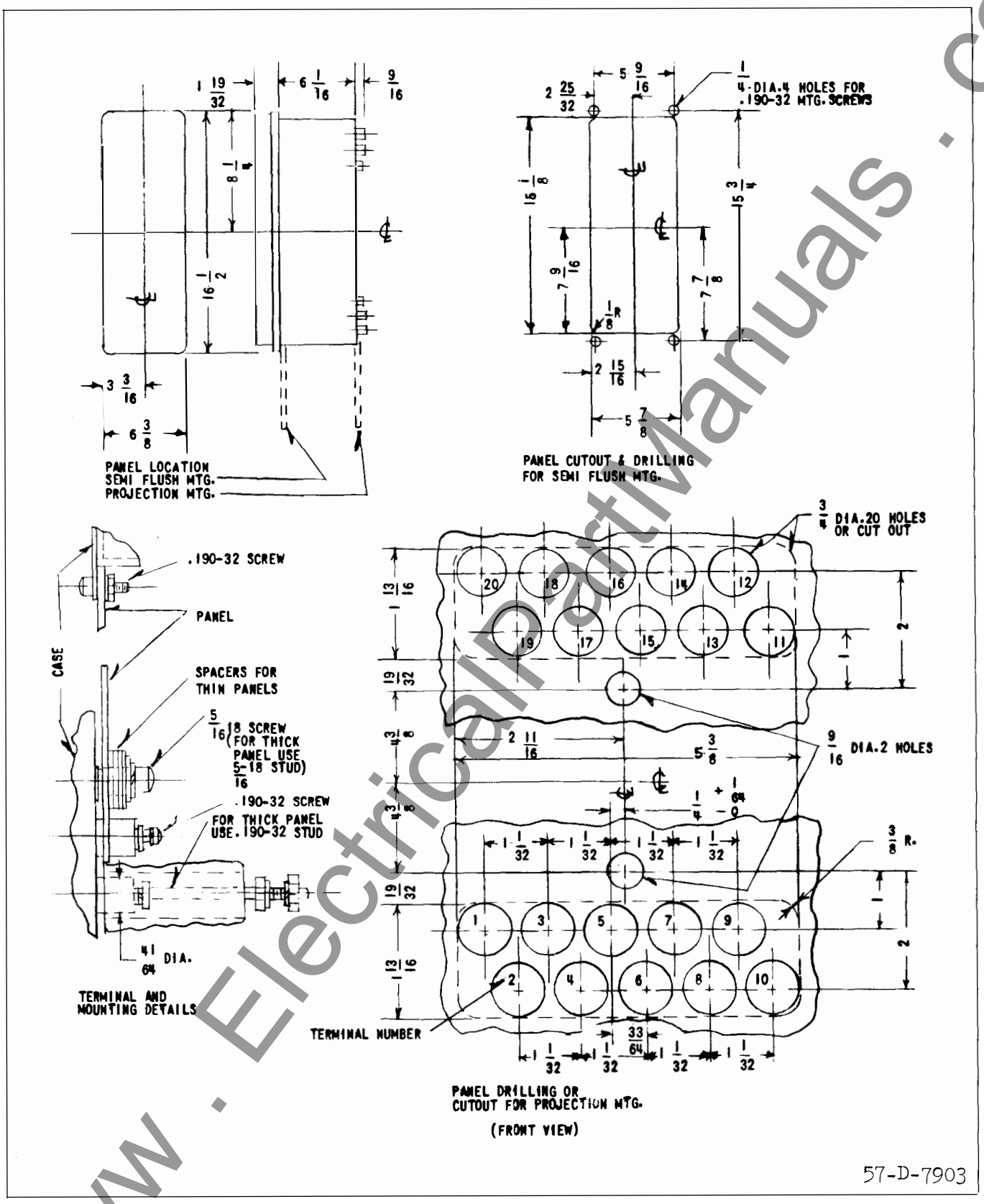

Fig. 9. Outline and Drilling Plan for the Type FT32 Case

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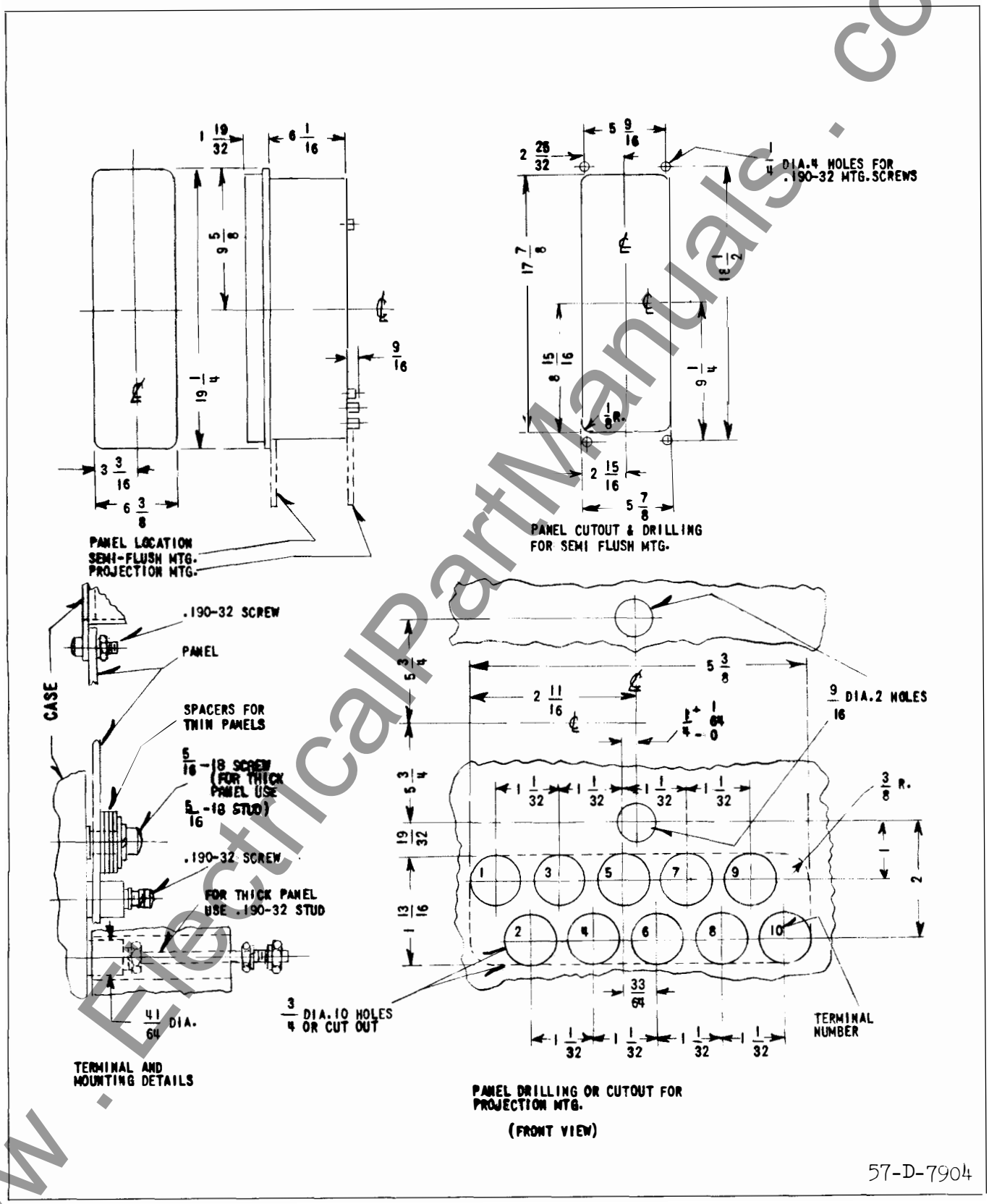

Fig. 10. Outline and Drilling Plan for the Type FT41 Case

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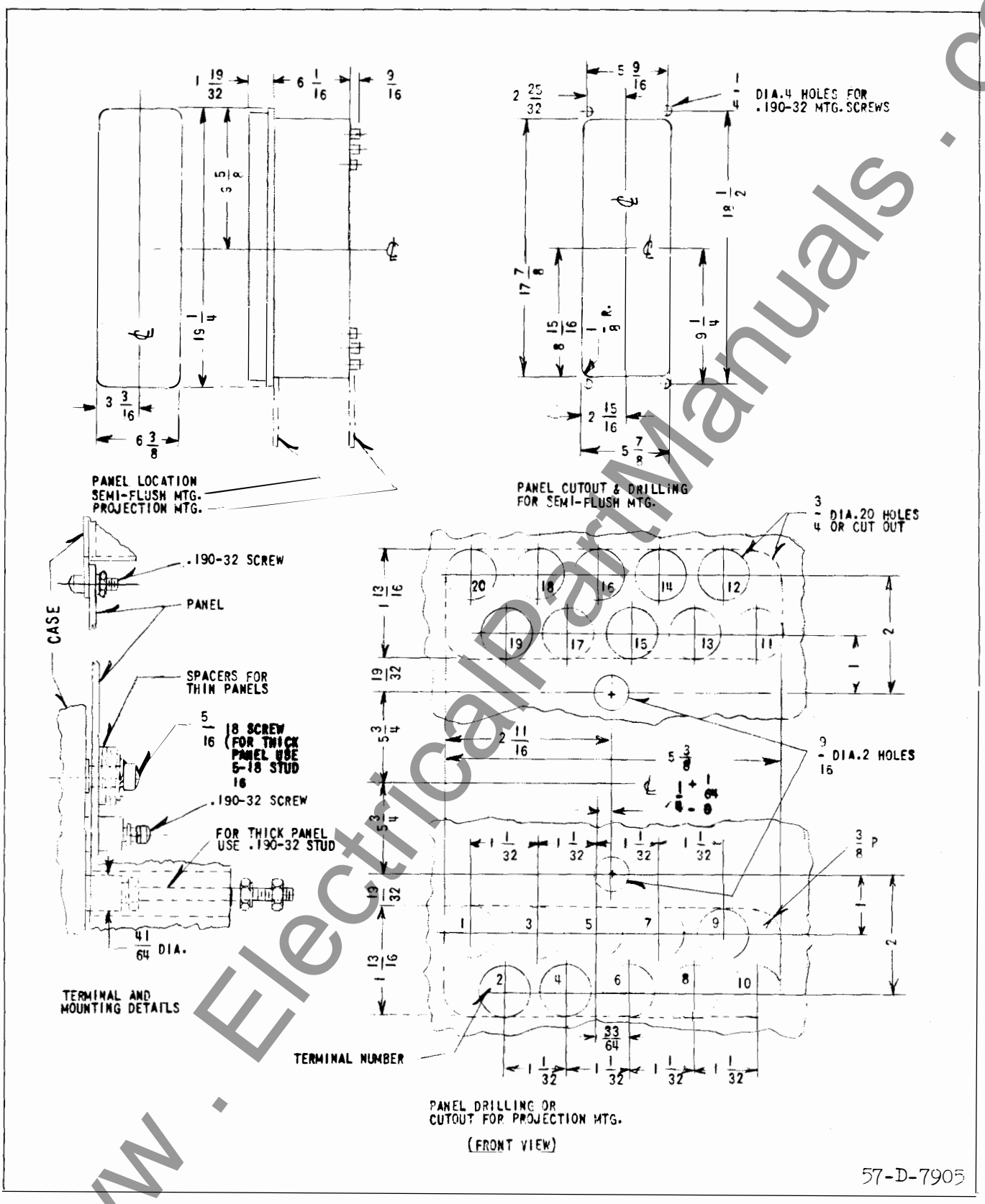

Fig. 11. Outline and Drilling Plan for the Type FT42 Case

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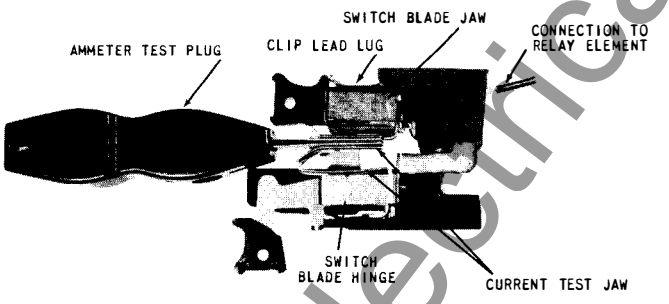
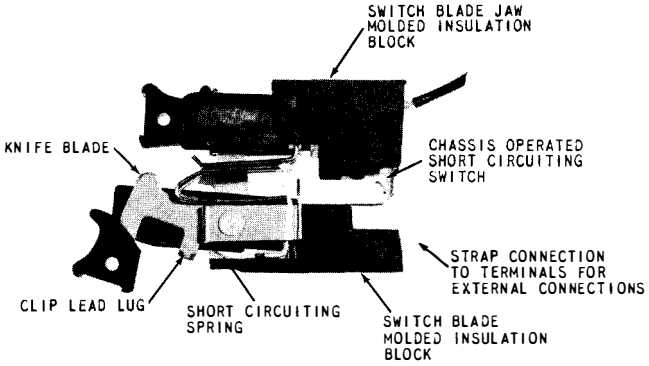


* *Fig. 1. Ammeter Test Plug in Testing Positions*



* *Fig. 2. Short Circuiting Switch*

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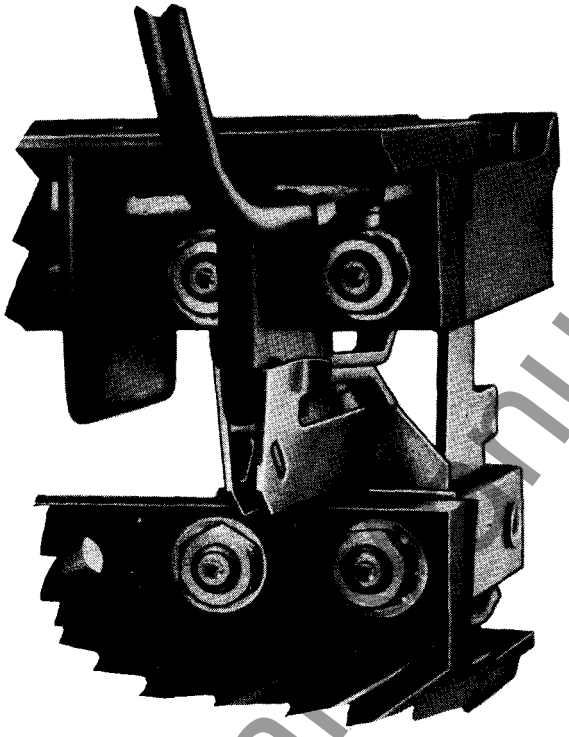
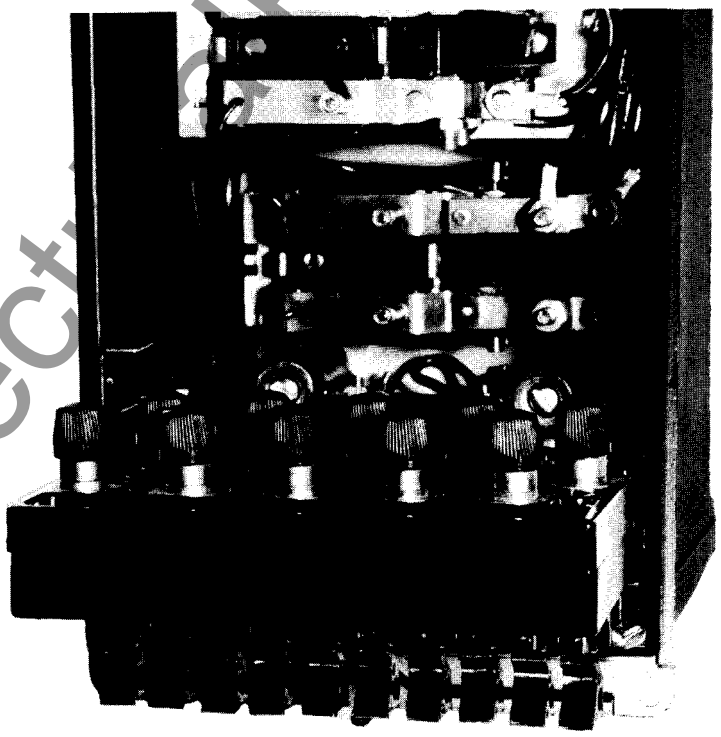


Fig. 3. Auxiliary Short Circuiting Switch (Enlarged View)



* *Fig. 4. Multi-Circuit Test Plug in Testing Position*

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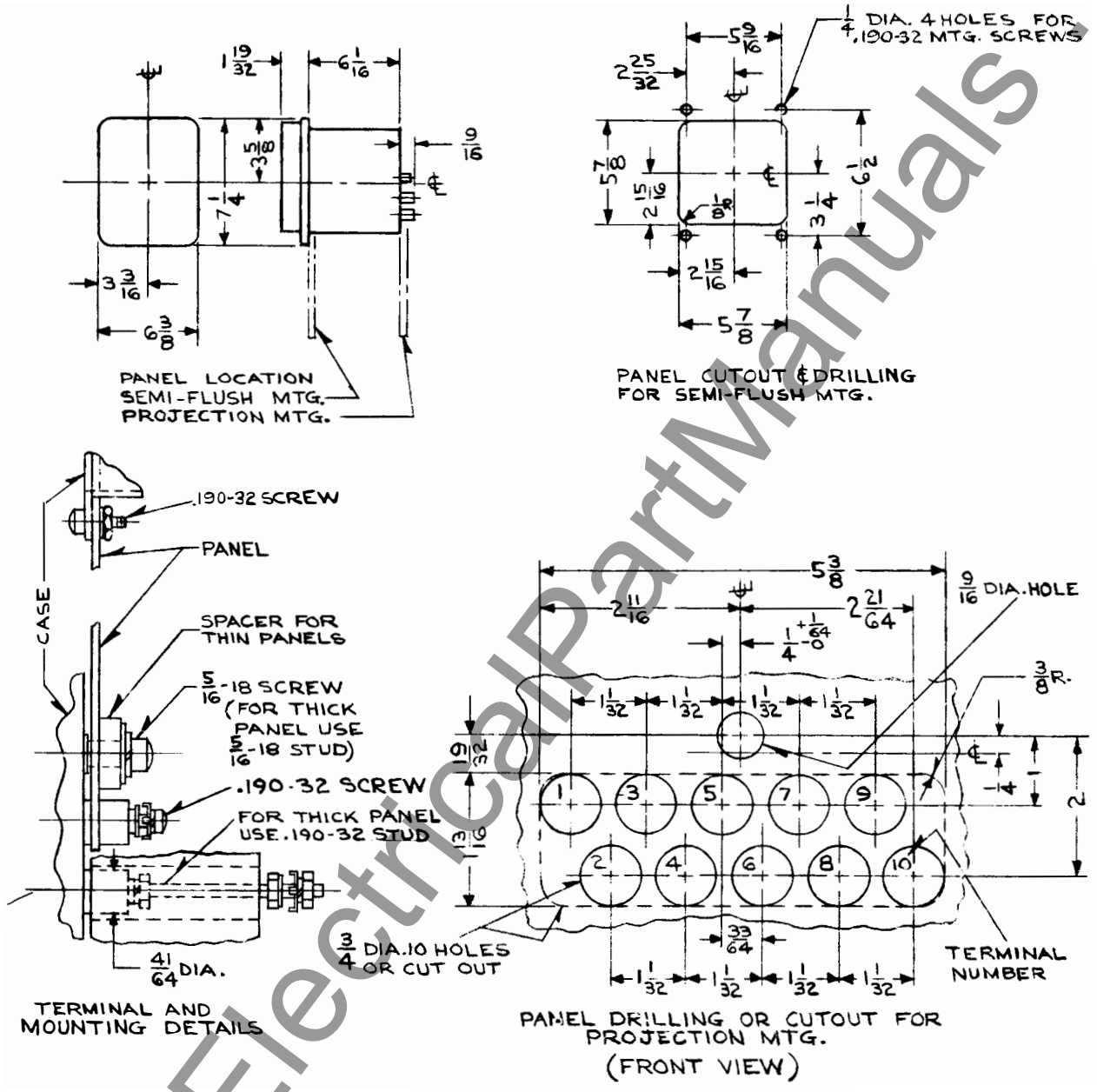

NOTE: ALL DIMENSIONS
IN INCHES.

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** Fig. 5. Outline and Drilling Plan for the Type FT11 Case*

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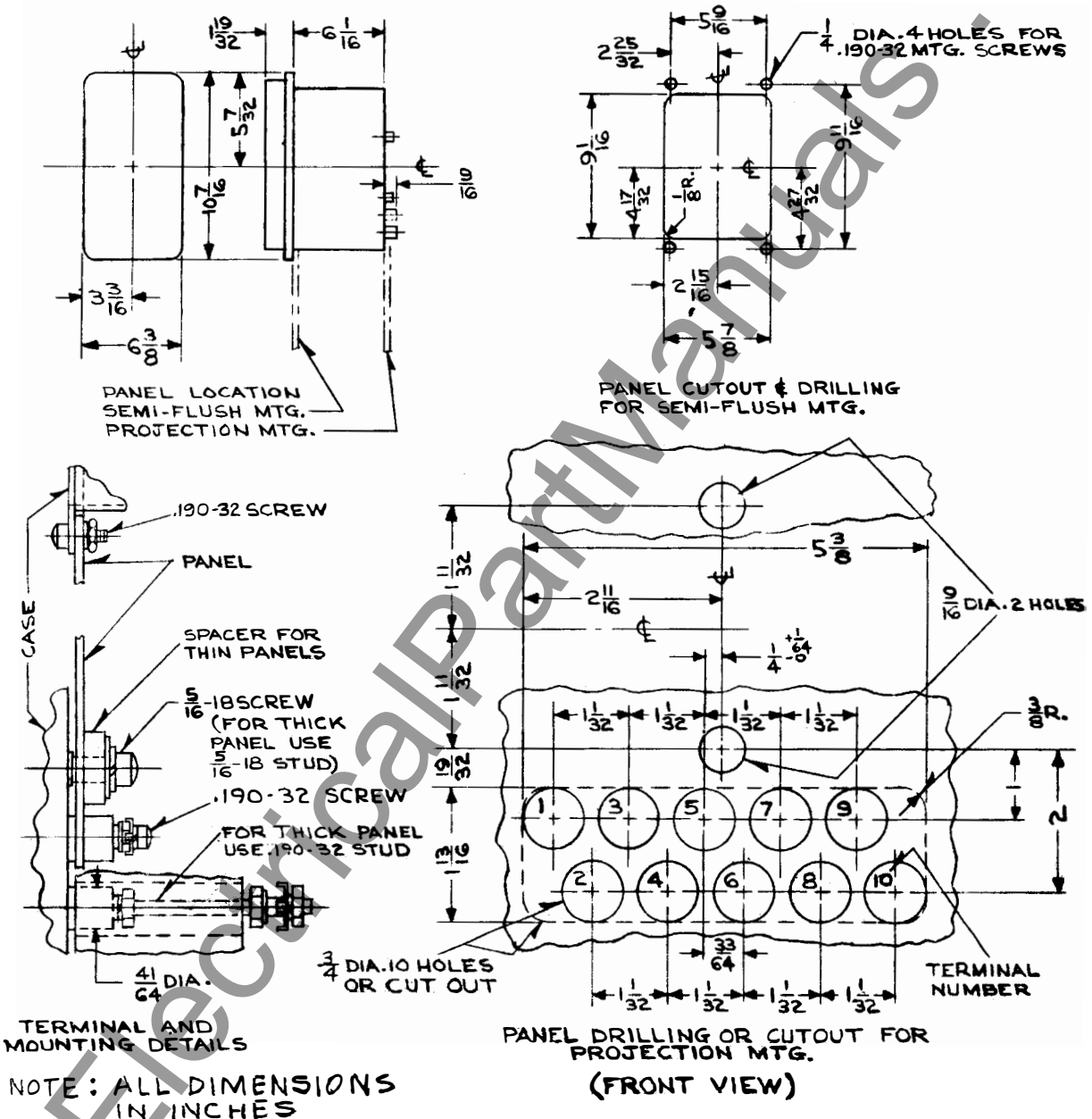

* *Fig. 6. Outline and Drilling Plan for the Type FT21 Case*

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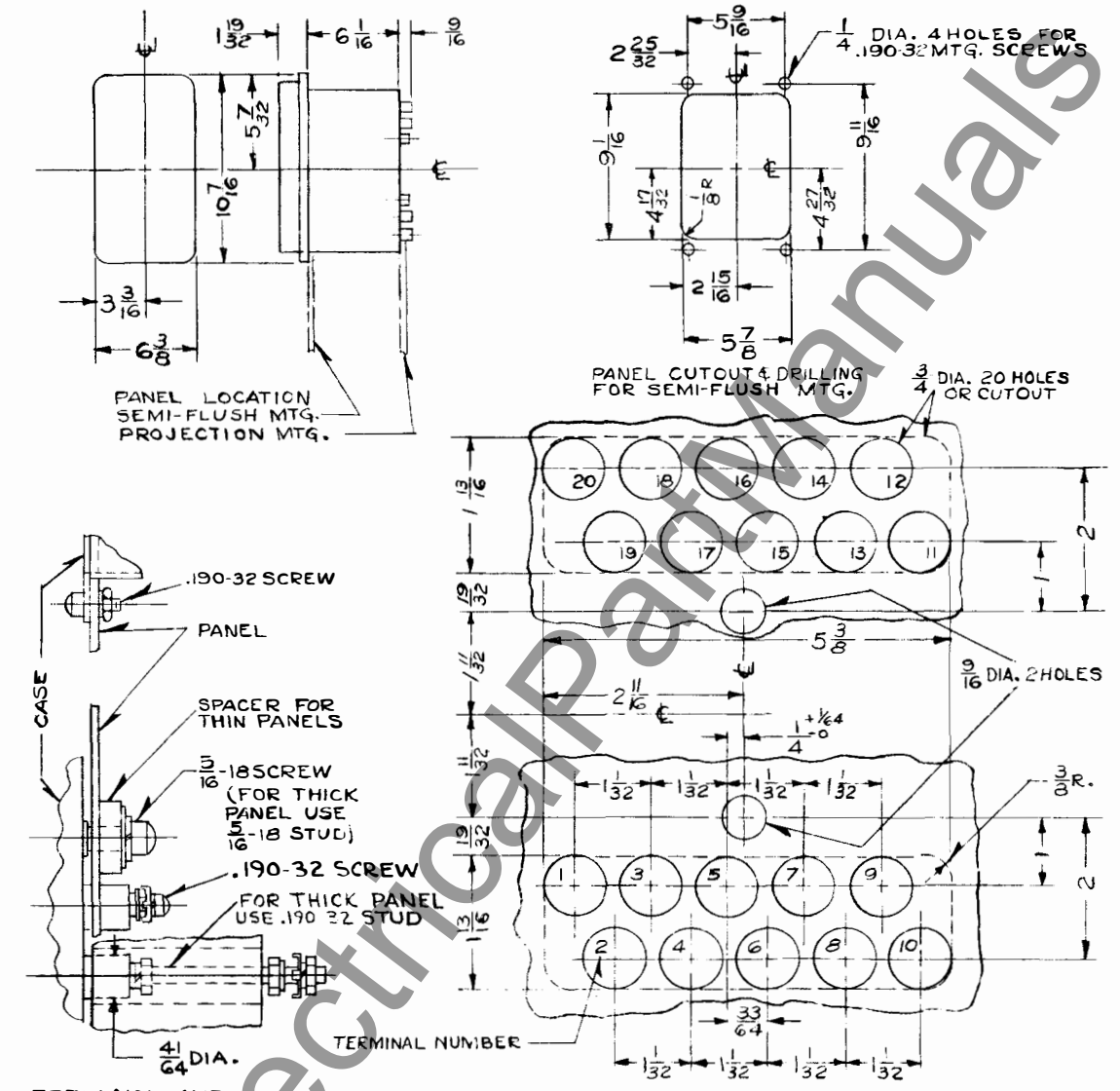

* *Fig. 7. Outline and Drilling Plan for the Type FT22 Case*

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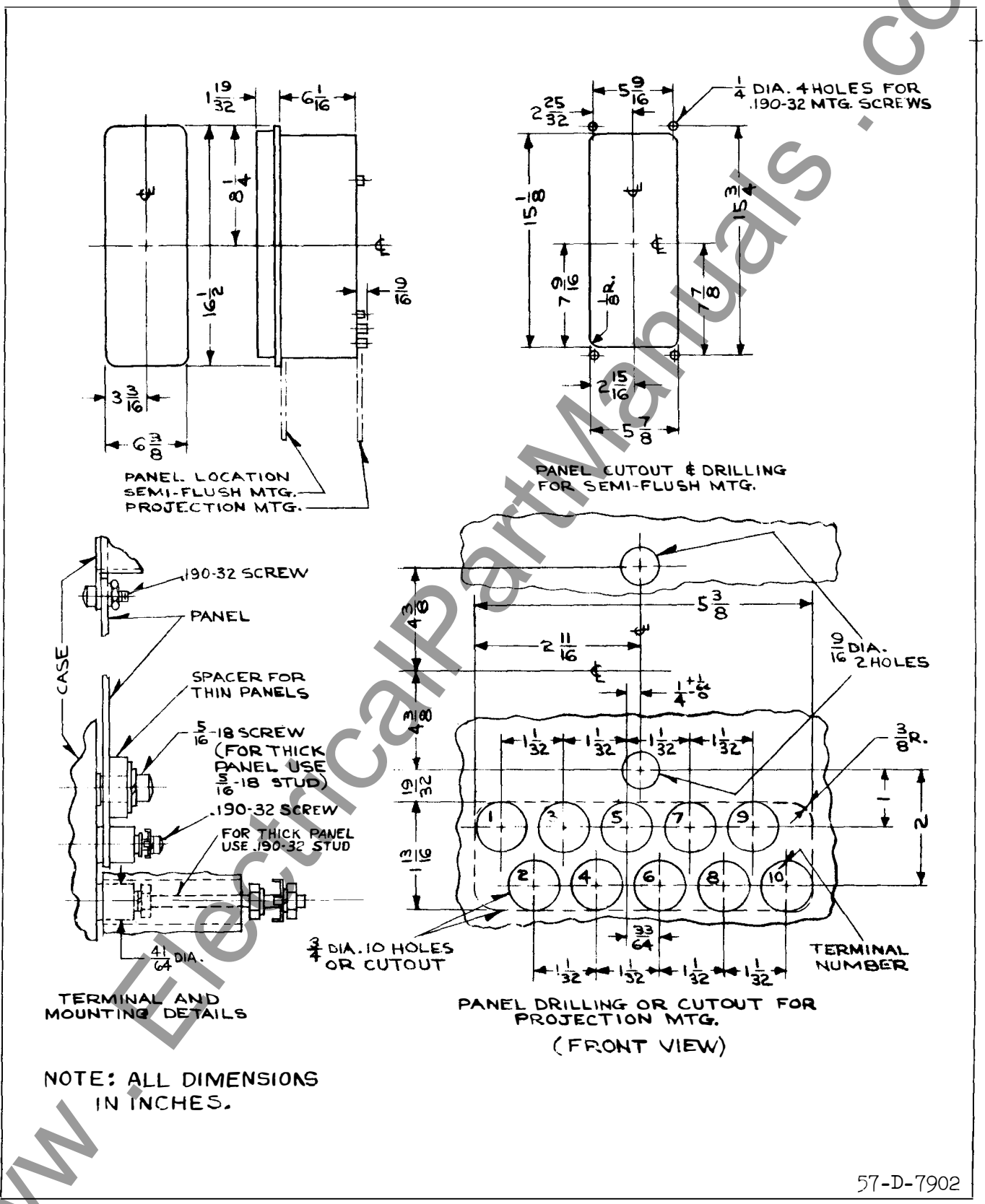

* *Fig. 8. Outline and Drilling Plan for the Type FT31 Case*

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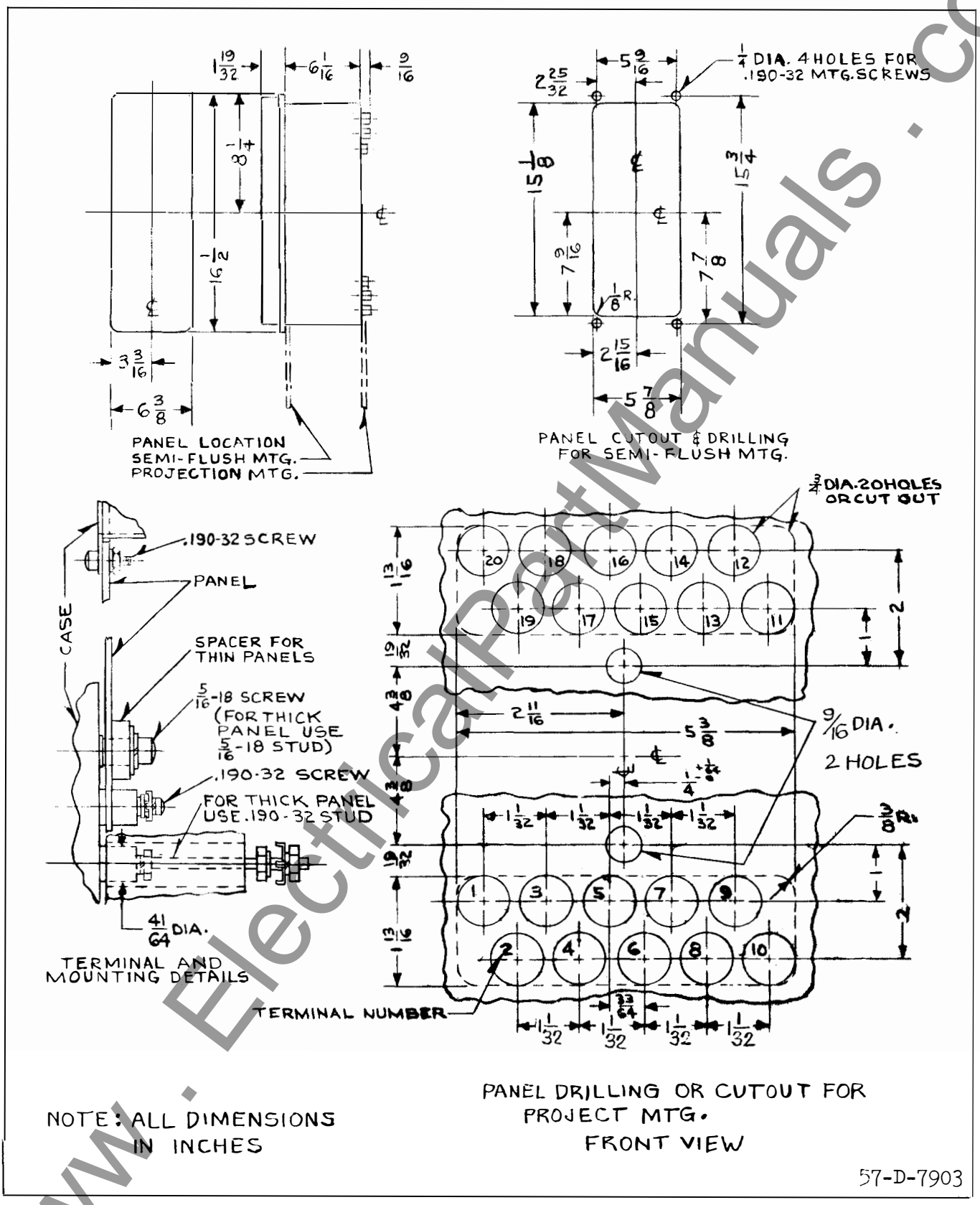

* *Fig. 9. Outline and Drilling Plan for the Type FT32 Case*

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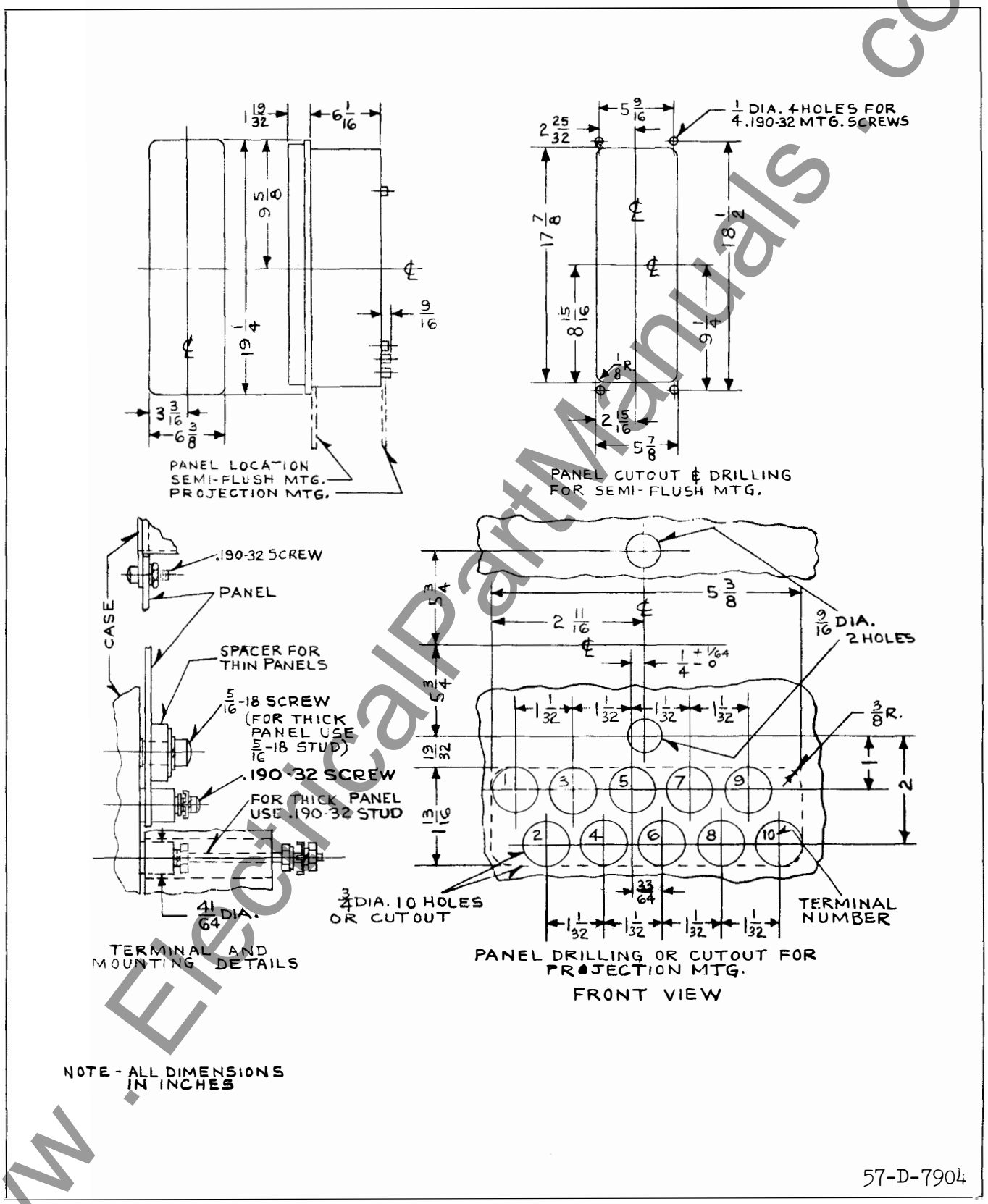

* *Fig. 10. Outline and Drilling Plan for the Type FT41 Case*

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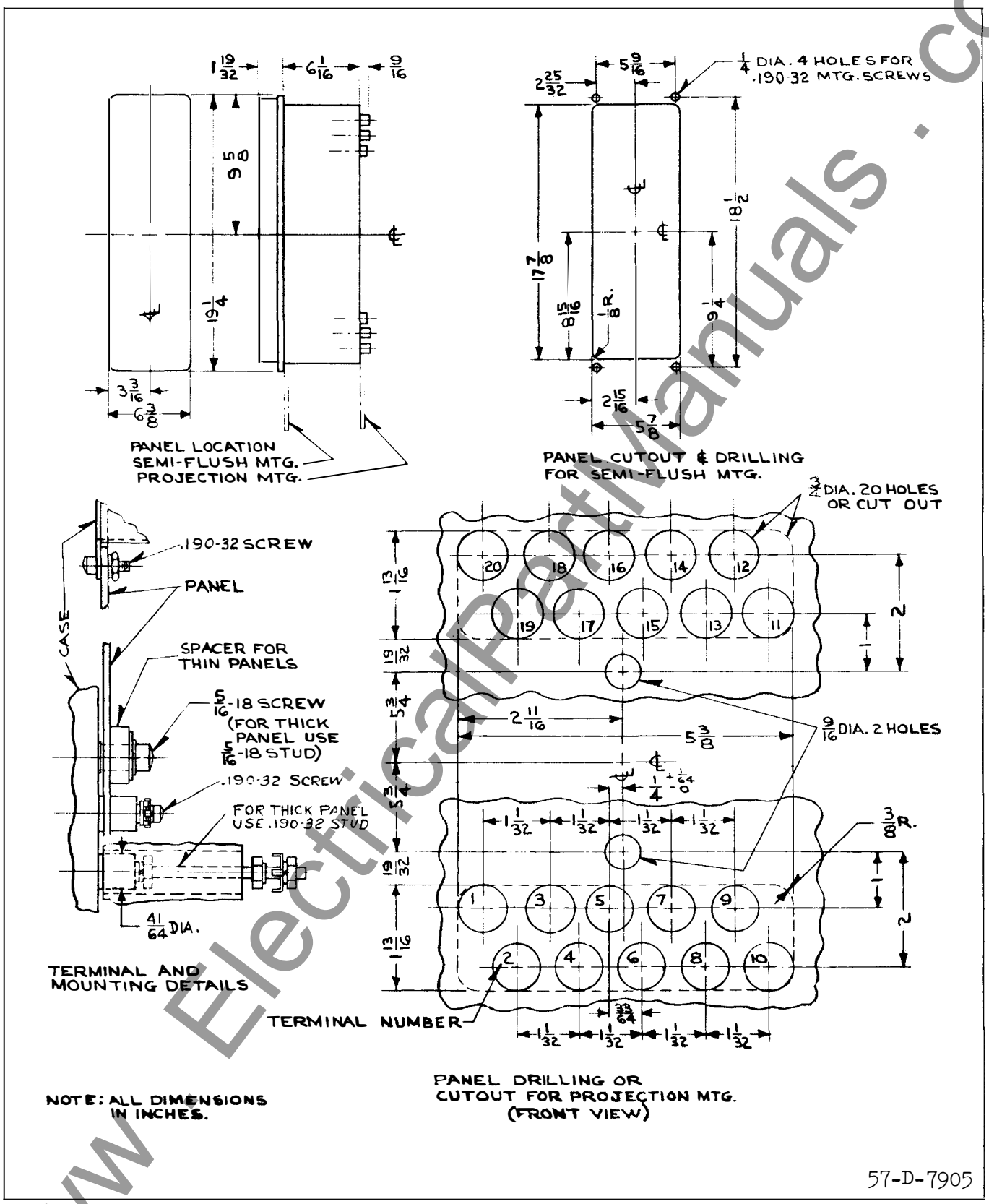

* *Fig. 11. Outline and Drilling Plan for the Type FT42 Case*

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INSTRUCTIONS

RELAYS IN TYPE FT11, FT21, FT22, FT31, FT32, FT41, FT42 CASES

The type FT (Flexitest) cases are dust-proof enclosures combining relay units and knife-blade test switches in the same case. This combination provides a compact flexible assembly easy to maintain, inspect, test and adjust. There are three main units of the type FT case: the case, cover, and chassis. The case is an all-steel welded housing containing the hinge half of the knife-blade test switches and the terminals for external connections. The cover is a molded phenolic frame with a clear glass window, a thumb nut, a reset lever, and a hinge. The hinge fits over the top flange of the case. The thumb nut, which fastens to a stud on the bottom flange of the case, holds the cover securely in place on the case. The chassis is a steel frame that supports the relay elements and the contact jaw half of the test switches. This slides in and out of the case. The electrical connections between the base and chassis are completed through the closed knife-blades.

There are four different size cases available. These are designated the FT11, FT21 or 22, FT31 or 32, and the FT41 or 42. The first digit of the designation represents the physical size and the second the number of terminal blocks. One terminal block can accommodate up to ten terminals. The case may be either semi-flush or projection mounted.

REMOVING CHASSIS

To remove the chassis, first remove the cover by unscrewing the captive thumb nut at the bottom and lifting the cover hinge off the top flange of the case. This exposes the relay units and all the test switches for inspection and testing. The next step is to open the test switches. *Always open the red handle switches first before any of the black handle switches or the cam action latches.* This opens the trip circuit to prevent accidental tripout. Then open all the remaining switches. The order of opening the remaining switches is not important. In opening the test switches they should be moved all the way back against the stops. With all the switches fully opened, release the cam action latch or latches and pull outward. The chassis can be set on a test bench for easy inspection, maintenance and test.

After removing the chassis a duplicate chassis may be inserted in the case or the blade portion of the switches can be closed and the cover put in place without the chassis. The chassis-operated auxiliary shorting switch remains closed with chassis out to prevent open circuiting the current transformers when the current test switches are closed. The operation of the auxiliary shorting switch is visible from the front of the relay, when the chassis is in place.

When the chassis is to be put back in the case, the above procedure is to be followed in the reversed order. *The red handle switch should not be closed until after the chassis has been latched in place and all of the black handle switches closed.*

ELECTRICAL CIRCUITS

Each terminal in the base connects through a test switch to the relay units in the chassis as shown on the internal schematic diagrams. The relay terminals are identified by numbers marked on the outside of the case. The test switch positions are identified by numbers marked on the molded blocks.

The potential and control circuits through the relay are disconnected from the external circuit by opening the associated test switches. Opening the current test switch short-circuits the current transformer secondary and disconnects one side of the relay coil but leaves the other side of the coil connected to the external circuit through the current test jack jaws. This circuit can be isolated by inserting the current test plug (without external connections), or by inserting the ten circuit test plug. Both switches of the current test switch pair must be open when using the current test plug in this manner to short-circuit the current transformer secondary.

TESTING

The relays can be tested in service, in the case

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but with the external circuits isolated or out of the case as follows:

TESTING IN SERVICE

The ammeter test plug can be inserted in the current test jaws after opening the knife-blade switch to check the current through the relay, as shown in Fig. 1. This plug consists of two conducting strips separated by an insulating strip. The ammeter is connected to these strips by terminal screws and the leads are carried out through holes in the back of the insulated handle.

Voltages between the potential circuits can be measured conveniently by clamping #2 clip leads on the projecting clip lead lug on the contact jaw.

TESTING IN CASE

With all blades in the full open position, the ten circuit test plug Fig. 4 can be inserted in the contact jaws. This connects the relay units to a set of binding posts and completely isolates the relay circuits from the external connections by means of an insulating barrier on the plug. The external test circuits are connected to these binding posts. The plug is inserted in the bottom test jaws with the binding posts up and in the top test switch jaws with the binding posts down.

The external test circuits may be made to the relay units by #2 test clip leads instead of the test plug. When connecting an external test circuit to the current elements using clip leads, care should be taken to see that the current test jack jaws are open so that the relay is completely isolated from the external circuits. Suggested means for isolating this circuit are outlined above, under "Electrical Circuits".

TESTING OUT OF CASE

With the chassis removed from the case, relay units may be tested by using the ten circuit test plug or by #2 test clip leads as described above. Any critical factory calibration is made with the chassis in the case and removing the chassis from the case may change the calibration values of these relays.

An internal schematic is available for each individual relay showing the schematic internal wiring. The outlines of the various cases are shown in Fig. 5 to Fig. 11.

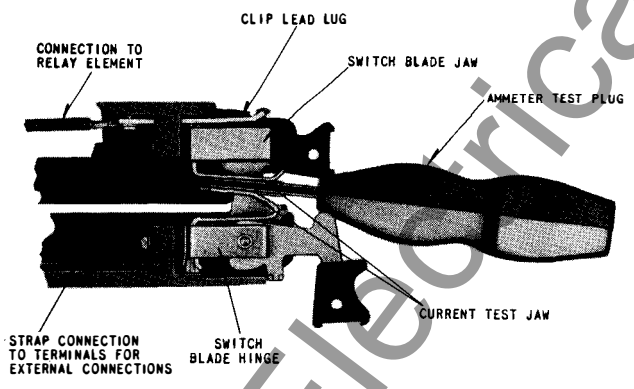

Fig. 1. Ammeter Test Plug in Testing Positions

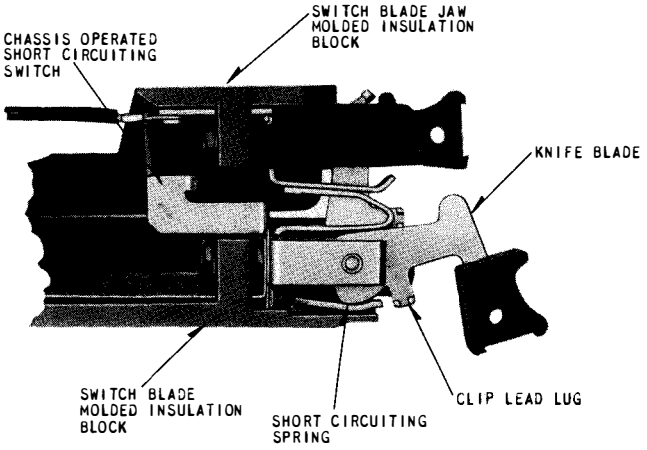

Fig. 2. Short Circuiting Switch

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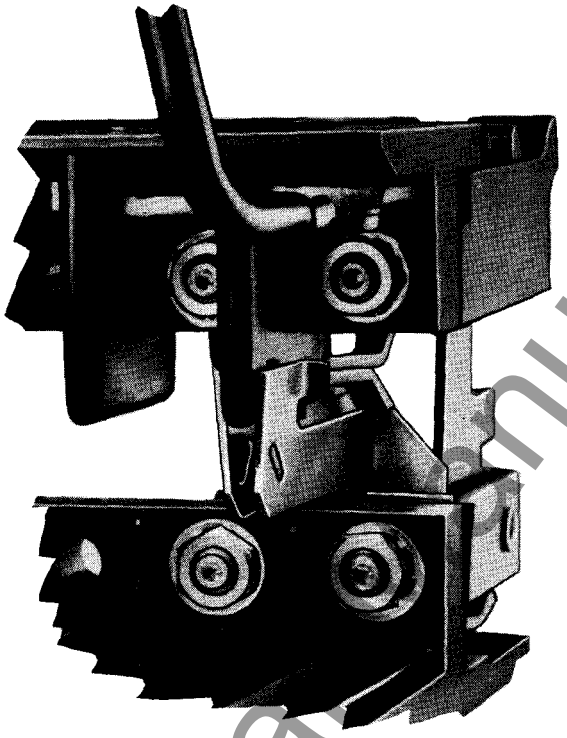

Fig. 3. Auxiliary Short Circuiting Switch (Enlarged View)

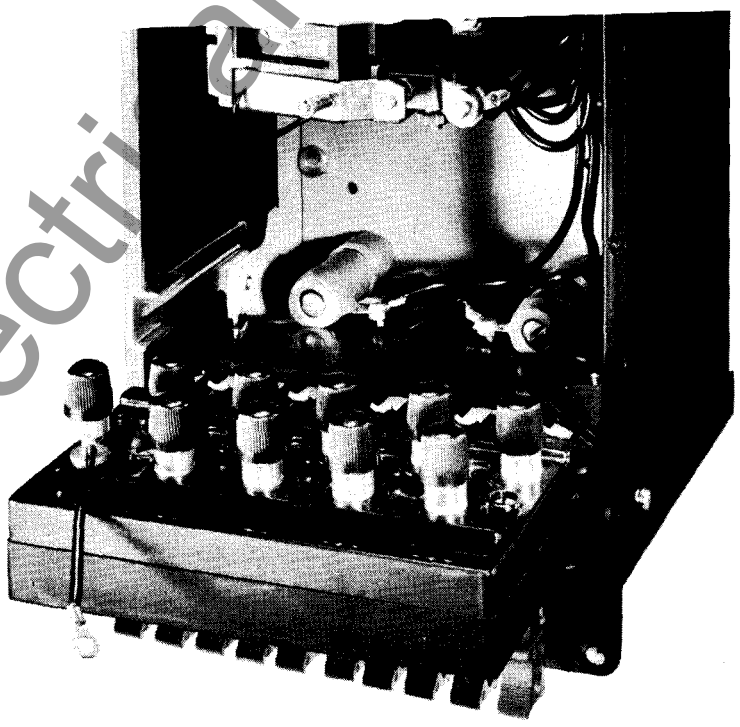

Fig. 4. Multi-Circuit Test Plug in Testing Position

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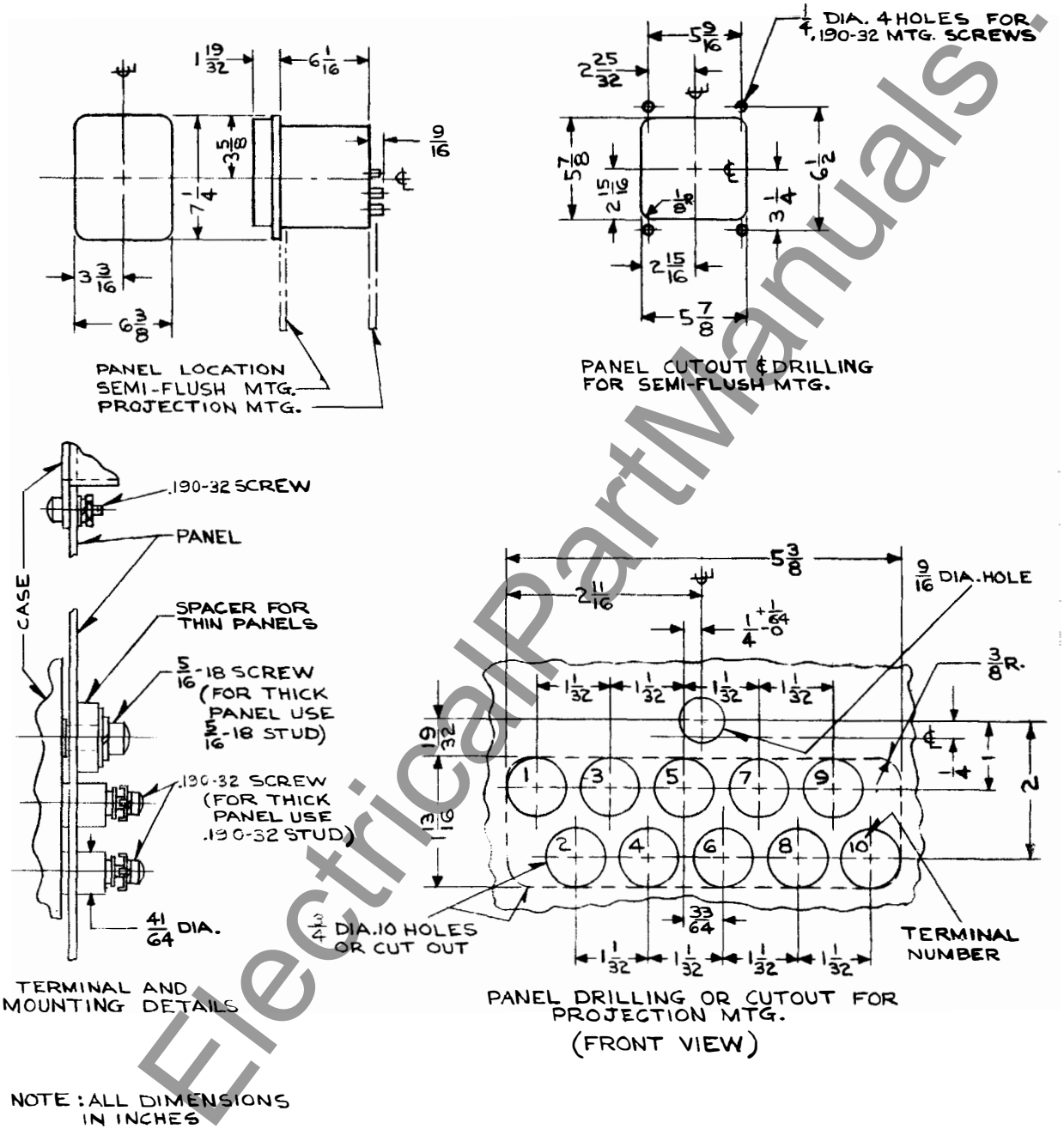

Fig. 5. Outline and Drilling Plan for the Type FT11 Case

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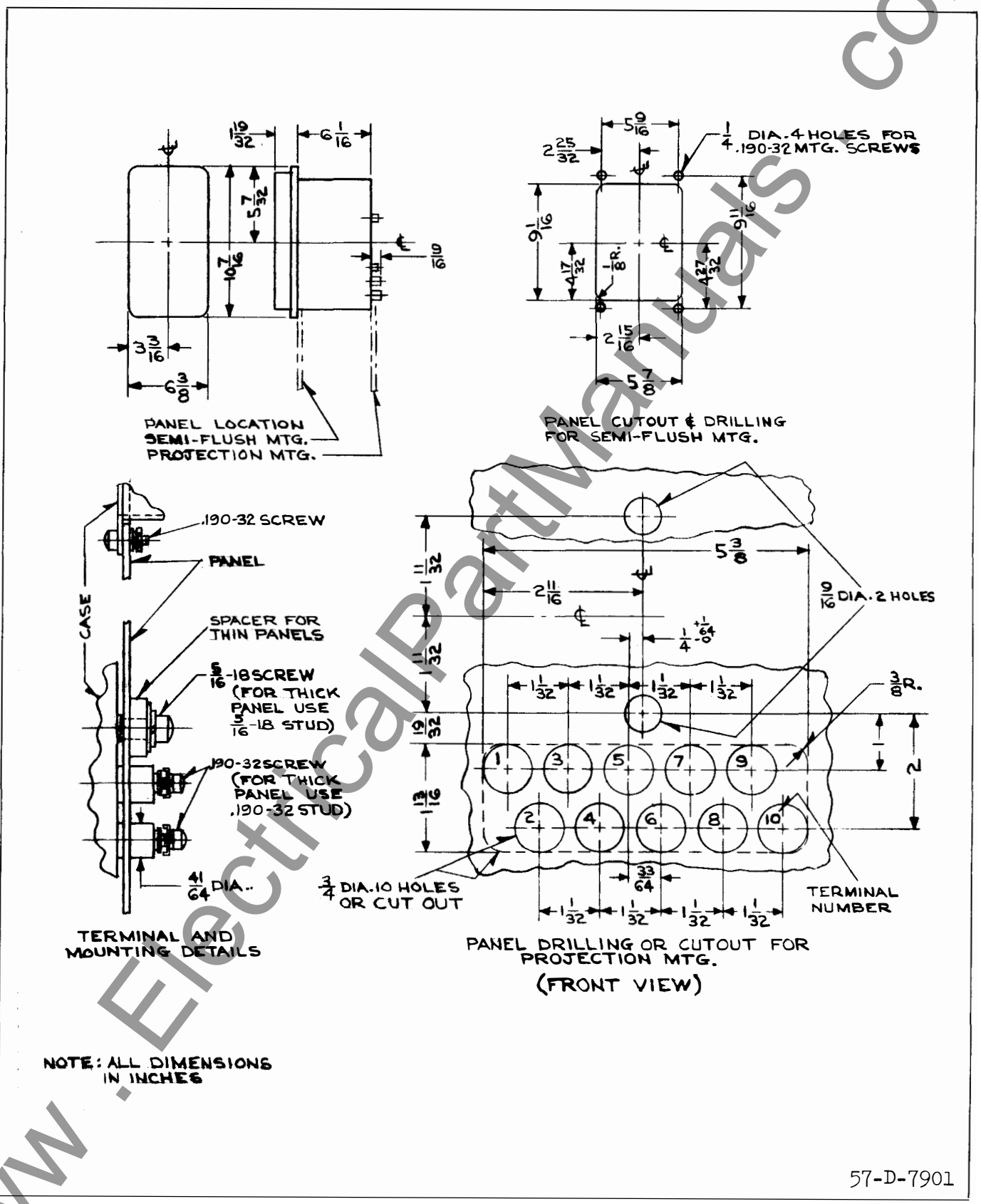

Fig. 6. Outline and Drilling Plan for the Type FT21 Case

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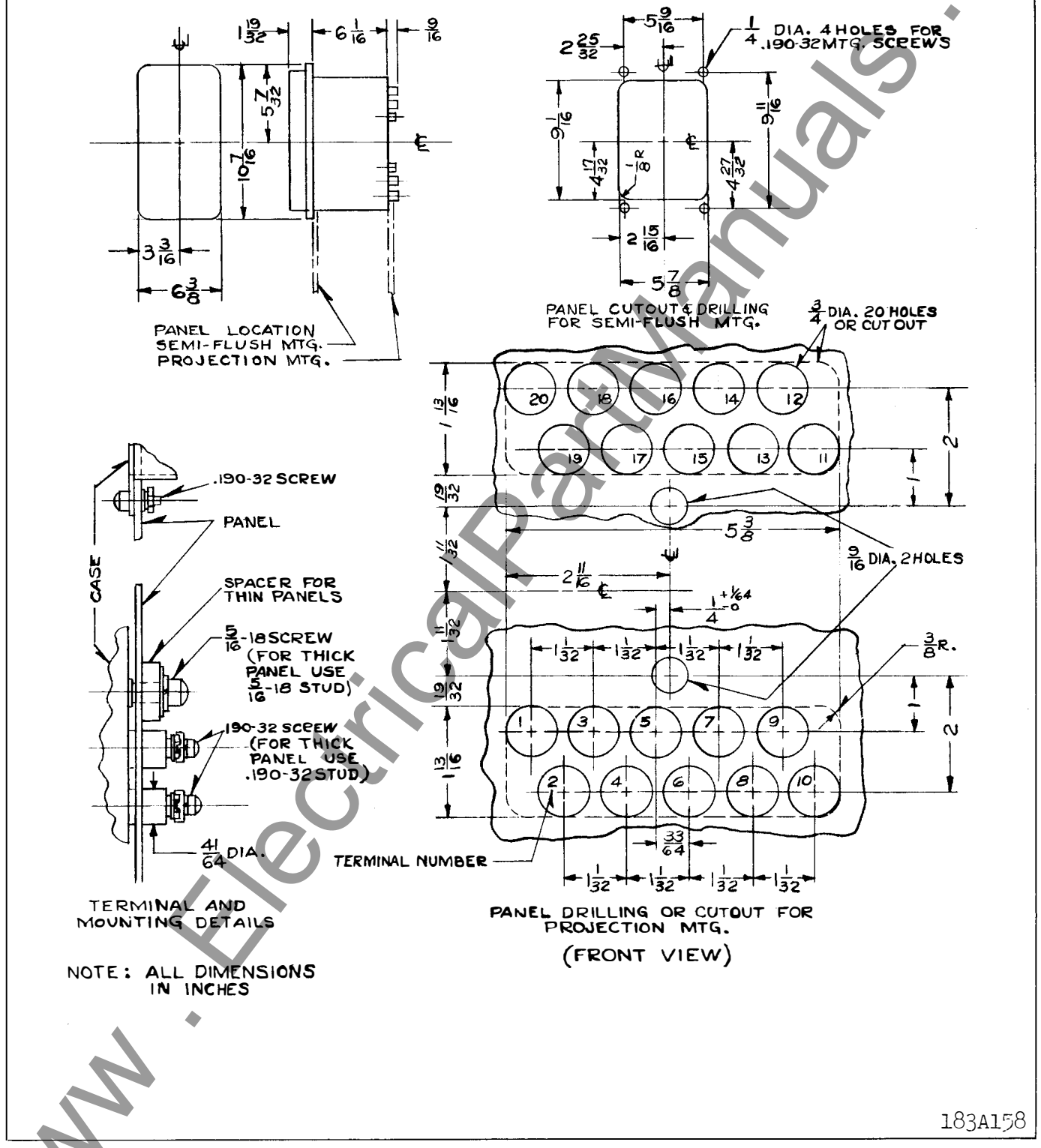

Fig. 7. Outline and Drilling Plan for the Type FT22 Case

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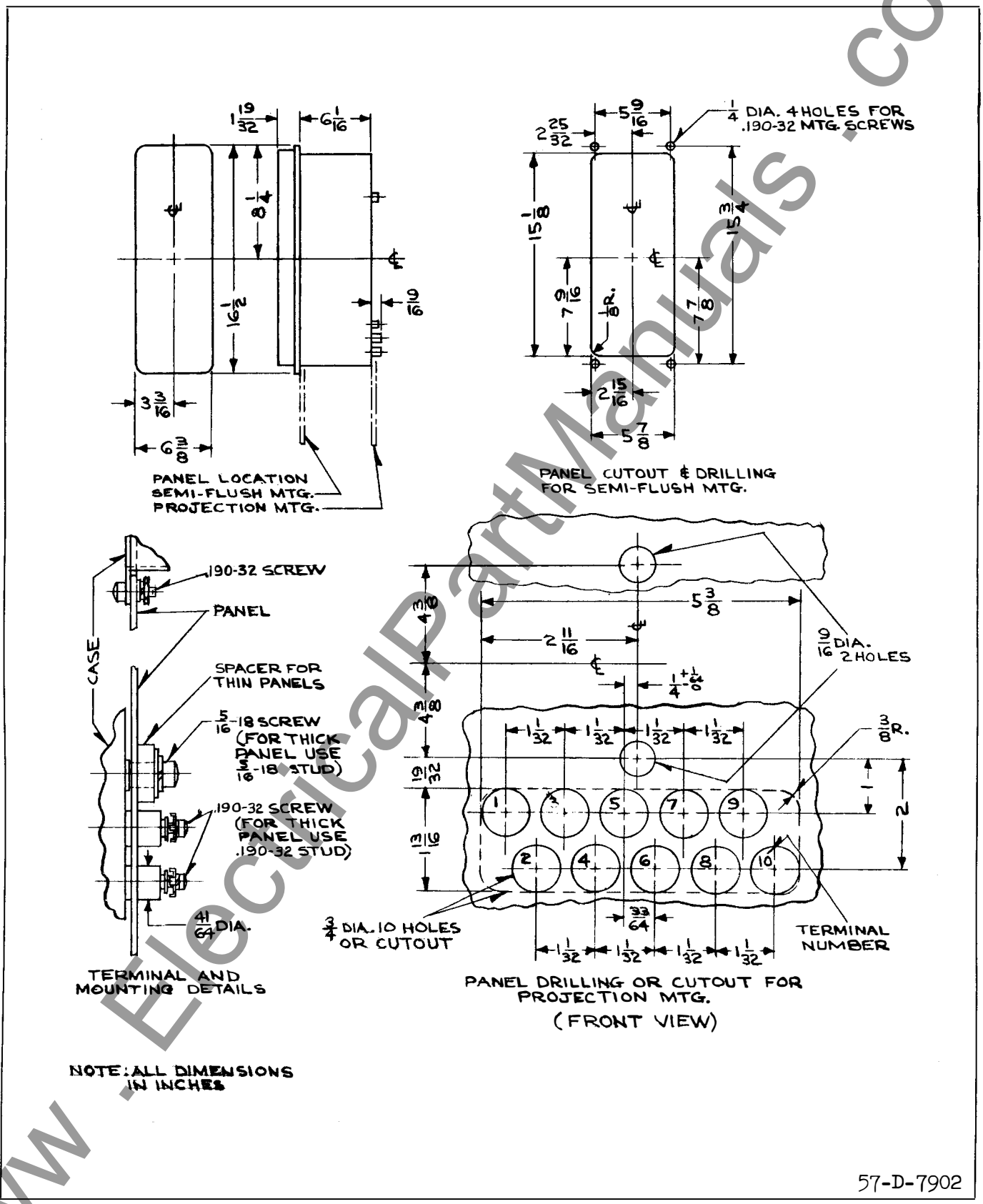

Fig. 8. Outline and Drilling Plan for the Type FT31 Case

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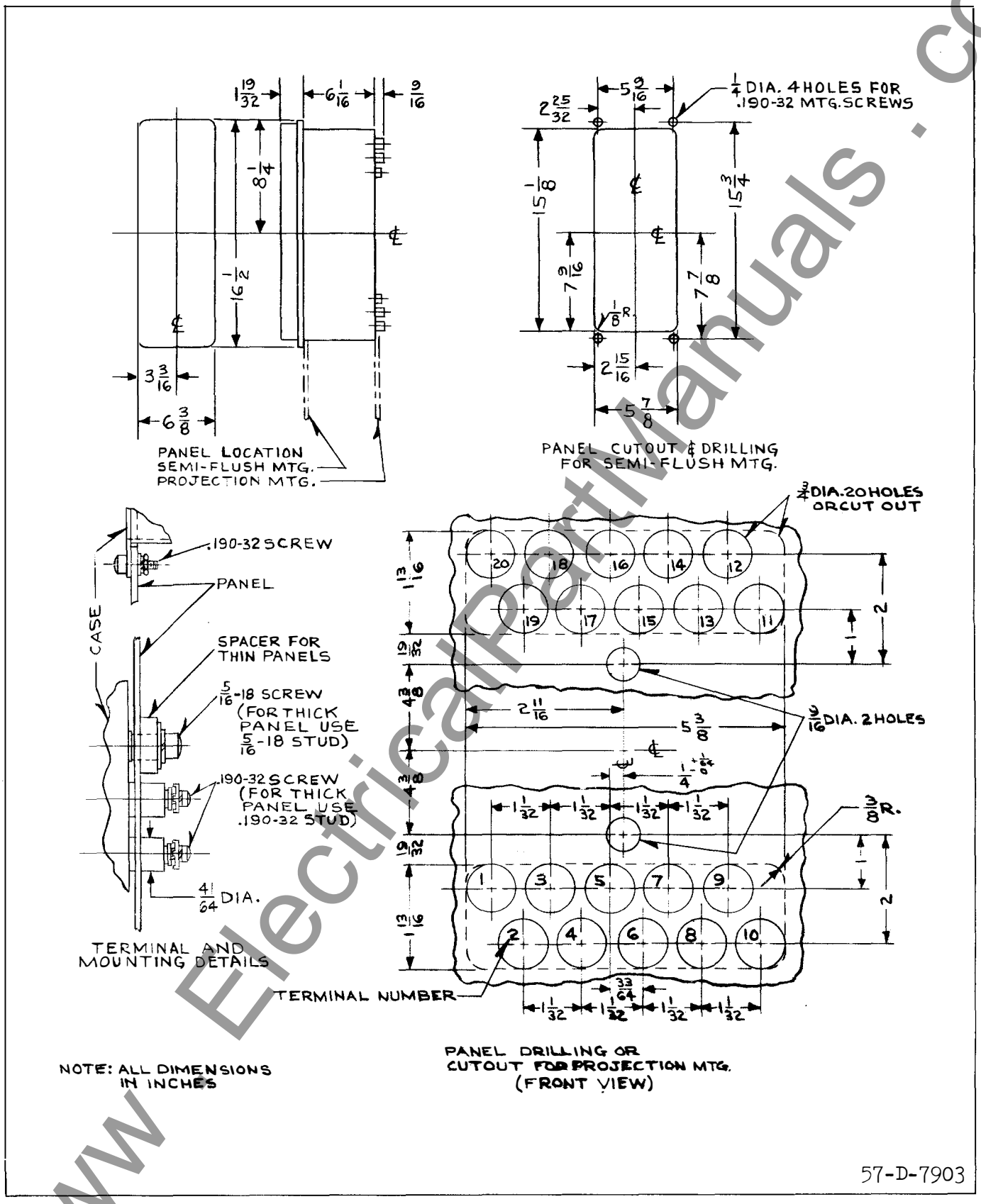

Fig. 9. Outline and Drilling Plan for the Type FT32 Case

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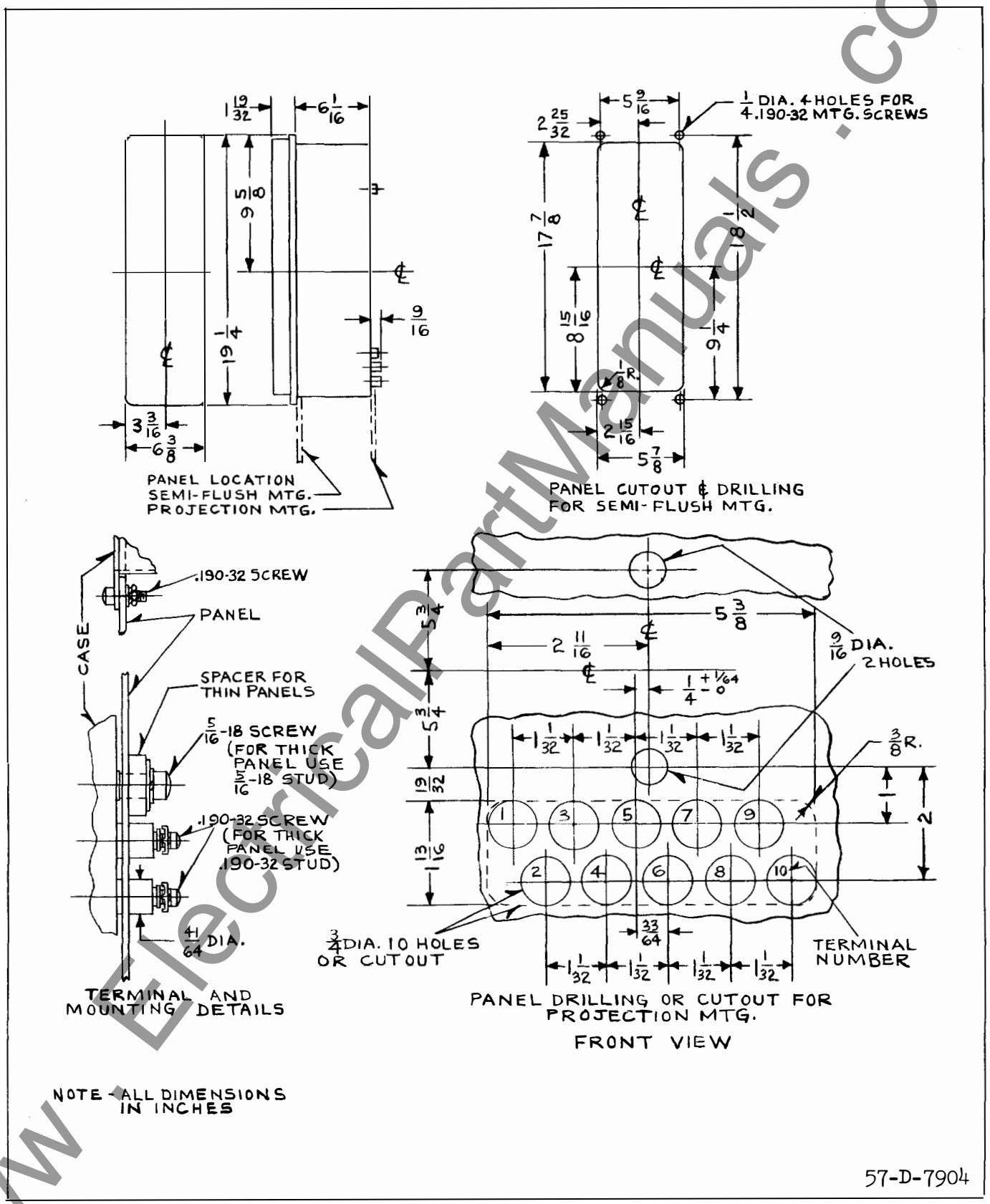

Fig. 10. Outline and Drilling Plan for the Type FT41 Case

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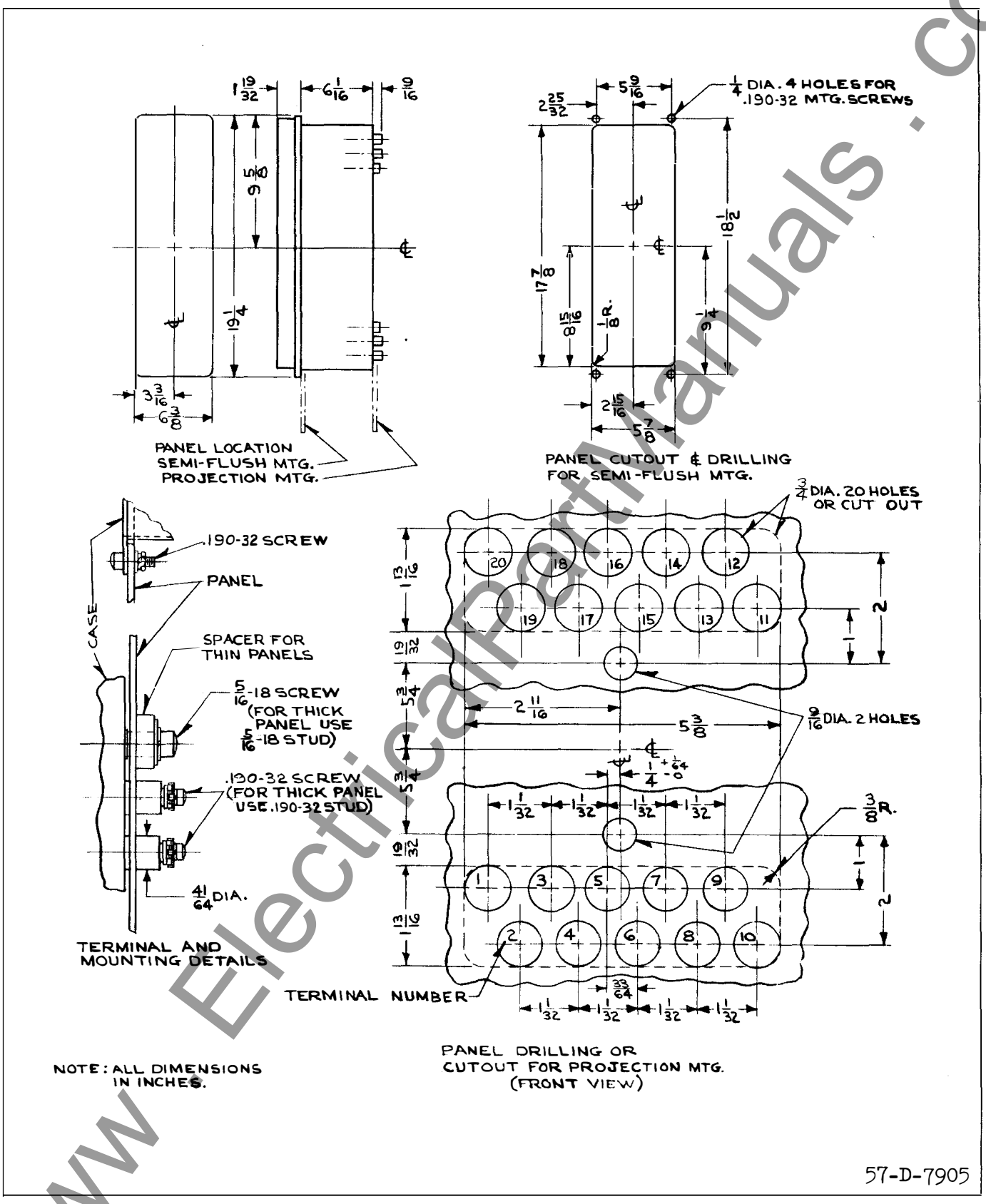

Fig. 11. Outline and Drilling Plan for the Type FT42 Case

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METER DIVISION **NEWARK, N.J.**

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INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

RELAYS IN TYPE FT11, FT21, FT22, FT31, FT32, FT41, FT42 CASES

The type FT (Flexitest) cases are dust-proof enclosures combining relay units and knife-blade test switches in the same case. This combination provides a compact flexible assembly easy to maintain, inspect, test and adjust. There are three main units of the type FT case: the case, cover, and chassis. The case is an all-steel welded housing containing the hinge half of the knife-blade test switches and the terminals for external connections. The cover is a molded phenolic frame with a clear glass window, a thumb nut, a reset lever, and a hook shaped support. The support fits over the top flange of the case. The thumb nut, which fastens to a stud on the bottom flange of the case, holds the cover securely in place on the case. The chassis is a steel frame that supports the relay elements and the contact jaw half of the test switches. This slides in and out of the case. The electrical connections between the base and chassis are completed through the closed knife-blades.

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REMOVING CHASSIS

To remove the chassis, first remove the cover by unscrewing the captive thumb nut at the bottom and lifting the cover support off the top flange of the case. This exposes the relay units and all the test switches for inspection and testing. The next step is to open the test switches. *Always open the red handle switches first before any of the black handle switches or the cam action latches.* This opens the trip circuit to prevent accidental tripout. Then open all the remaining switches. The order of opening the remaining switches is not important. In opening the test switches they should be moved all the way back against the stops. With all the switches fully opened, release the cam action latches and pull outward. The chassis can be set on a test bench for easy inspection, maintenance and test.

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TESTING

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*Denotes change from superseded issue.

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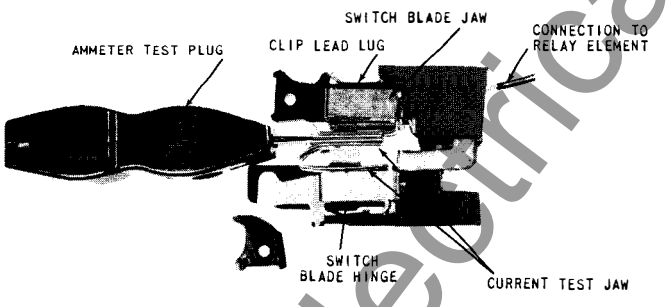

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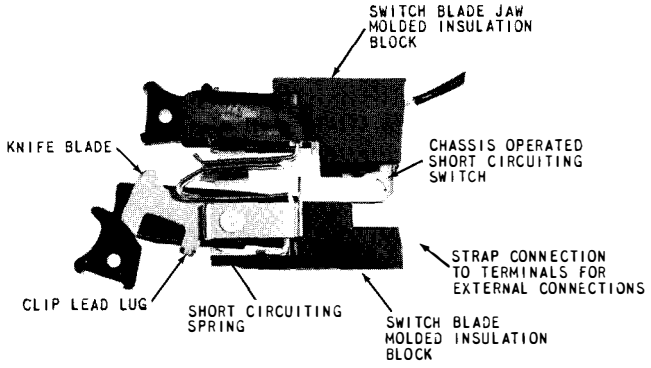

Fig. 2. Short Circuiting Switch

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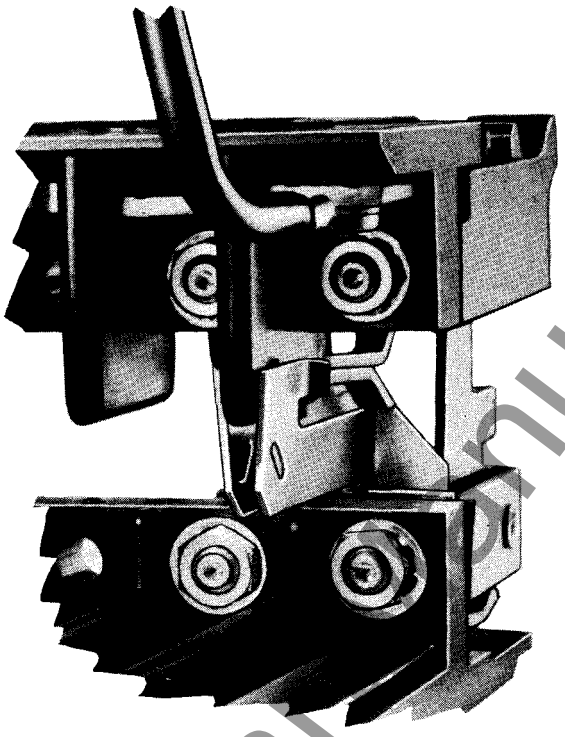

Fig. 3. Auxiliary Short Circuiting Switch (Enlarged View)

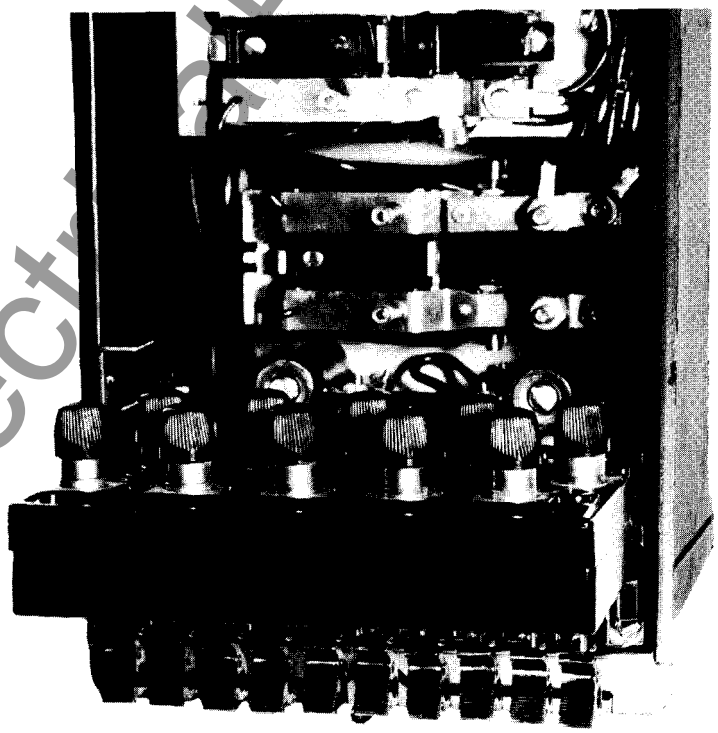

Fig. 4. Multi-Circuit Test Plug in Testing Position

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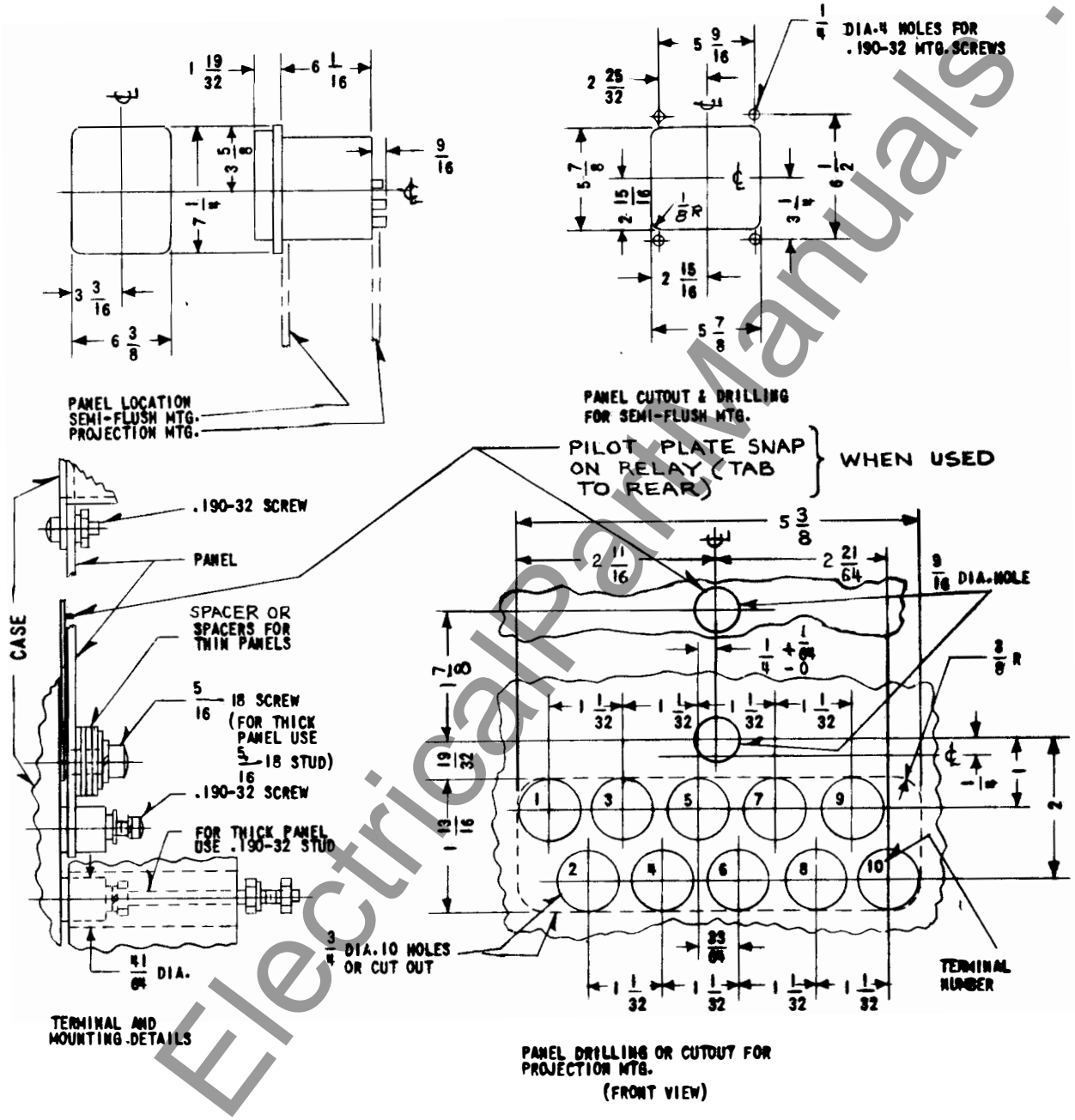

** Fig. 5. Outline and Drilling Plan for the Type FT11 Case*

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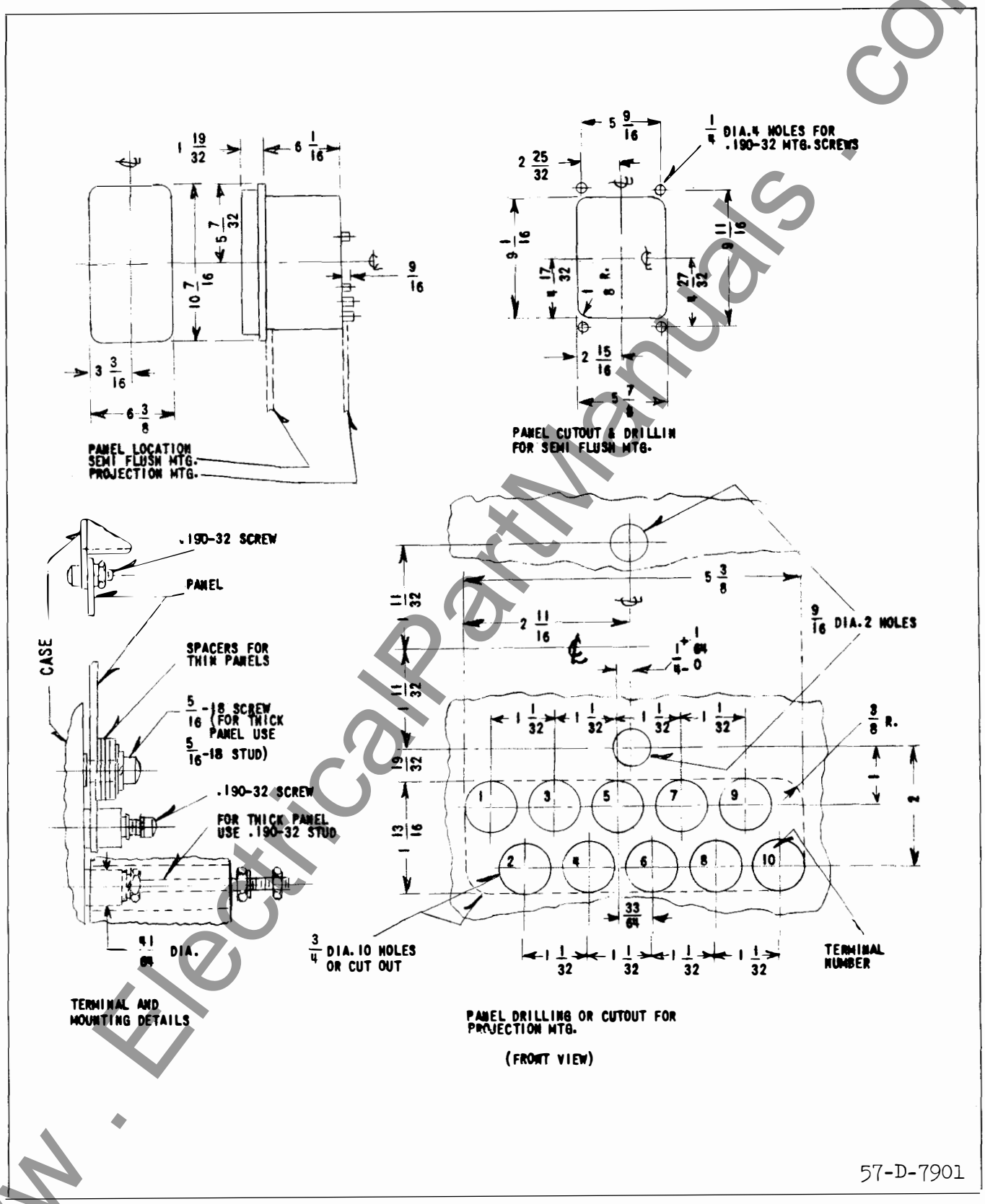

Fig. 6. Outline and Drilling Plan for the Type FT21 Case

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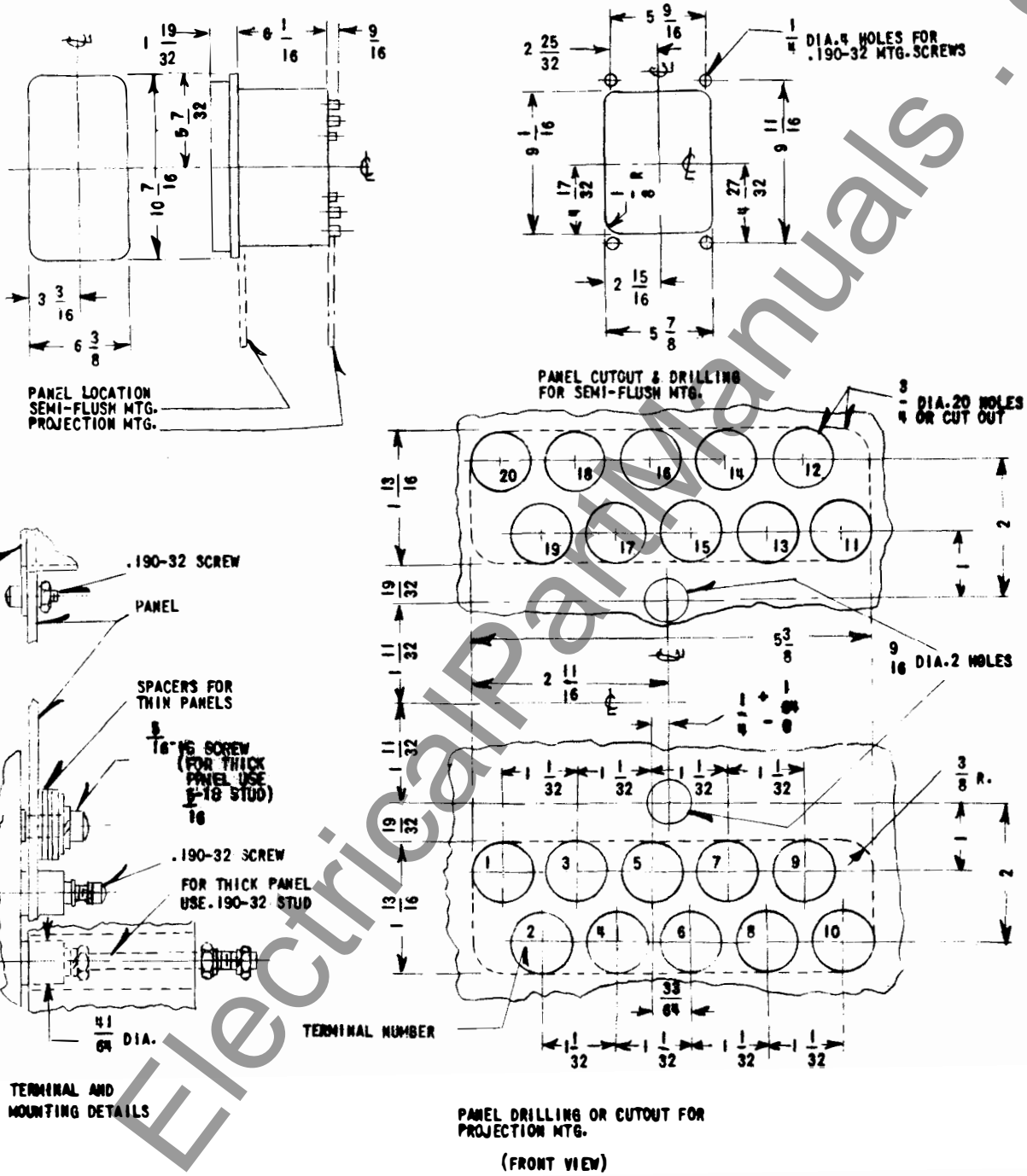

Fig. 7. Outline and Drilling Plan for the Type FT22 Case

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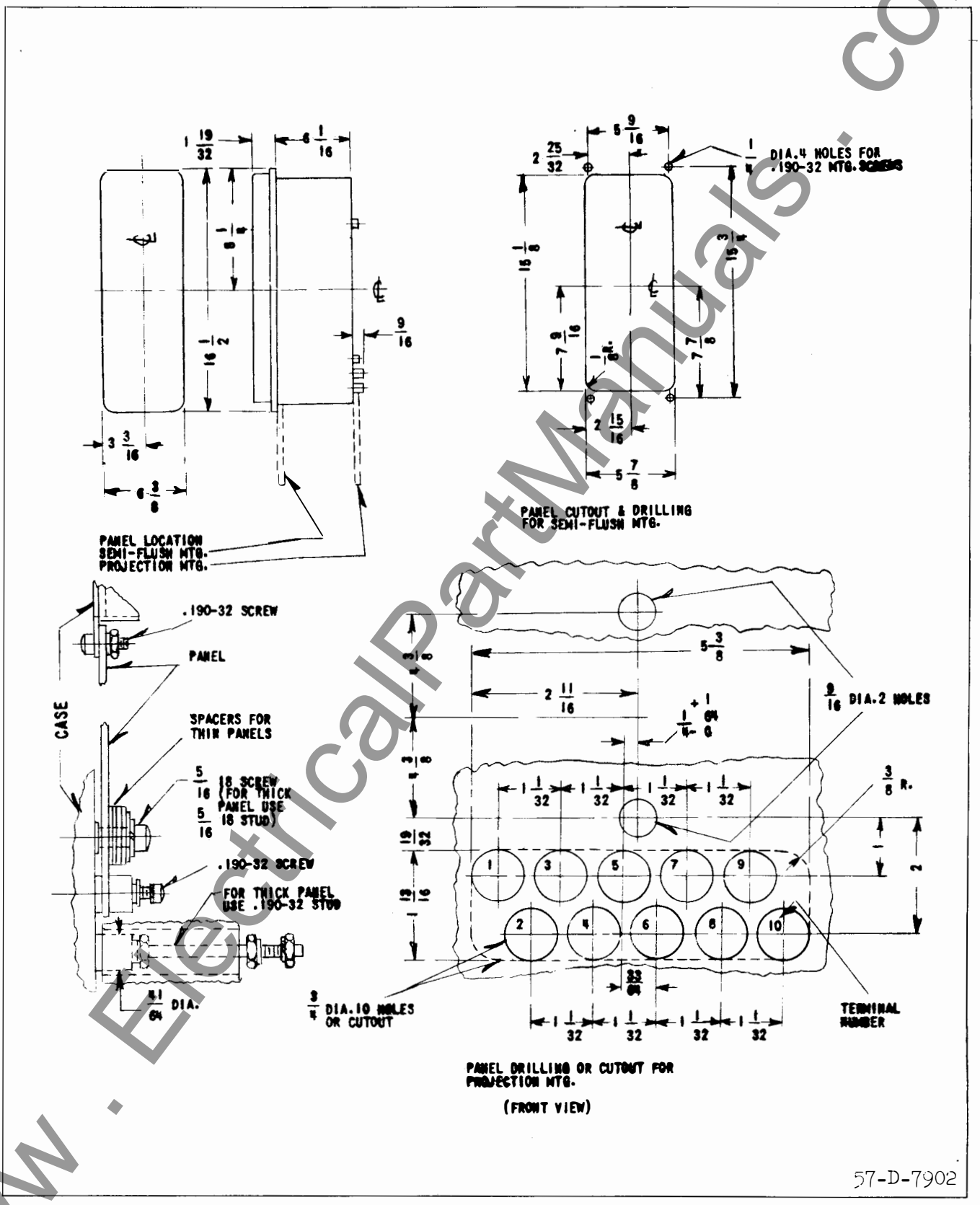

* *Fig. 8. Outline and Drilling Plan for the Type FT31 Case*

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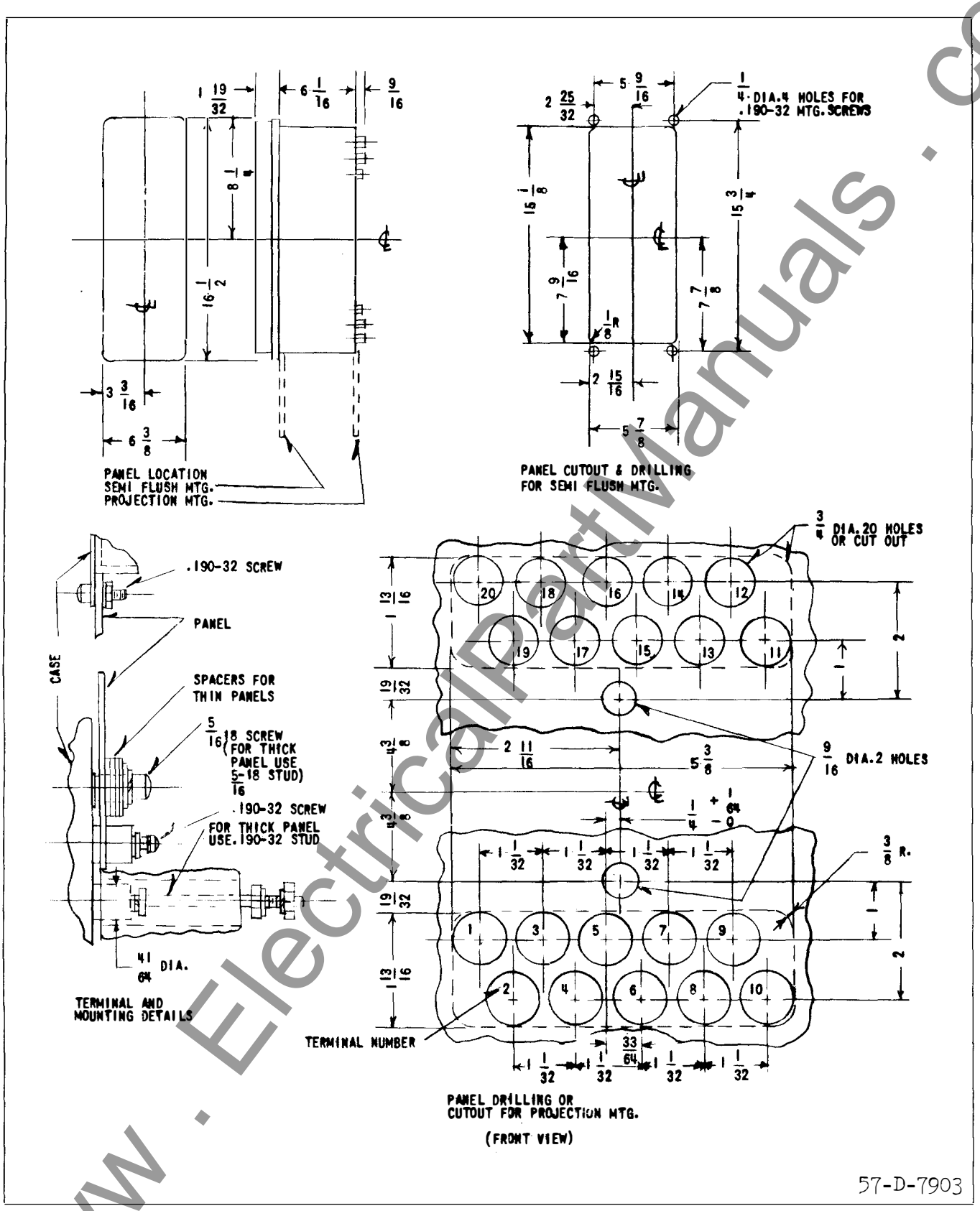

Fig. 9. Outline and Drilling Plan for the Type FT32 Case

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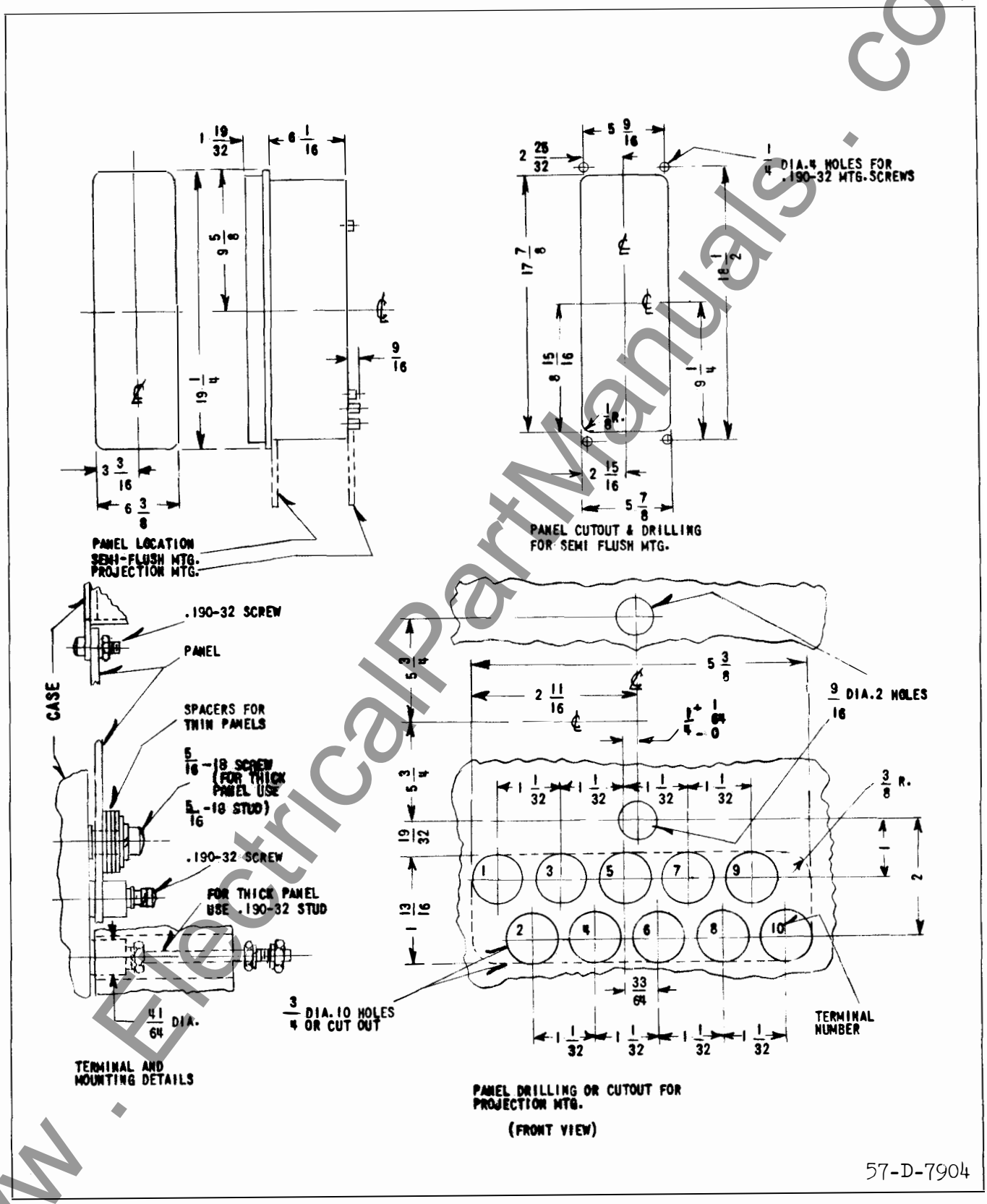

Fig. 10. Outline and Drilling Plan for the Type FT41 Case

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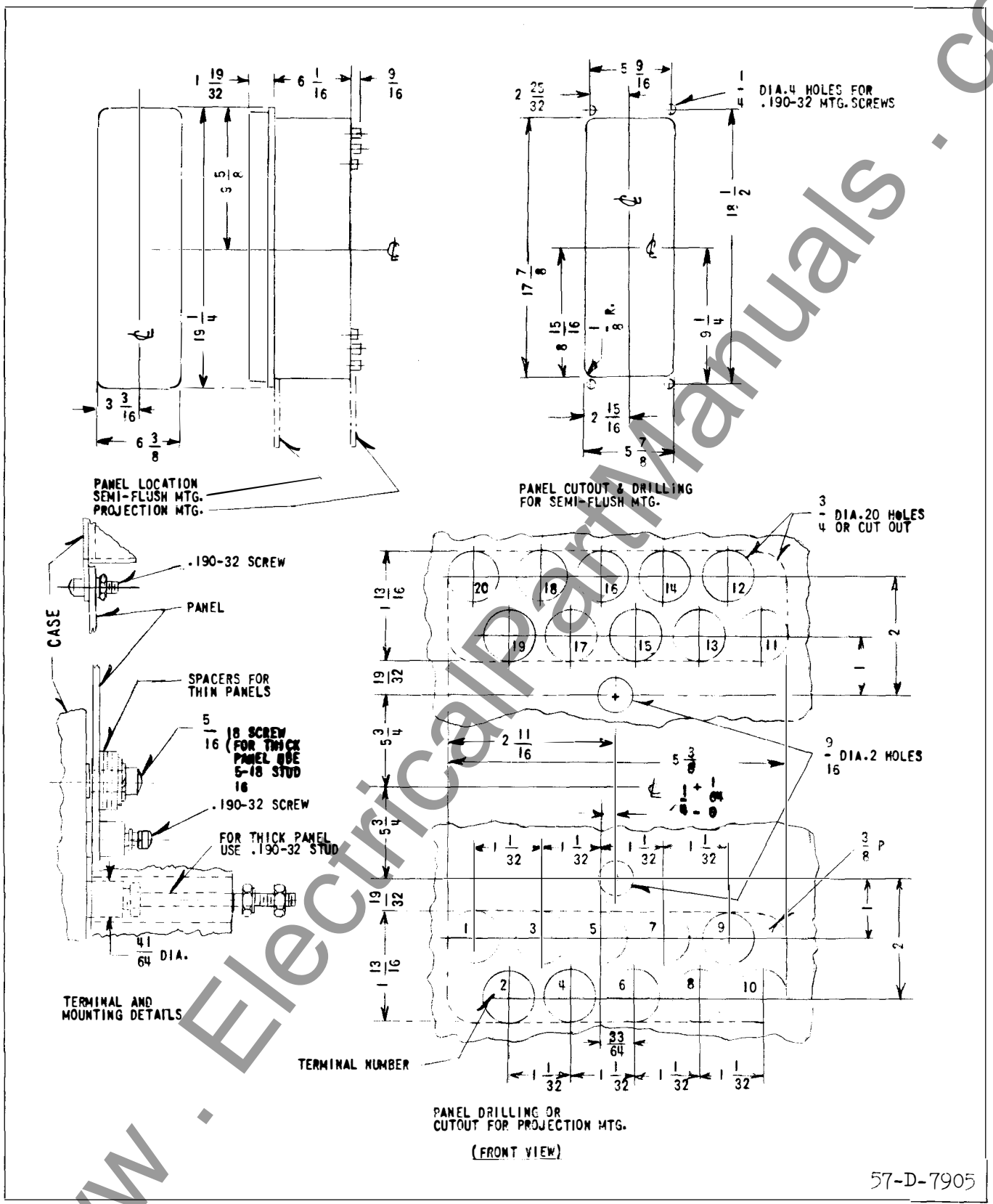

Fig. 11. Outline and Drilling Plan for the Type FT42 Case

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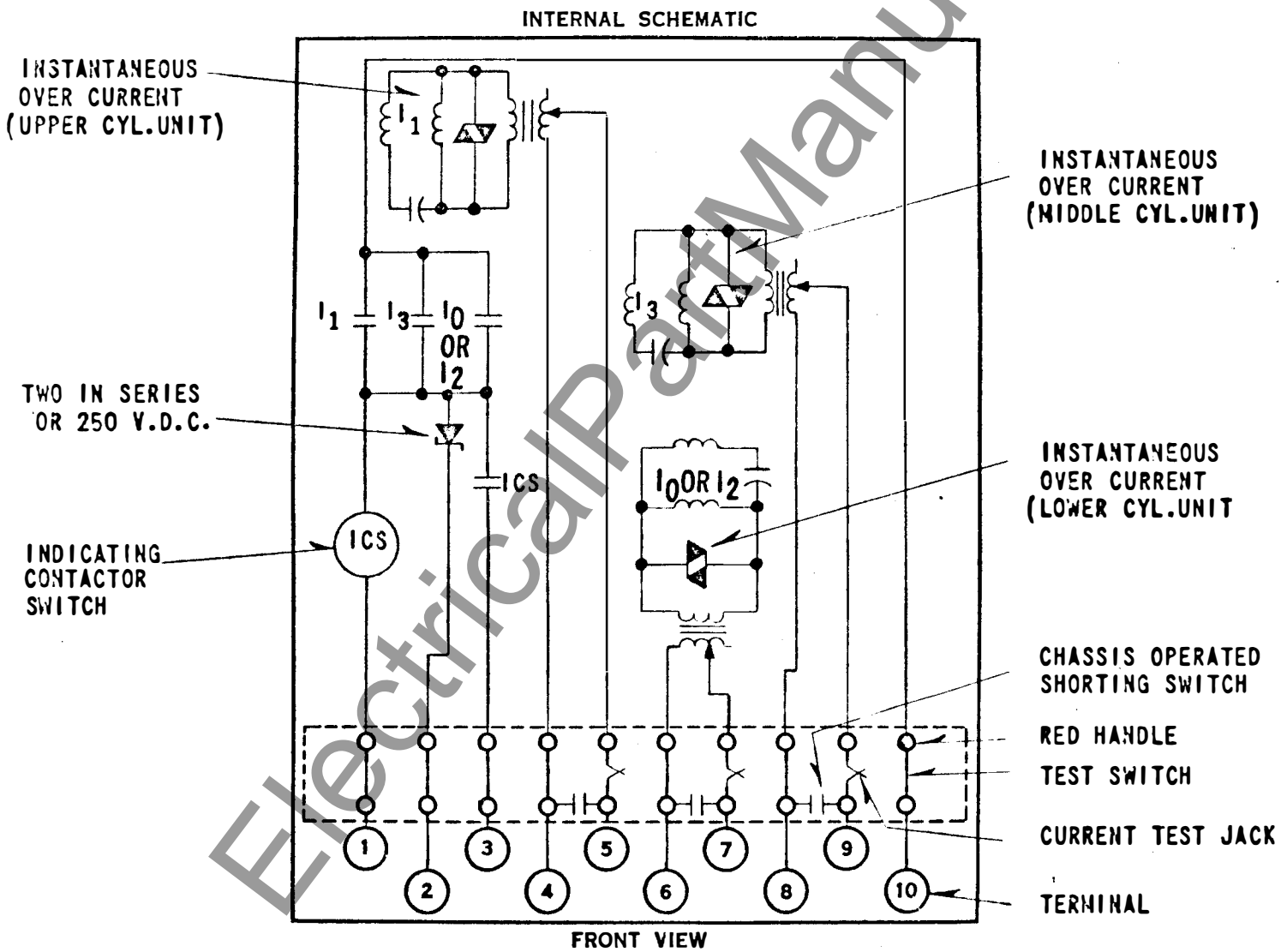

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