

TOCCO

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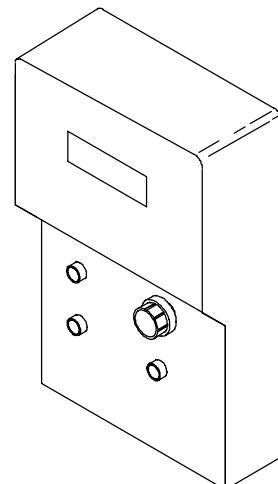
Processes

Induction Heating

Description

Single Induction Heating Power Source
Pendant Control

TOCCOtron® PC



OWNER'S MANUAL

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SECTION 1 – SAFETY PRECAUTIONS – READ BEFORE USING

1-1. Symbol Usage



Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

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- ▲ Marks a special safety message.

☞ Means "Note"; not safety related.



This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Induction Heating Hazards

- ▲ The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-4. Read and follow all Safety Standards.
- ▲ Only qualified persons should install, operate, maintain, and repair this unit.
- ▲ During operation, keep everybody, especially children, away.



ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The power circuit and output bus bars or connections are electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Enclose any connecting bus bars and coolant fittings to prevent unintentional contact.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Disconnect input power before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Use only nonconductive coolant hoses with a minimum length of 18 inches (457 mm) to provide isolation.
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- Do not touch power circuit if you are in contact with the work, ground, or another power circuit from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.

SIGNIFICANT DC VOLTAGE exists after removal of input power on inverters.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any internal parts.



INDUCTION HEATING can cause burns.

- Hot parts and equipment can injure.
- Do not touch or handle induction head/coil during operation.
- Do not touch hot parts bare-handed.
- Allow cooling period before handling parts or equipment.
- Keep metal jewelry and other metal personal items away from head/coil during operation.



FIRE OR EXPLOSION hazard.

- Do not overheat parts and adhesive.
- Watch for fire; keep extinguisher nearby.
- Keep flammables away from work area.
- Do not locate unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not operate unit in explosive atmosphere.



FUMES AND GASES can be hazardous.

Induction Heating of certain materials, adhesives, and fluxes can produce fumes and gases. Breathing these fumes and gases can be hazardous to your health.

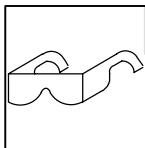
- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust to remove fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instruction for adhesives, fluxes, metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watchperson nearby. Fumes and gases from heating can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not heat in locations near degreasing, cleaning, or spraying operations. The heat can react with vapors to form highly toxic and irritating gases.
- Do not overheat coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the heated area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if overheated. See coating MSDS for temperature information.

1-3. Additional Symbols for Installation, Operation, and Maintenance



FALLING UNIT can cause injury.

- Use handle and have person of adequate physical strength lift unit.
- Move unit with hand cart or similar device.
- For units without a handle, use equipment of adequate capacity to lift unit.
- When using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



FLYING METAL OR ADHESIVE can injure eyes.

- Wear approved safety glasses with side shields or wear face shield.



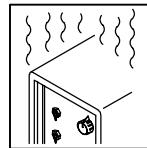
MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.



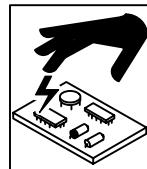
MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near induction heating operations.



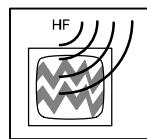
OVERUSE can cause OVERHEATING

- Allow cooling period.
- Reduce output or reduce duty cycle before starting to heat again.
- Follow rated duty cycle.



STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified person familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut.

1-4. Principal Safety Standards

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Canadian Electrical Code Part 1, CSA Standard C22.1, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

1-5. EMF Information

Considerations About Induction Heating And The Effects Of Low Frequency Electric And Magnetic Fields

The following is a quotation from the General Conclusions Section of the U.S. Congress, Office of Technology Assessment, *Biological Effects of Power Frequency Electric & Magnetic Fields – Background Paper*, OTA-BP-E-53 (Washington, DC: U.S. Government Printing Office, May 1989): "... there is now a very large volume of scientific findings based on experiments at the cellular level and from studies with animals and people which clearly establish that low frequency magnetic fields can interact with, and produce changes in, biological systems. While most of this work is of very high quality, the results are complex. Current scientific understanding does not yet allow us to interpret the evidence in a single coherent framework. Even more frustrating, it does not yet allow us to draw definite conclusions about questions of possible risk or to of-

fer clear science-based advice on strategies to minimize or avoid potential risks."

To reduce magnetic fields in the workplace, use the following procedures:

1. Arrange output cable to one side and away from the operator.
2. Do not coil or drape output cable around the body.
3. Keep power source and cable as far away from the operator as practical.

About Pacemakers:

The above procedures are also recommended for pacemaker wearers. Consult your doctor for complete information.

SECTION 1 – MESURES DE SECURITE POUR LE CHAUFFAGE PAR INDUCTION

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AVERTISSEMENT

LE CHAUFFAGE PAR INDUCTION peut être dangereux.

PRENDRE LES MESURES NECESSAIRES POUR EVITER LES RISQUES DE BLESSURES GRAVES, VOIRE MORTELLES. TENIR LES ENFANTS A DISTANCE. LES PORTEURS D'UN STIMULATEUR CARDIAQUE DOIVENT PREALABLEMENT CONSULTER LEUR MEDECIN.

Pendant les opérations de chauffage, comme dans la plupart des activités, l'opérateur s'expose à certains dangers. Le chauffage n'est pas dangereux à condition de prendre certaines mesures. Les consignes de sécurité indiquées ci-après ne sont qu'un résumé des informations plus détaillées se trouvant dans les normes de sécurité énumérées à la page suivante. Lire et respecter toutes les normes de sécurité.

LES OPERATIONS D'INSTALLATION, DE FONCTIONNEMENT, DE MAINTENANCE ET DE REPARATION NE DOIVENT ETRE CONFIEES QU'A DU PERSONNEL QUALIFIE.



Danger de mort PAR ELECTROCUTION.

Le contact de composants électriques peut provoquer des accidents mortels ou des brûlures graves. Le circuit de puissance et les connexions de sortie sont sous tension lorsqu'on active la sortie. Le circuit d'alimentation et les circuits internes de la machine sont également sous tension lorsque l'alimentation est sur marche. Des équipements installés ou reliés à la borne de terre de manière incorrecte sont dangereux.

1. Ne pas toucher des composants électriques sous tension.
2. Envelopper les connexions et raccords de refroidissement pour éviter tout contact accidentel.
3. Porter des gants d'isolation secs, sans trous, et une protection corporelle.
4. Isolez-vous de la pièce et du sol avec des tapis ou des couvertures d'isolation suffisamment grands pour prévenir tout contact physique avec la pièce ou la terre.
5. Déconnecter l'alimentation avant d'installer l'appareil ou d'en effectuer l'entretien. Verrouiller ou étiqueter la sortie d'alimentation selon la norme OSHA 29 CFR 1910.147 (se reporter aux Principales normes de sécurité).
6. Utiliser seulement des tuyaux non conducteurs avec une longueur minimale de 460 mm pour assurer l'isolation.

7. Installer et mettre cet équipement correctement à la terre conformément au manuel utilisateur et aux codes nationaux, gouvernementaux et locaux.
8. Vérifier souvent la terre de l'alimentation – contrôler et s'assurer que le conducteur de terre du câble d'alimentation est correctement relié à la borne de terre dans le boîtier de déconnexion ou que le connecteur est branché à une sortie de boîtier correctement mise à la terre.
9. En réalisant des connexions d'entrée brancher d'abord le conducteur de terre approprié – contrôler deux fois les connexions.
10. Vérifier souvent le bon état du câble d'alimentation ou l'isolation des fils – remplacer le câble immédiatement s'il est endommagé – des fils dénudés peuvent provoquer des accidents mortels.
11. Arrêter tous les équipements lorsqu'ils ne sont pas utilisés.
12. Ne pas utiliser des câbles usés, endommagés, sous dimensionnés ou mal épissés.
13. Ne pas porter les câbles autour de votre corps.
14. Ne pas toucher le circuit électrique si vous êtes en contact avec la pièce, la terre ou le circuit électrique d'une autre machine.
15. Utiliser seulement des équipements bien entretenus. Réparer ou remplacer immédiatement des composants endommagés. Effectuer des travaux d'entretien sur l'appareil selon le manuel.
16. Porter un harnais de sécurité pour effectuer des travaux au-dessus du sol.
17. Maintenir solidement en place tous les panneaux et couvercles.



LE CHAUFFAGE PAR INDUCTION peut provoquer des blessures ou des brûlures au contact de PIECES CHAUDES OU DE L'EQUIPEMENT.

1. Ne pas toucher ou manipuler la tête/l'enroulement à induction pendant le fonctionnement.
2. Tenir les bijoux et autres objets personnels en métal éloignés de la tête/de l'enroulement pendant le fonctionnement.
3. Laisser refroidir les composants ou équipements avant de les manipuler.



LE CHAUFFAGE PAR INDUCTION peut provoquer un incendie.

1. Ne pas surchauffer les composants ni les adhésifs.
2. Attention aux risques d'incendie: tenir un extincteur à proximité.
3. Stocker des produits inflammables hors de la zone de travail.

La mise en place de l'appareil sur, au-dessus ou à proximité de surfaces inflammables peut être source d'INCENDIES OU d'EXPLOSION.

1. Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces inflammables.
2. Ne pas installer l'appareil à proximité de produits inflammables.
3. Ne pas faire fonctionner l'appareil en atmosphère explosive.



DES FUMEES ET DES GAZ peuvent être dangereux pour votre santé.

Le chauffage à induction génère des fumées et des gaz. Leur inhalation peut être dangereuse pour votre santé.

1. Eloigner la tête des fumées. Ne pas respirer les fumées.
2. A l'intérieur, ventiler la zone et/ou utiliser un extracteur pour l'évacuation des fumées et des gaz.
3. Si la ventilation est insuffisante, utiliser un respirateur à alimentation d'air homologué.
4. Lire les spécifications de sécurité des matériaux (MSDSs) et les instructions du fabricant concernant les adhésifs, les métaux, les consommables, les revêtements, les nettoyants et les dégraissateurs.

5. Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz provenant du chauffage peuvent déplacer l'air, abaisser le niveau d'oxygène, et provoquer des lésions ou des accidents mortels. S'assurer que l'air ambiant ne présente aucun danger.
6. Ne pas chauffer dans des endroits se trouvant à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur peut réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
7. Ne pas chauffer des métaux munis d'un revêtement tels que l'acier galvanisé, plaqué au plomb ou au cadmium, à moins que le revêtement ne soit enlevé de la zone chauffée, que la zone soit bien ventilée et, si nécessaire, en portant un respirateur. Les revêtements et tous les métaux contenant ces éléments peuvent dégager des fumées toxiques s'ils sont chauffés.

1-1. Dangers supplémentaires de mise en route, de fonctionnement et d'entretien

	<p>LA CHUTE DE MATERIEL peut provoquer des blessures personnelles graves et endommager les équipements.</p> <ol style="list-style-type: none">1. Utiliser la poignée et demander à une personne ayant la force physique nécessaire pour soulever l'appareil.2. Déplacer l'appareil à l'aide d'un chariot ou d'un engin similaire.3. Pour les appareils sans poignée utiliser un équipement d'une capacité appropriée pour soulever l'appareil.4. En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.		<p>UNE UTILISATION INTENSIVE peut provoquer un SURCHAUFFEMENT DU MATERIEL.</p> <ol style="list-style-type: none">1. Prévoir une période de refroidissement2. Réduire le courant de sortie ou le facteur de marche avant de recommencer le chauffage.3. Respecter le facteur de marche nominal.
	<p>L'ELECTRICITE STATIQUE peut endommager les composants des tableaux électriques.</p> <ol style="list-style-type: none">1. Etablir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.2. Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes PC.		
	<p>LA PROJECTION DE PIECES DE METAL ou DE COLLE peut provoquer des blessures aux yeux.</p> <ol style="list-style-type: none">1. Porter des lunettes de protection avec des protections latérales.		<p>Il subsiste DU COURANT CONTINU IMPORTANT après la mise hors tension de l'alimentation électrique.</p> <ol style="list-style-type: none">1. Avant de toucher des organes internes, arrêter la source électrique, débrancher l'alimentation, et décharger les condensateurs d'alimentation conformément aux instructions indiquées dans la partie maintenance.
	<p>DES ORGANES MOBILES peuvent provoquer des blessures.</p> <ol style="list-style-type: none">1. S'abstenir de toucher des organes mobiles tels que des ventilateurs.2. Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.		<p>LE RAYONNEMENT HAUTE FREQUENCE peut provoquer des interférences avec les équipements de radio-navigation et de communication, les services de sécurité et les ordinateurs.</p> <ul style="list-style-type: none">• Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.• L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.• Si le FCC signale des interférences, arrêter immédiatement l'appareil.• Effectuer régulièrement le contrôle et l'entretien de l'installation.• Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence.
	<p>DES CHAMPS MAGNETIQUES CREEES PAR DES COURANTS ELEVES peuvent affecter le fonctionnement du stimulateur cardiaque.</p> <ol style="list-style-type: none">1. Porteurs de stimulateur cardiaque, restez à distance.2. Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de chauffage à induction.		

1-2. Informations concernant les champs électro-magnétiques (Information EMF)

Considérations relatives au chauffage à induction et aux effets des champs électriques et magnétiques basse fréquence.

Le texte suivant est extrait des conclusions générales Département du Congrès U.S., Office of Technology Assessment, *Effets biologiques des champs magnétiques et électriques basse fréquence – Background Paper*, OTA-BP-E-53 (Washington, DC: U.S. Government Printing Office, May 1989): ". . . on dispose maintenant d'importantes découvertes scientifiques reposant sur des expériences effectuées dans le domaine cellulaire et des études réalisées sur des animaux et des personnes qui démontrent clairement que des champs magnétiques basse fréquence peuvent avoir une interaction et produire des changements dans les systèmes biologiques. Alors que la plus grande partie de cet ouvrage est d'une très grande qualité, les résultats sont complexes. La compréhension scientifique courante ne nous permet pas encore d'interpréter la preuve fournie dans un seul ouvrage cohérent. Il est encore plus frustrant de ne pas pouvoir tirer des conclusions définitives en ce qui concerne les problèmes de risque possible ou de

proposer des recommandations scientifiques claires pour des stratégies à suivre en vue de minimiser ou de prévenir des risques potentiels."

Pour réduire les champs magnétiques sur le poste de travail, appliquer les procédures suivantes :

4. Disposer le câble de sortie d'un côté à distance de l'opérateur
5. Ne pas enrouler ou draper le câble électrique autour du corps.
6. Placer la source de courant et le câble le plus loin possible de l'opérateur.

En ce qui concerne les stimulateurs cardiaques

Les procédures ci-dessus concernent également les porteurs de stimulateur cardiaque. Consulter votre médecin pour un complément d'information.

PRINCIPALES NORMES DE SÉCURITÉ

Normes de sécurité et de santé, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Code électrique national, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Code électrique du Canada, partie 1, CSA Standard C22.1, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

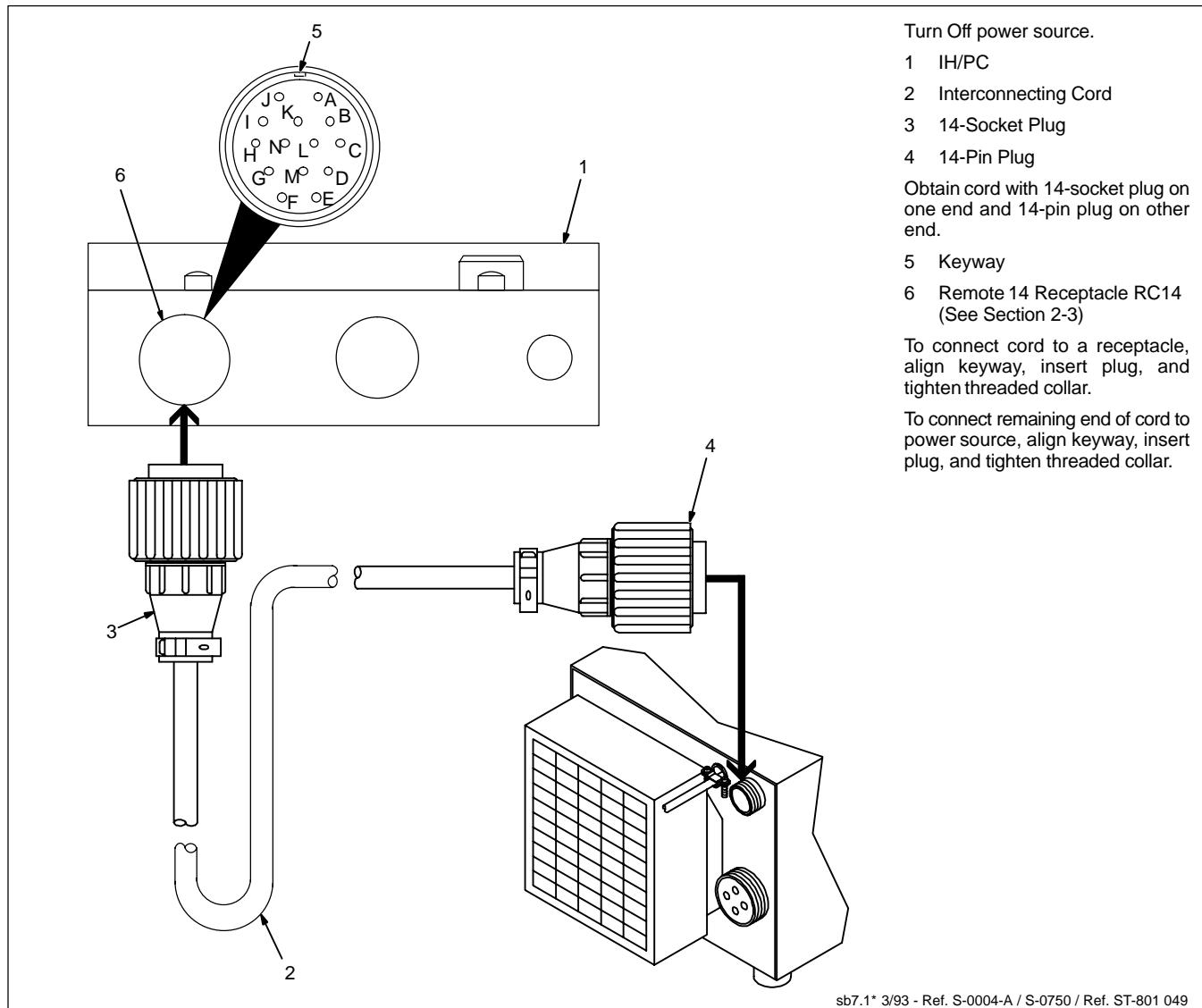
Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

SECTION 2 – INSTALLATION

2-1. Specifications

Specification	Description
Overall Dimensions	Height: 11-3/4 in (298 mm); Width: 7-1/4 in (184 mm); Depth: 3-1/8 in (79 mm)
Weight	Net: 2-3/4 lb (1.25 kg)
Type Of Input Power	24 Volts DC
Auxiliary Relay Rating	120 Volts AC, 5 Amperes
Interconnecting Cord With Plugs	15 ft (4.6 m)
Extension Cord (Optional)	25 ft (7.6 m)
Memory Capacity	Eight Programs Total; Either Single Or Multiple Program Accessibility (see Section 3-3H)
Control Capacity	Single Power Source Control
Time Range For Delay Settings And Power Levels	0.00 To 655.35 Seconds / 0.0 To 655.2 Minutes (see Section 3-3G)
Time Range For Initial And Final Slopes	0.00 To 655.35 Seconds / 0.0 To 655.2 Minutes (see Section 3-3G)
Time Range For Auxiliary Relays	0.00 To 655.35 Seconds / 0.0 To 655.2 Minutes (see Section 3-3G)

2-2. Connecting To Power Source



2-3. Remote 14 Pin Information For Receptacle RC14

 REMOTE 14	Pin	Pin Information
Remote Contactor	A	+24 volts dc from power source.
	B	Contact closure to A completes power source +24 volts dc contactor control circuit.
Remote Output Control	D	Control circuit common.
	E	0 to +10 volts dc signal for power source output control.
Power Source Fault	F, J	Absence of contact closure from power source indicates power source output failure.
Remote Metering	I	Actual frequency input signal (1 volt/5 kHz).
	L	Average power input signal (1 volt/1 kW).
	M	Voltage input signal RMS (1 volt/50 volts).
	N	Current input signal RMS (1 volt/50 amperes)
	K	Chassis common.

2-4. Feedback Scaling Setup Information For Receptacle RC14

NOTE 	<i>Power source feedback scaling is selected during the set-up procedure. See Sections 3-3C, D, E, and F for set-up screens.</i>
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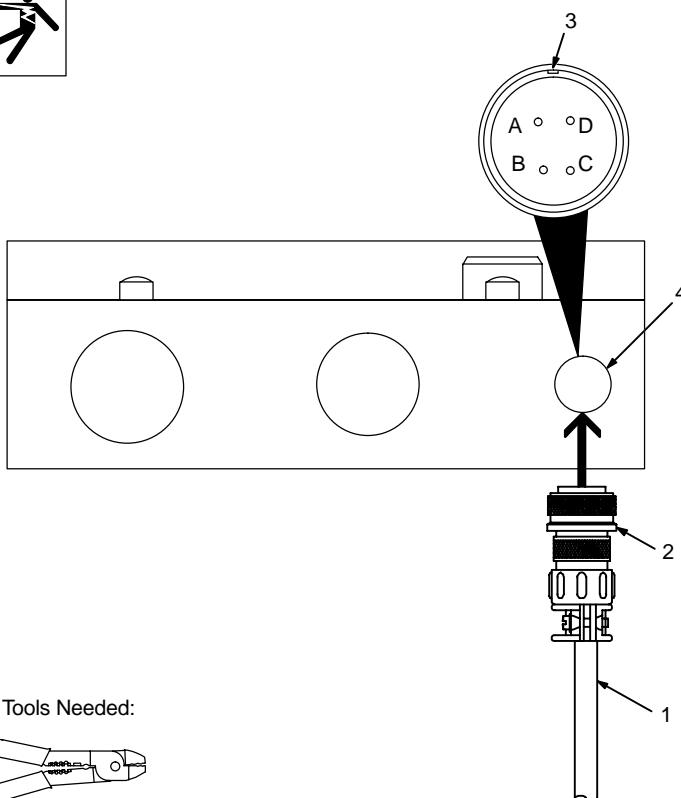
 REMOTE 14	Pin	Power Source Feedback Scale			
		IHPS II 5 KW	INTELLIFIRE 250	IHPS II 4 KW	IHPS II 10 DC
Remote Metering	I	1 volt/5 kHz	1 volt/10 kHz	1 volt/5 kHz	1 volt/5 kHz
	L	1 volt/1 kW	1 volt/5 kW	1 volt/1 kW	1 volt/1 kW
	M	1 volt/50 volts	1 volt/100 volts	1 volt/50 volts	1 volt/50 volts
	N	1 volt/50 amperes	1 volt/100 amperes	1 volt/50 amperes	1 volt/50 amperes

2-5. Remote Start/Stop Switch And Flow Switch Connections

NOTE



Remote Start/Stop function will only work if enabled in the set-up screens (see Section 3-3). The coolant flow detection feature is enabled or disabled in the set-up screens (see Section 3-3).



Tools Needed:



A remote maintained contact switch can be connected to the pendant controller to start or stop the heating program. A flow switch connection can also be made for a coolant system.

Turn Off power source.

1 Interconnecting Cord (Customer Supplied)

2 4-Pin Plug

Obtain cord and install supplied plug on one end.

3 Keyway

4 Remote Start/Stop Receptacle RC4 (See Section 2-6)

To connect cord to receptacle, align keyway, insert plug, and tighten threaded collar.

To connect remaining end of cord, make connections to maintained contact switch and/or flow switch.

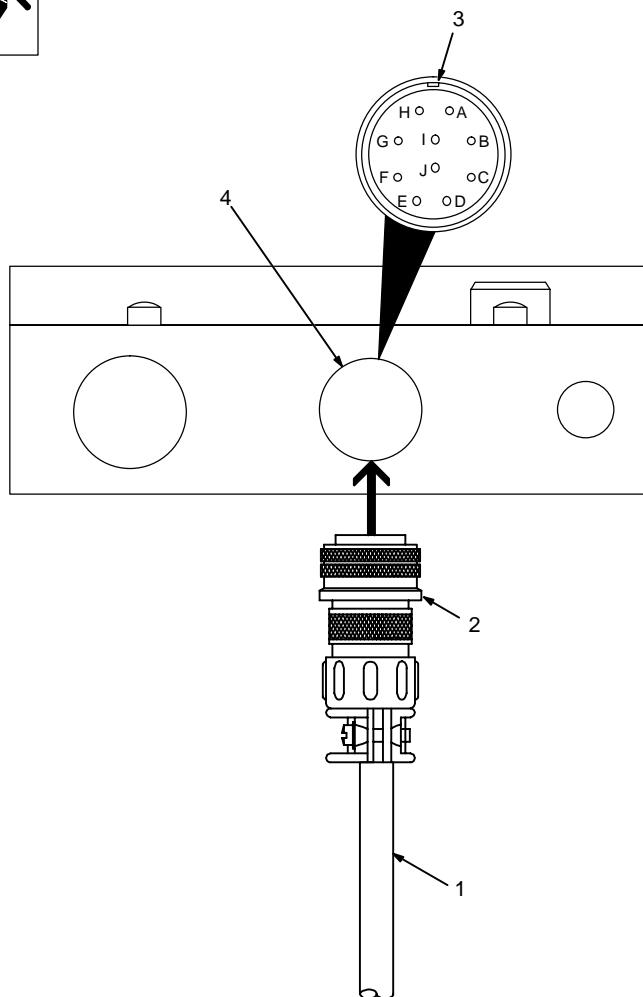
If optional connections to an external device are being made, proceed to Section 2-7.

Ref. S-0446-A / S-0628-A

2-6. Remote Start/Stop Socket Information For Receptacle RC4

	START/STOP	Socket	Socket Information
Remote Start/Stop	A	+24 volts dc.	
	B	Maintained contact closure to socket A starts the heating cycle. Opening the contact closure or pressing the STOP button on the pendant stops the heating cycle.	
Coolant Flow Indication	C	Contact closure to socket D by flow switch indicates coolant is flowing in the induction heating system. Absence of contact closure will prevent starting heating cycle, or stop heating cycle and provide an error message on the pendant display.	
	D	+24 volts dc.	

2-7. Connecting External Device (Optional)



This control may be connected to an external device, such as a fixturing control or programmable logic control. The control can send signals to the external device when a program is running and when a fault exists.

To connect external device, proceed as follows:

Turn Off power source.

1 External Control Cord
(Customer Supplied)

2 10-Socket Plug

Obtain cord and install supplied plug on one end.

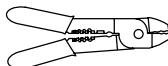
3 Keyway

4 Remote I/O Receptacle RC10
(See Section 2-8)

To connect cord to receptacle, align keyway, insert plug, and tighten threaded collar.

To connect remaining end of cord, make connections to external control panel or device.

Tools Needed:



Ref. S-0166-A / S-0628-A

2-8. External Device Pin Information For Receptacle RC10

INPUT/OUTPUT	Pin	Pin Information
In Cycle Relay The In Cycle Relay energizes when the pendant is In Cycle. The In Cycle mode for the pendant is whenever the power source is energized or an auxiliary timer is in operation.	A B C	In cycle relay common. N.C. contacts. N.O. contacts.
Auxiliary Relay The Aux. Relay is fully programmable for use in controlling auxiliary equipment such as clamps or solenoids, and operates even after the heating cycle ends. The delay time and on time are set during programming. When this relay is activated, the pendant is in cycle and the In Cycle Relay is activated.	D E F	Aux. relay common. N.C. contacts. N.O. contacts.
Limit Relay The Limit Relay will activate if the following conditions are present: When cycle ends if the power source or pendant was in a limit condition. Whenever Coolant Flow Indication contacts open at sockets C and D of receptacle RC4 indicating no coolant flow is present (see Section 2-6).	G H I	Limit relay common. N.C. contacts. N.O. contacts.

2-9. Field Installation Of Optional EPROM Memory Upgrade

Installation of the EPROM memory upgrade expands memory capacity of the IH/PC to allow storing a maximum of eight operating programs.

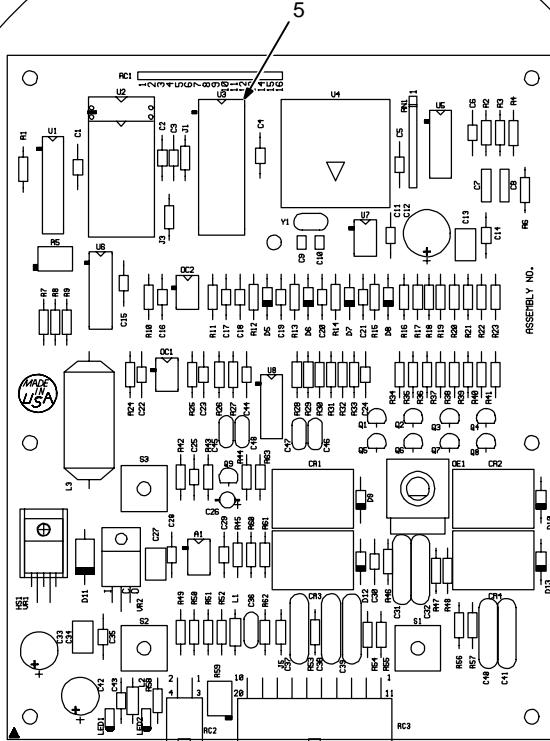
NOTE



DO NOT set circuit board on any conductive surface. Place circuit board on a nonconductive, static-protected surface.



Use a proper puller tool to remove EPROM from circuit board; DO NOT use a screwdriver or any other device to pry EPROM from circuit board. When installing EPROM on circuit board, match notch in EPROM housing with notch in DIP receptacle. Align all EPROM pins with receptacle sockets and gently press EPROM onto receptacle to secure pins into sockets.



1 IH/PC

Place pendant on a nonconductive, static-protected work surface.

2 Parameter Adjust Knob

Loosen setscrew to release shaft from Parameter Adjust knob.

3 Rear Panel

Remove 9 screws securing rear panel. Remove rear panel from case.

4 Circuit Board PC1

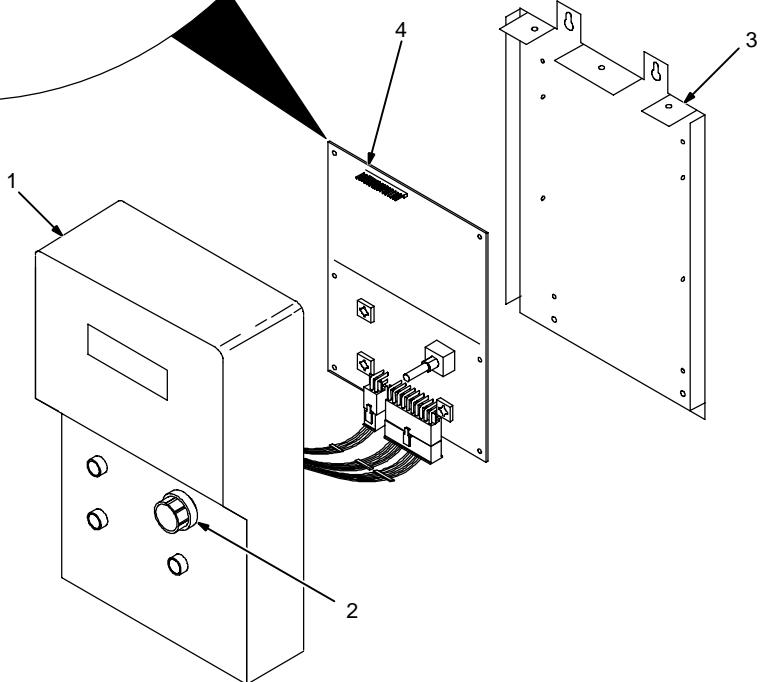
Remove 6 screws securing circuit board. Carefully lift up circuit board and disconnect ribbon cable connector from top of board. Rotate board out of case toward bottom of pendant to access component side.

5 EPROM U3

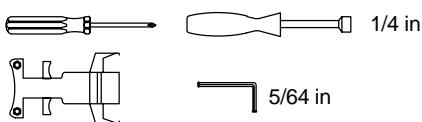
Remove existing EPROM from PC1 and install supplied EPROM on circuit board.

Position EPROM so that notch in EPROM housing is in same direction as notch in DIP receptacle and pins align with sockets. Gently press EPROM down to secure pins into sockets.

To assemble IH/PC, reverse procedure beginning just before Item 5.

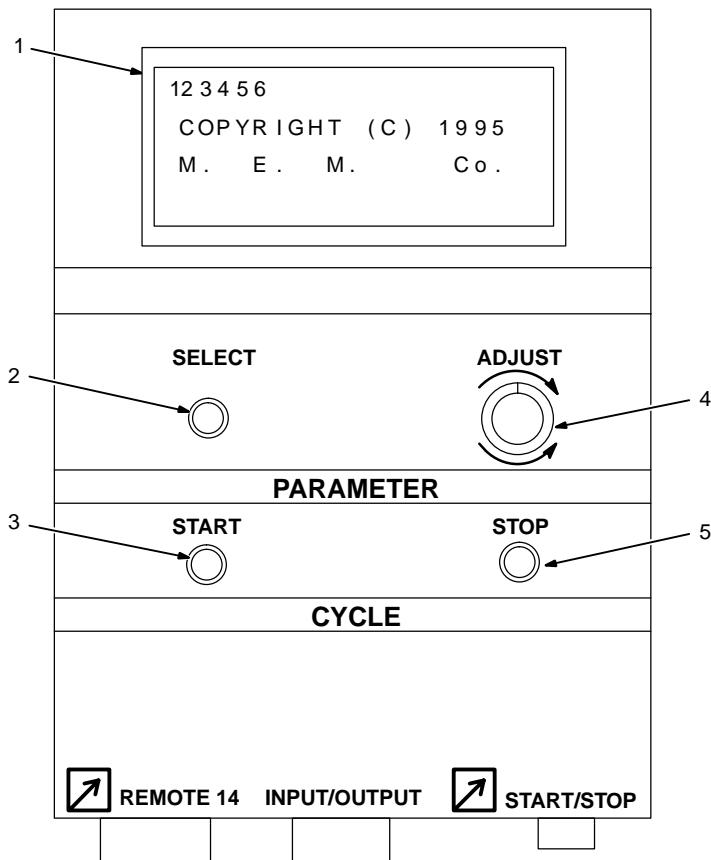


Tools Needed:



SECTION 3 – PROGRAMMING

3-1. Digital Display, Push Buttons, And Knob



▲ Keep all panels, doors, and covers closed and secure during programming.

▲ Place Remote Start switch in Off position.

1 Digital Display

2 Parameter Select Button

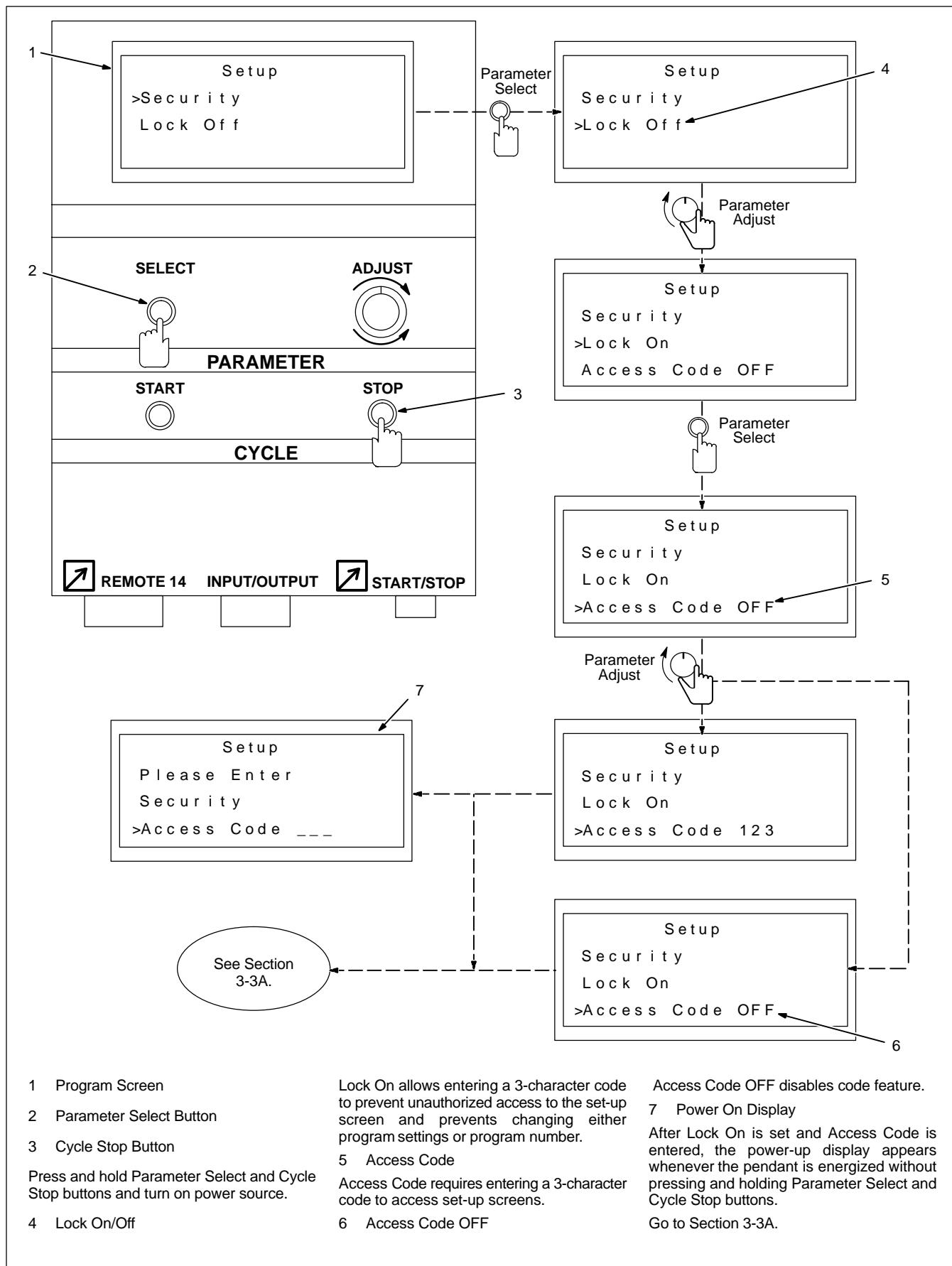
3 Cycle Start Button

4 Parameter Adjust Knob

Rotate knob clockwise to change setting(s) or increase value. Rotate knob counterclockwise to return to previous setting(s) or decrease value.

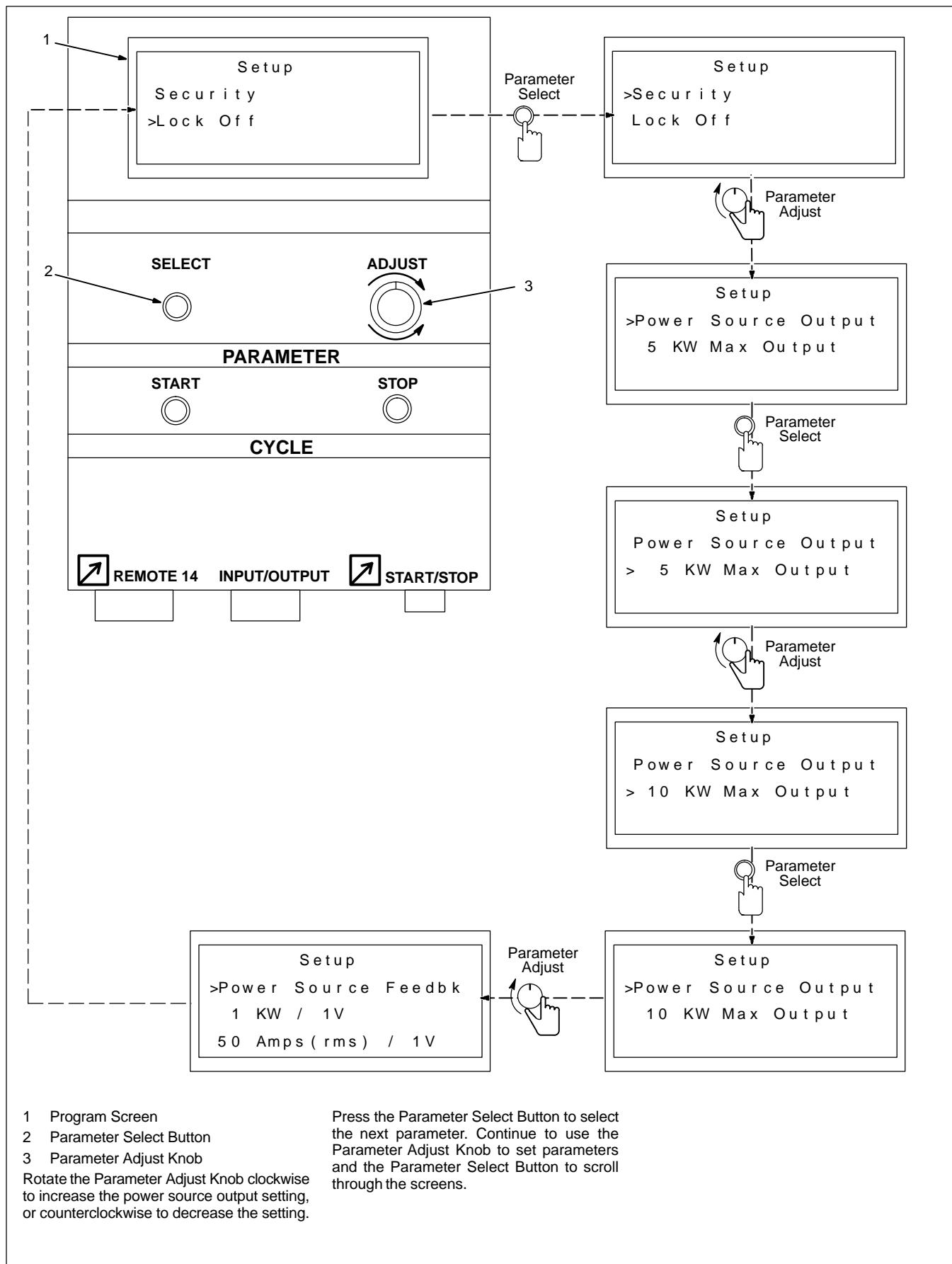
5 Cycle Stop Button

3-2. Set-Up Security Screens

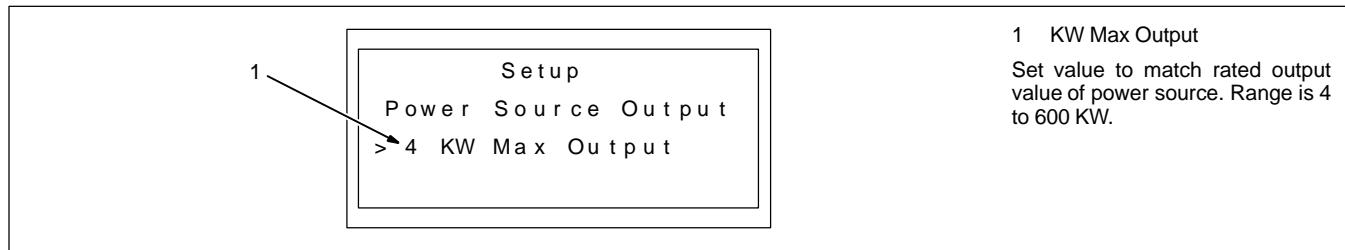


3-3. Set-Up Parameter Screens

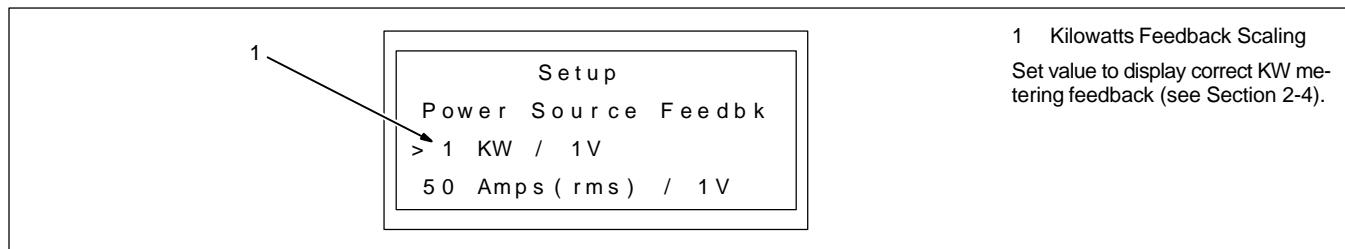
A. Set-Up Parameter Screens



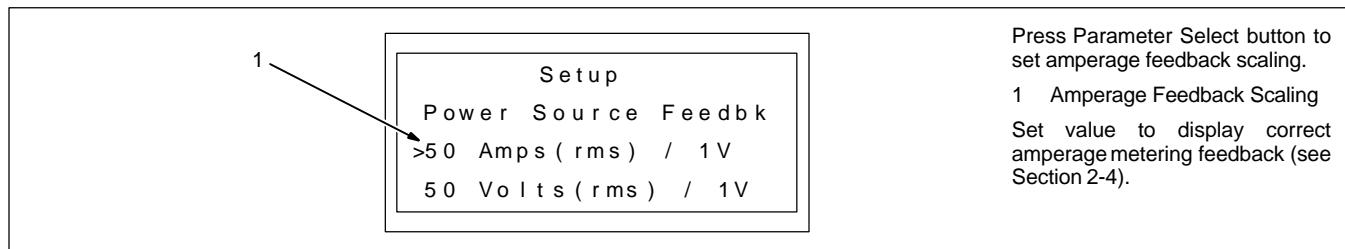
B. Power Source Output Screen



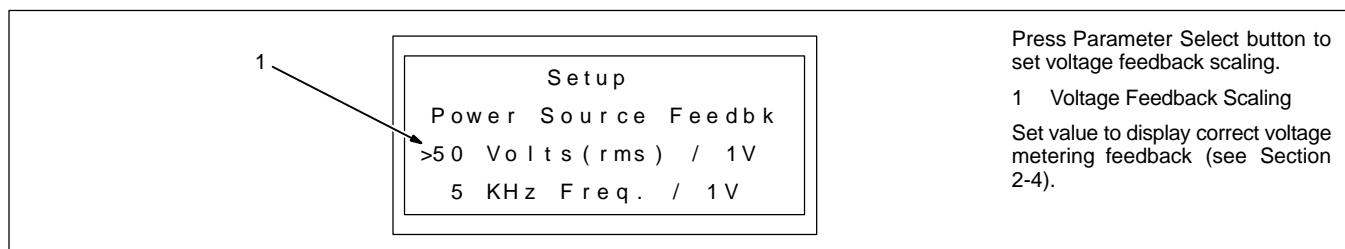
C. Kilowatts Feedback Scaling



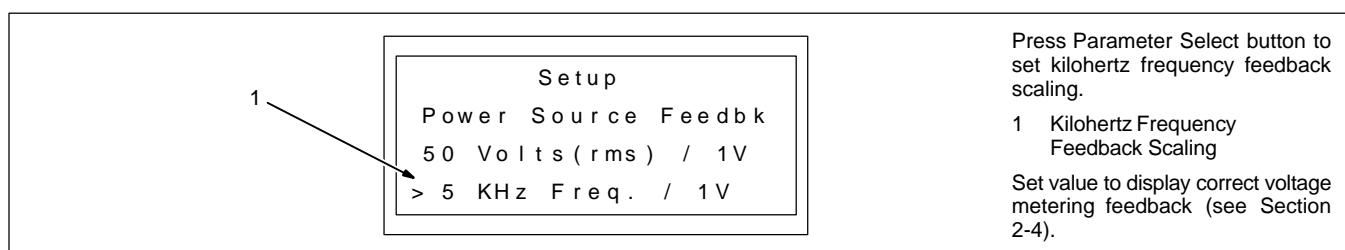
D. Amperage Feedback Scaling



E. Voltage Feedback Scaling

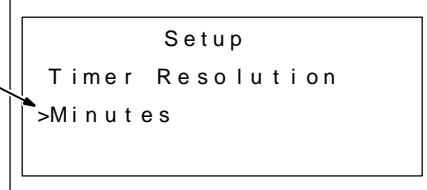


F. Kilohertz Frequency Feedback Scaling



G. Timer Resolution

1



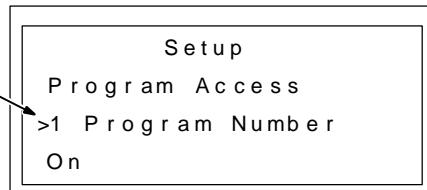
Press Parameter Select button to set timer resolution.

1 Minutes Or Seconds

Set either minutes or seconds for time interval of timer functions.

H. Program Access

1



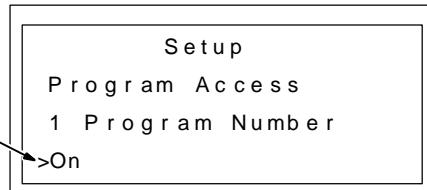
If access is set to Off for a linked program and input power is turned off and back on, the link will automatically be turned off. Turning access back on for the linked program will not turn the link back on. The program link operation must be performed again.

Press Parameter Select button to set program access.

1 Program Number

Set desired program number to either turn on access for parameter setting and operation or turn off access completely. Range is from 1 to 8.

2



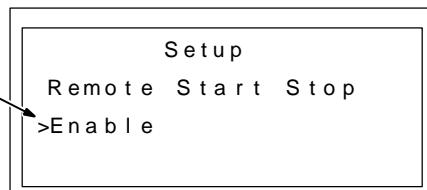
2 On Or Off

Set On to allow access to set program number. Set Off to prevent access to set program number.

Repeat procedure as necessary to turn on or off accessibility for desired program(s).

I. Remote Start/Stop

1

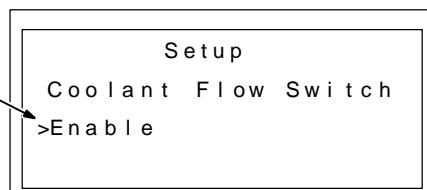


1 Enable Or Disable

Set Enable to use remote start/stop feature. Set Disable when not using remote start/stop.

J. Coolant Flow Switch

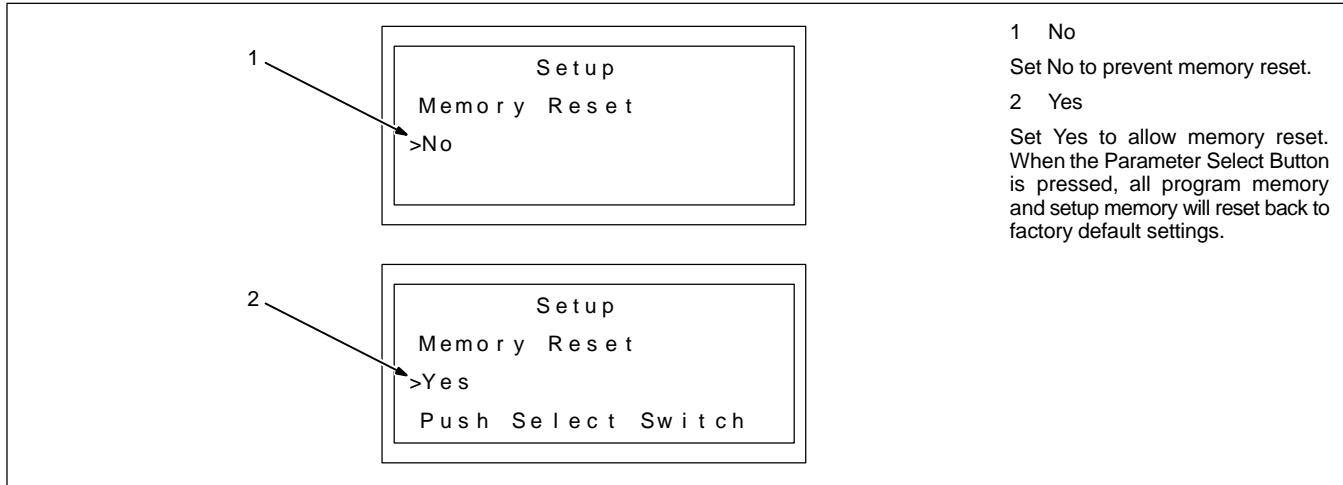
1



1 Enable Or Disable

Set Enable to use coolant flow switch feature. Set Disable when not using coolant flow switch.

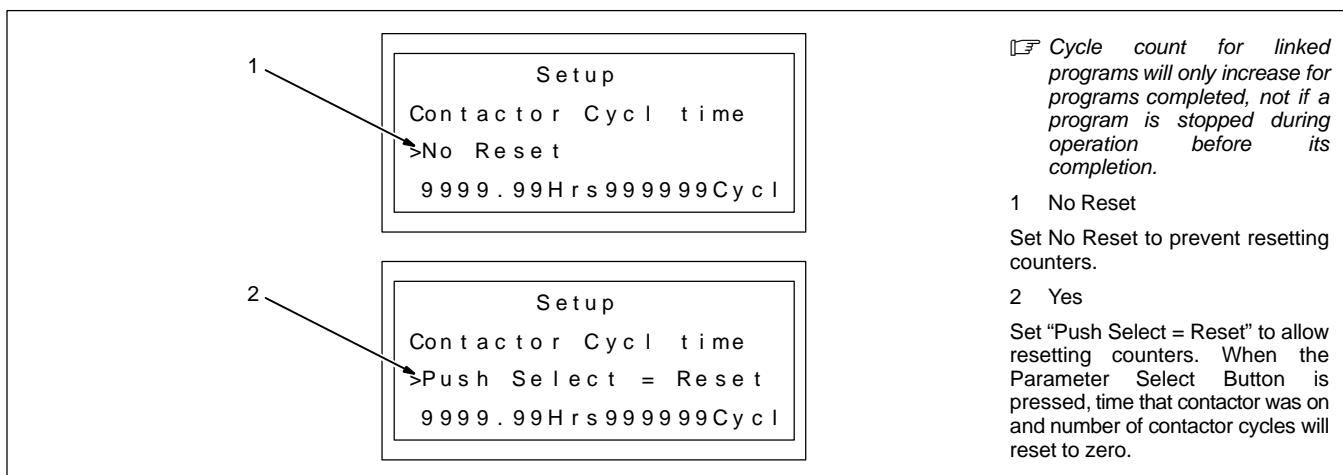
K. Memory Reset



L. Cycle Time Counters



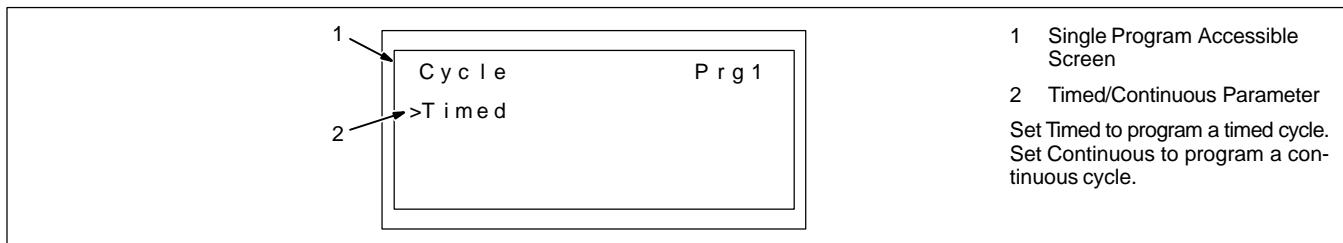
Memory Reset parameter does not reset cycle time counters.



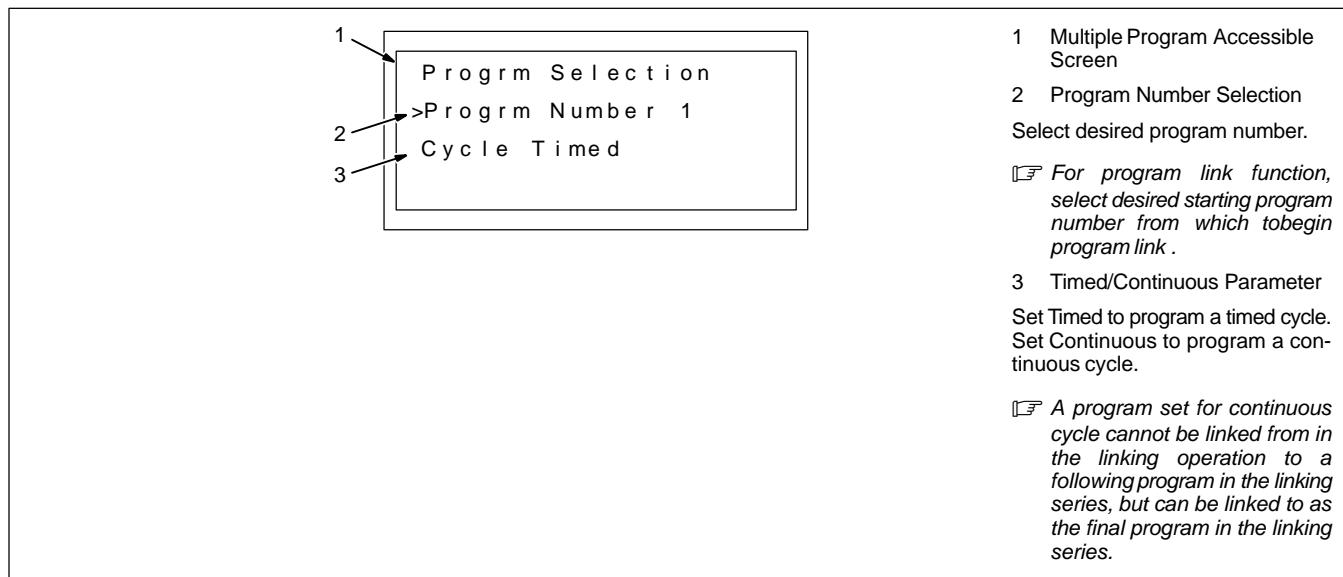
After performing the set-up procedure, turn power off and back on again at power source to enter settings into IH/PC memory.

3-4. Program(s) Parameter Screens

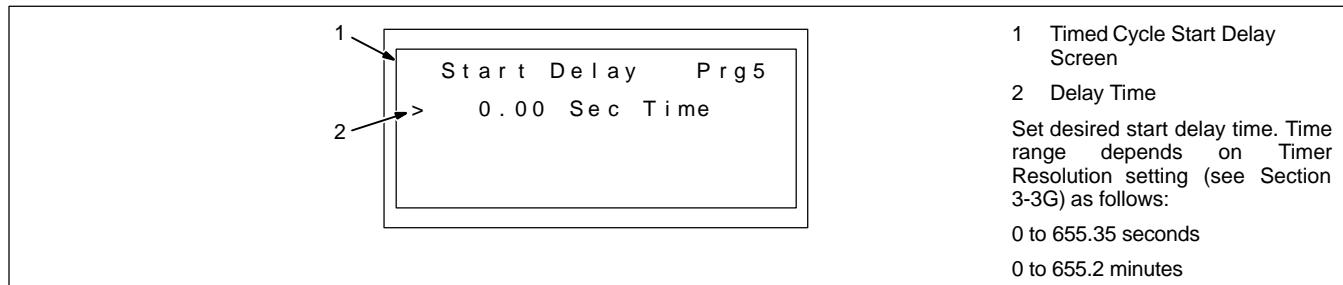
A. Single Program Accessible Screen



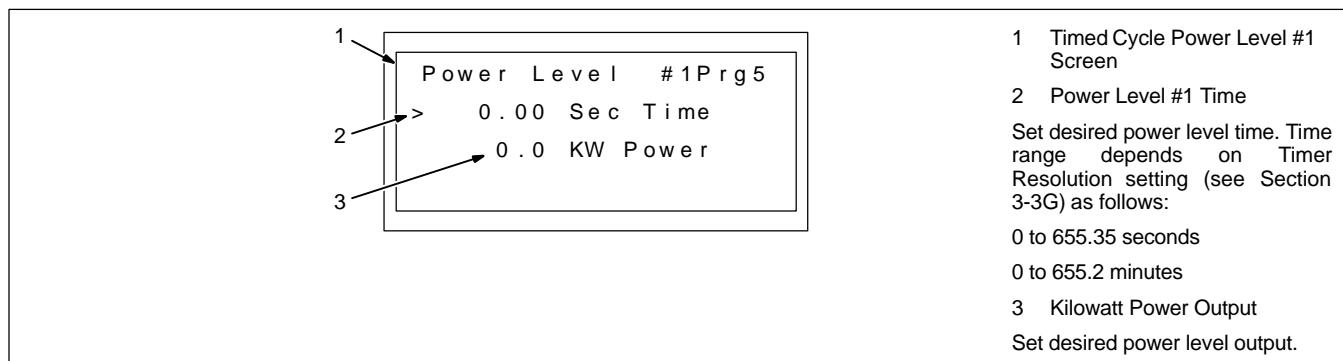
B. Multiple Program Accessible Screen



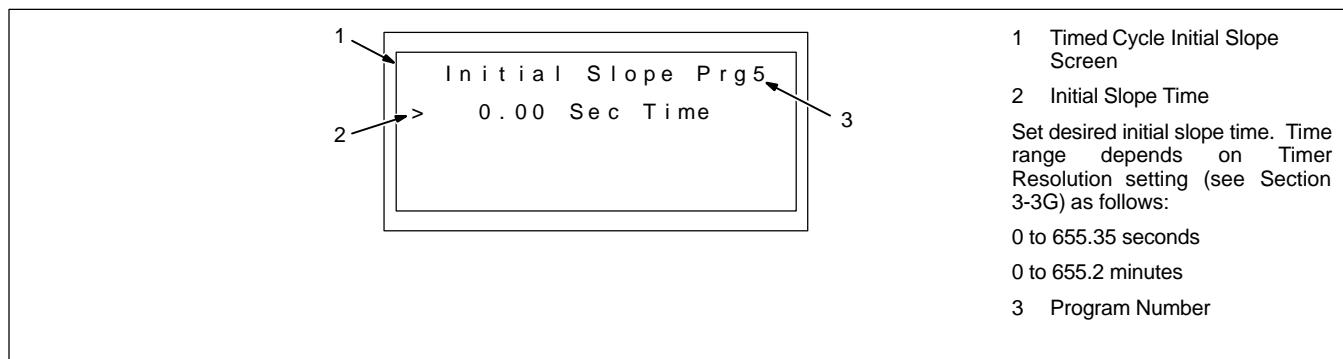
C. Timed Cycle Start Delay Time



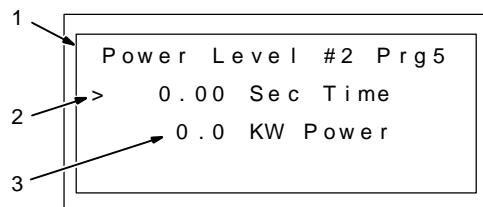
D. Timed Cycle Power Level #1



E. Timed Cycle Initial Slope

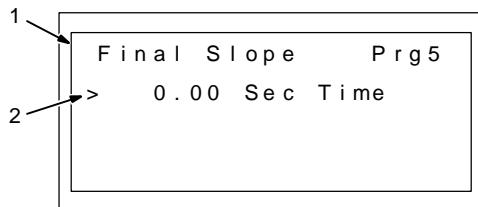


F. Timed Cycle Power Level #2



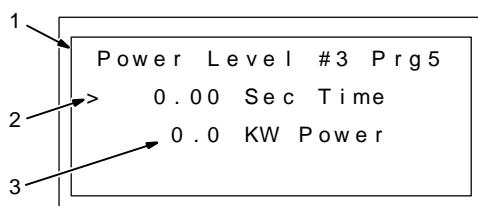
- 1 Timed Cycle Power Level #2 Screen
- 2 Power Level #2 Time
Set desired power level time. Time range depends on Timer Resolution setting (see Section 3-3G) as follows:
 - 0 to 655.35 seconds
 - 0 to 655.2 minutes
- 3 Kilowatt Power Output
Set desired power level output.

G. Timed Cycle Final Slope



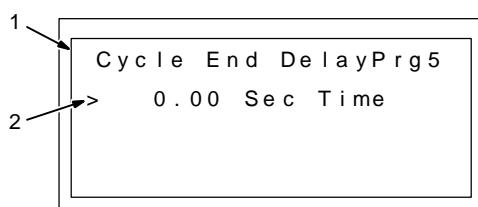
- 1 Timed Cycle Final Slope Screen
- 2 Final Slope Time
Set desired final slope time. Time range depends on Timer Resolution setting (see Section 3-3G) as follows:
 - 0 to 655.35 seconds
 - 0 to 655.2 minutes

H. Timed Cycle Power Level #3



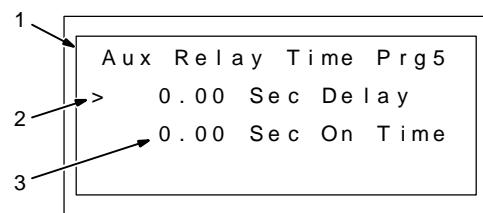
- 1 Timed Cycle Power Level #3 Screen
- 2 Power Level #3 Time
Set desired power level time. Time range depends on Timer Resolution setting (see Section 3-3G) as follows:
 - 0 to 655.35 seconds
 - 0 to 655.2 minutes
- 3 Kilowatt Power Output
Set desired power level output.

I. Timed Cycle End Delay Time



- 1 Timed Cycle End Delay Screen
- 2 Delay Time
Set desired end delay time. Time range depends on Timer Resolution setting (see Section 3-3G) as follows:
 - 0 to 655.35 seconds
 - 0 to 655.2 minutes

J. Timed Cycle Auxiliary Relay Time



1 Timed Cycle Auxiliary Relay Time Screen

2 Auxiliary Relay Delay Time

Set desired delay time. Time range depends on Timer Resolution setting (see Section 3-3G) as follows:

0 to 655.35 seconds

0 to 655.2 minutes

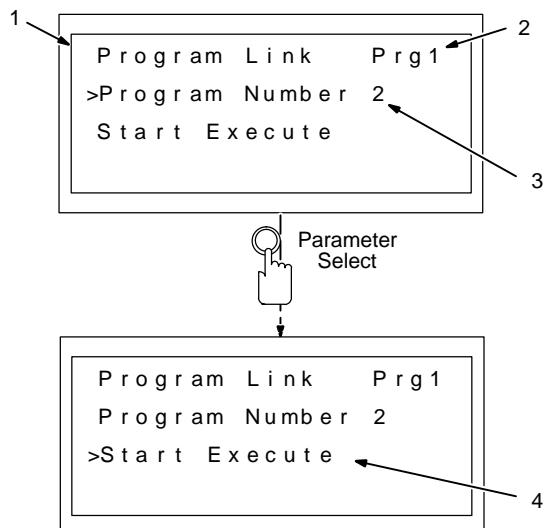
3 Auxiliary Relay On Time

Set desired on time. Time range depends on Timer Resolution setting (see Section 3-3G) as follows:

0 to 655.35 seconds

0 to 655.2 minutes

K. Program Link



1 Program Link Screen

2 Program Number To Link From

First program number to start link from must be selected before starting linking operation using the program number selection function (see Section 3-4B on this Errata Sheet).

3 Program Number To Link To

Set desired program number to link to after the starting program number. Range is from 1 to 8. To disable the link function, set to Off.

4 Start Method Selection

Select desired start method for program link operation. Start Execute requires an input signal from a contact closure to begin running the first program and to run the next linked program. Start input can be from either the start button on the pendant or a remote start/stop switch, depending on setup selection (see Section 3-3I in the Owner's Manual). Auto Execute only requires an input signal from a contact closure to begin running the first program and automatically continue the second program as well as any additional linked programs.

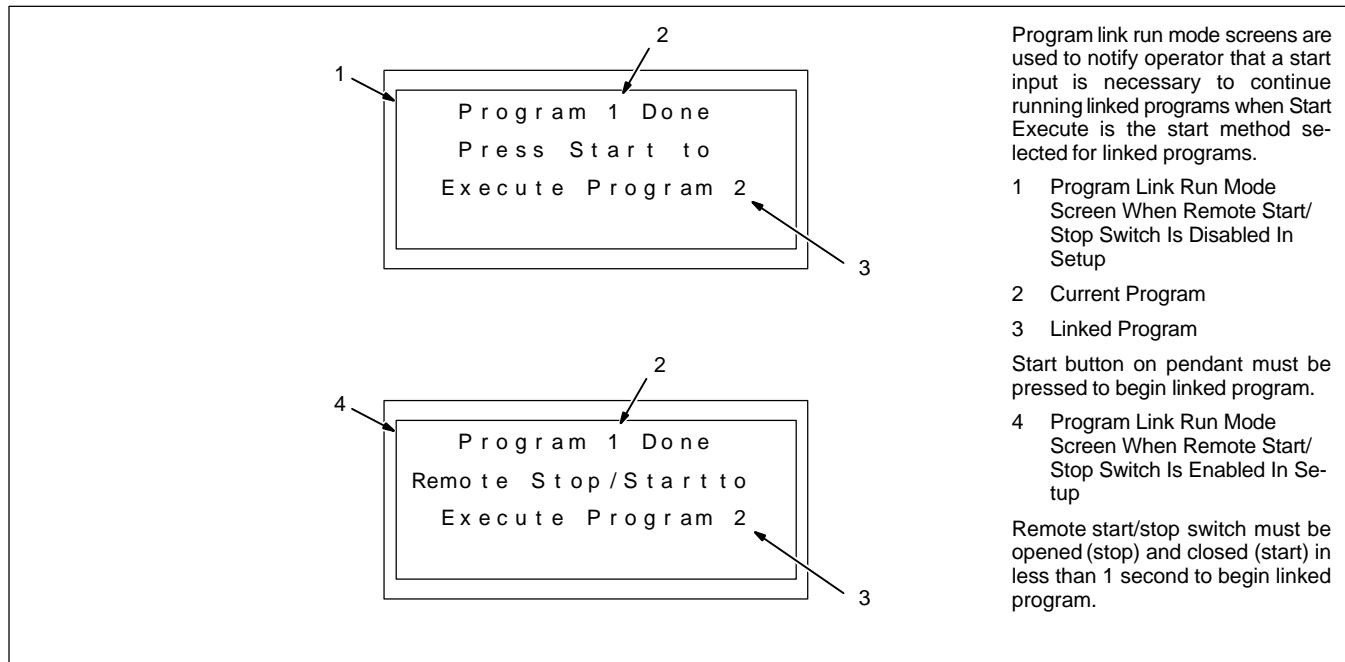
To link multiple programs, repeat this procedure for each additional program (e.g. programs 1, 2, and 3). If programs 1 and 2 are linked, then program 2 must be set in the program number selection function before returning to the program link function to link programs 2 and 3.

To create a loop, repeat the link procedure to link program 3 to program 1.

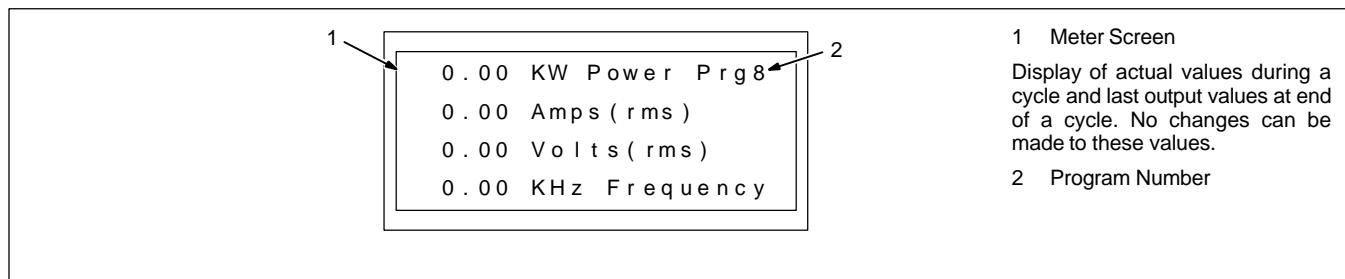
Start method can also be different between linked programs.. If programs 1 and 2 are set for Auto Execute, program 2 and 3 can be set for Start Execute.

Remember to set the starting program number in the program number selection function before running the program link operation.

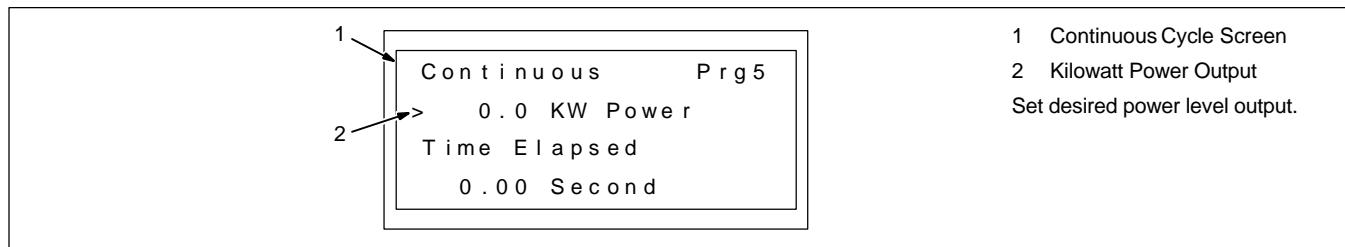
L. Program Link Run Mode Screens



M. Meter Screen

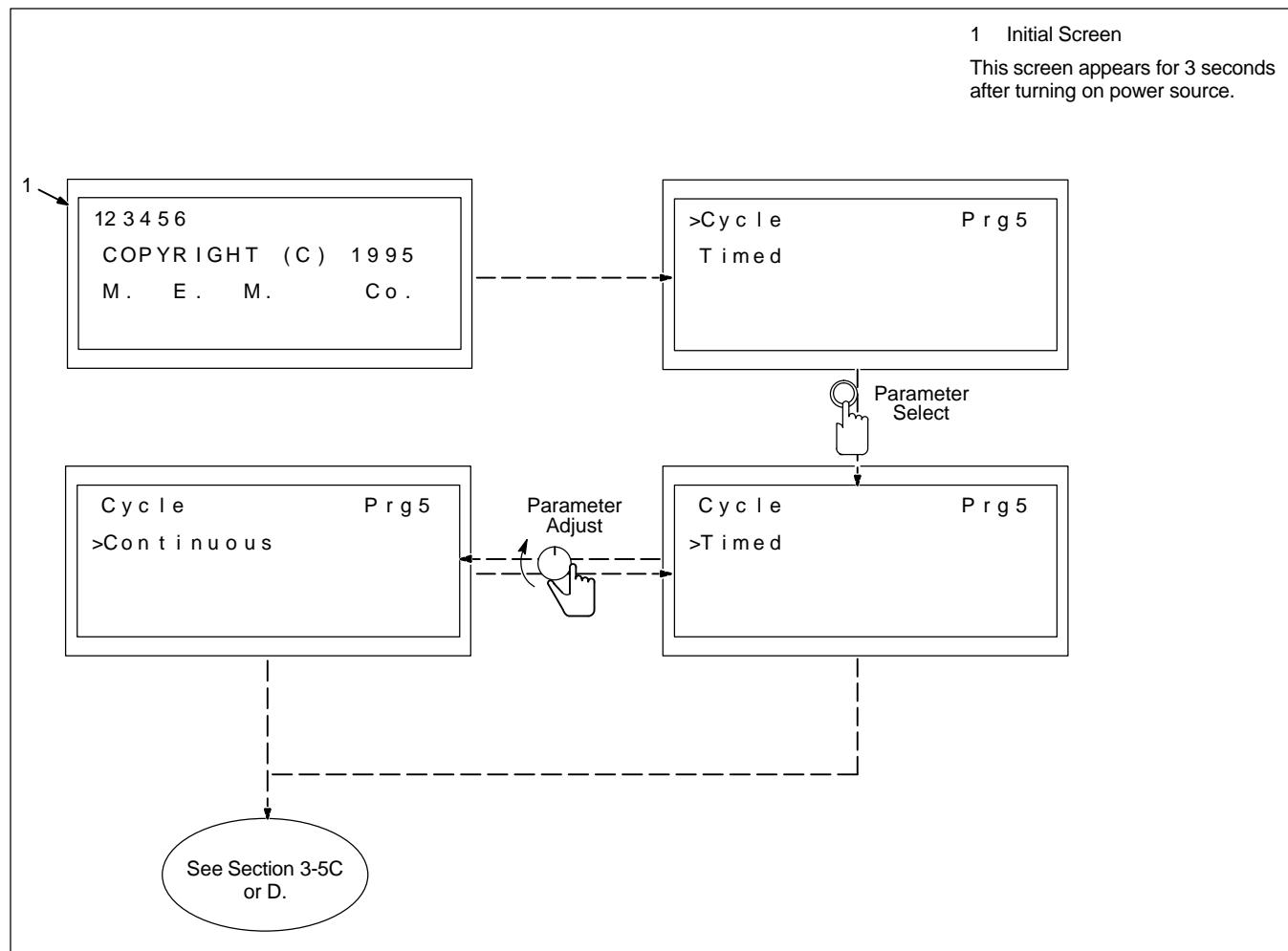


N. Continuous Cycle Power Output

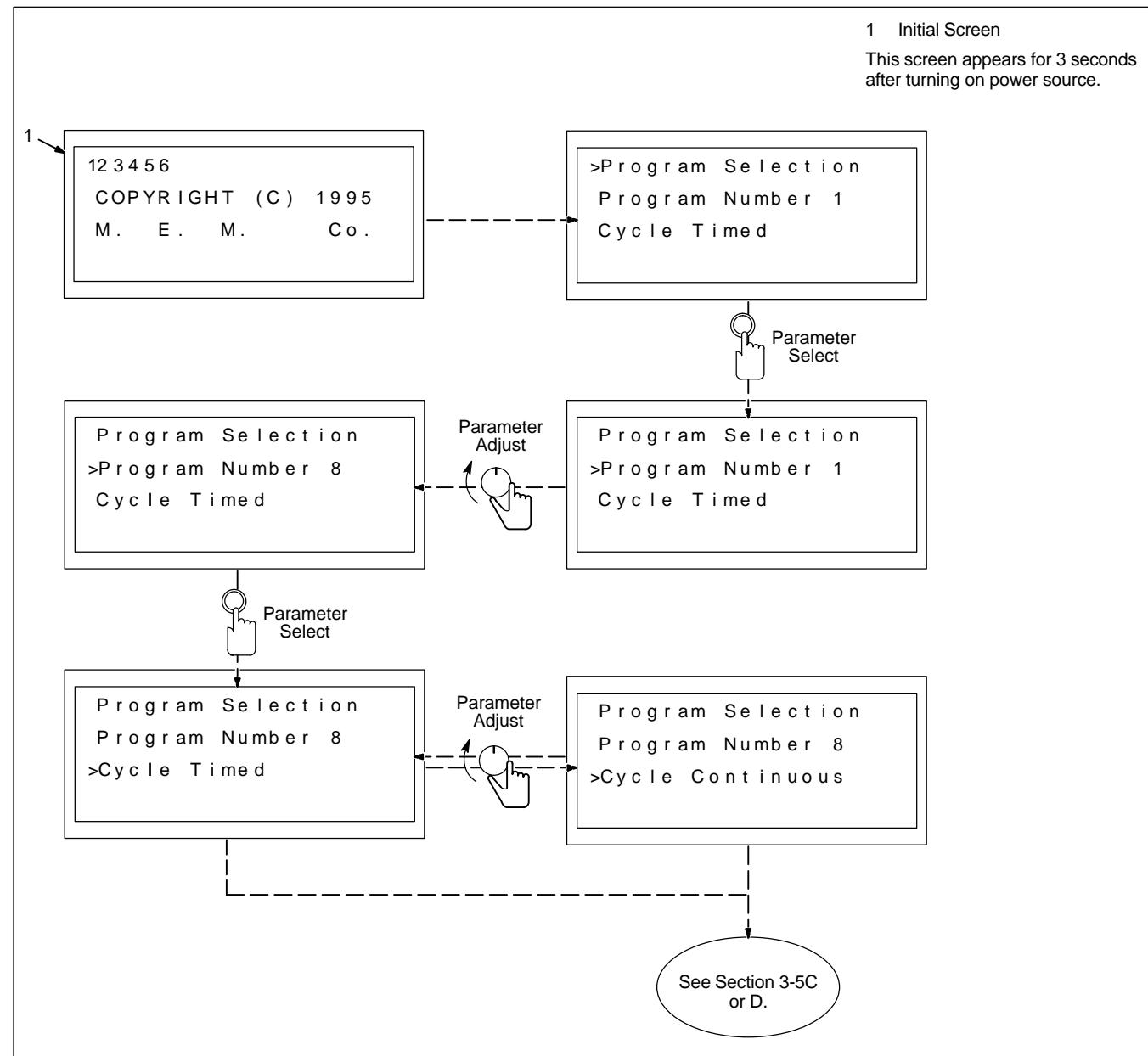


3-5. Setting Program Parameters

A. Selecting Type Of Cycle For Single Program



B. Selecting Type Of Cycle For Multiple Programs

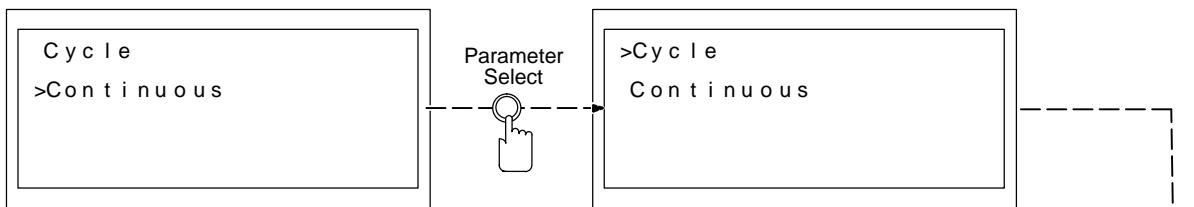


C. Setting Power Source Output For Continuous Cycle

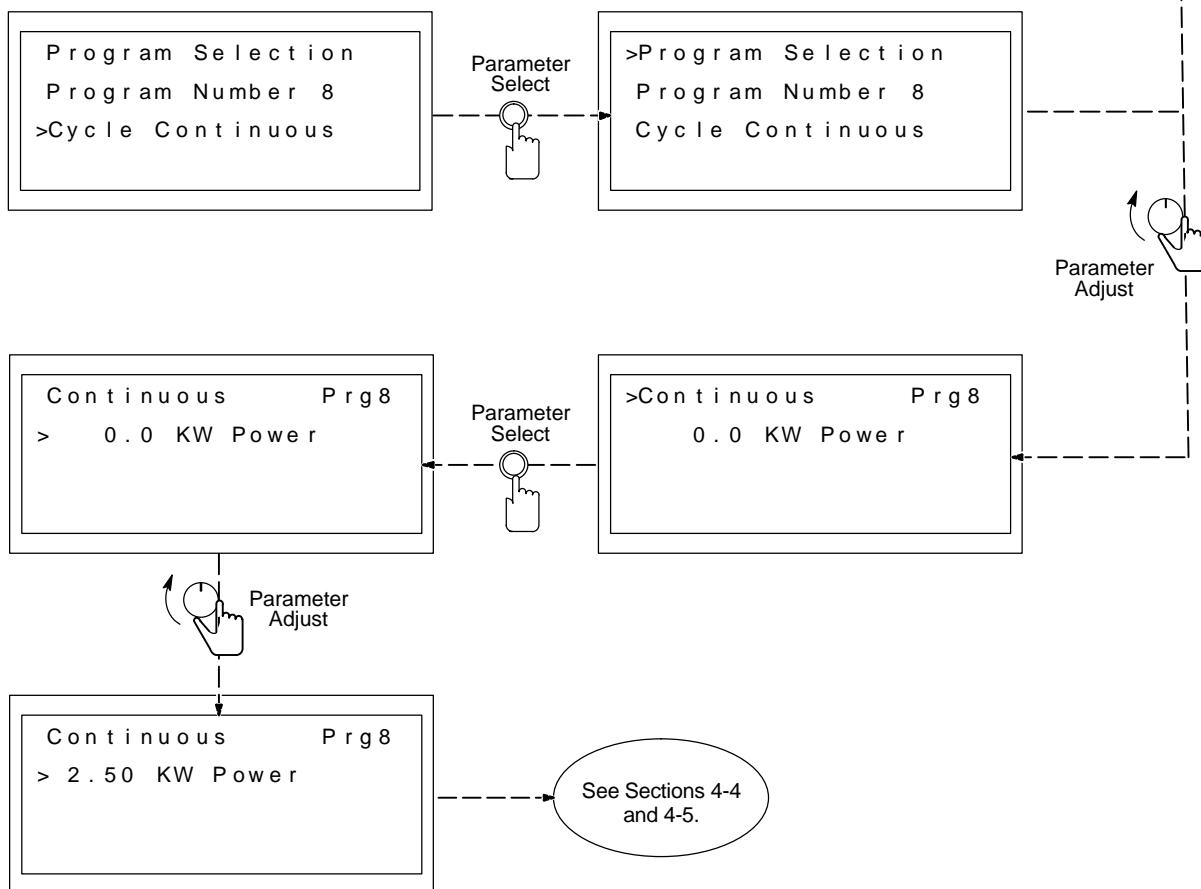
NOTE

After "Type Of Cycle" selection for single program or multiple programs, the remaining parameter setting procedures are the same for either single program or multiple programs using the Parameter Select and Parameter Adjust controls.

Single Program Screens →



Multiple Programs Screens →

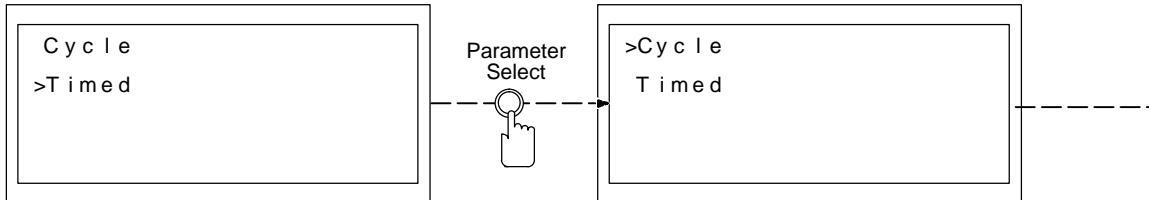


D. Setting Timed Cycle Start Delay Time

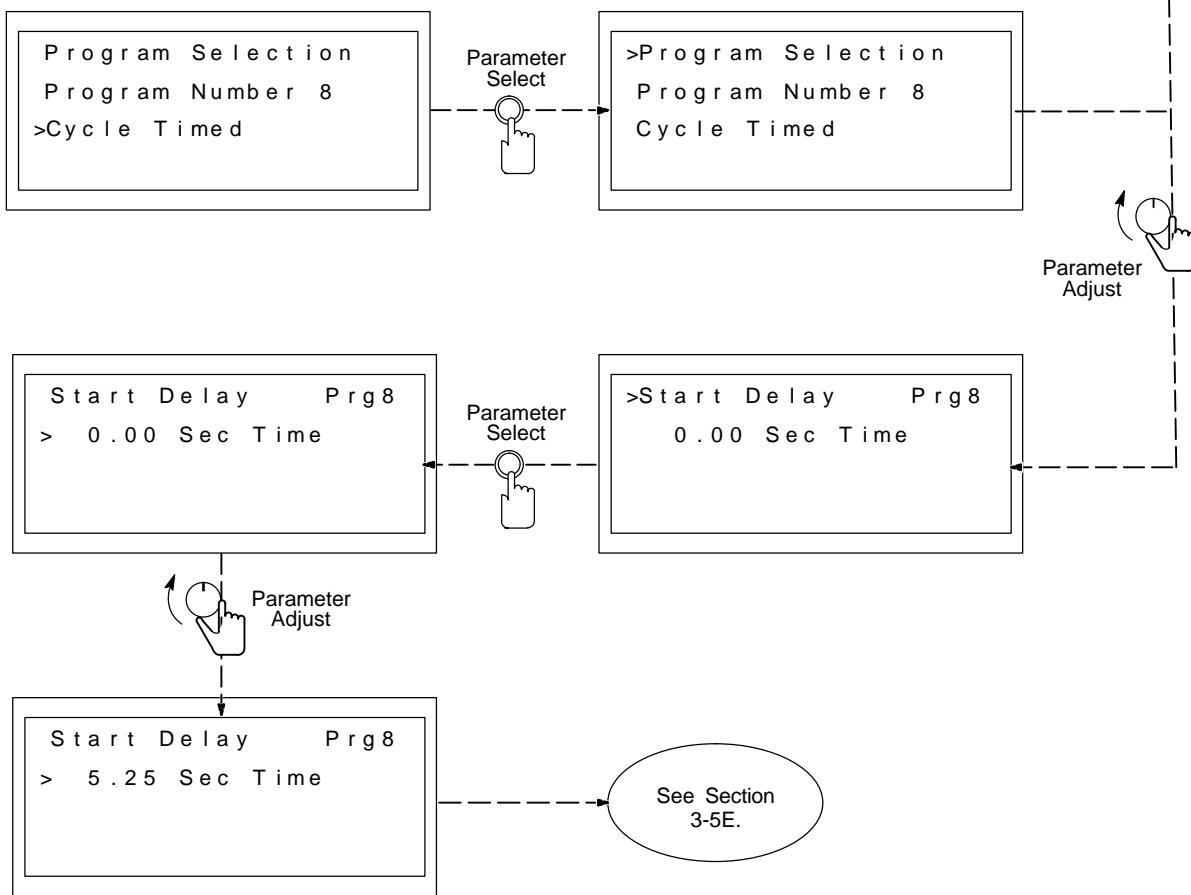
NOTE

After "Type Of Cycle" selection for single program or multiple programs, the remaining parameter setting procedures are the same for either single program or multiple programs using the Parameter Select and Parameter Adjust controls.

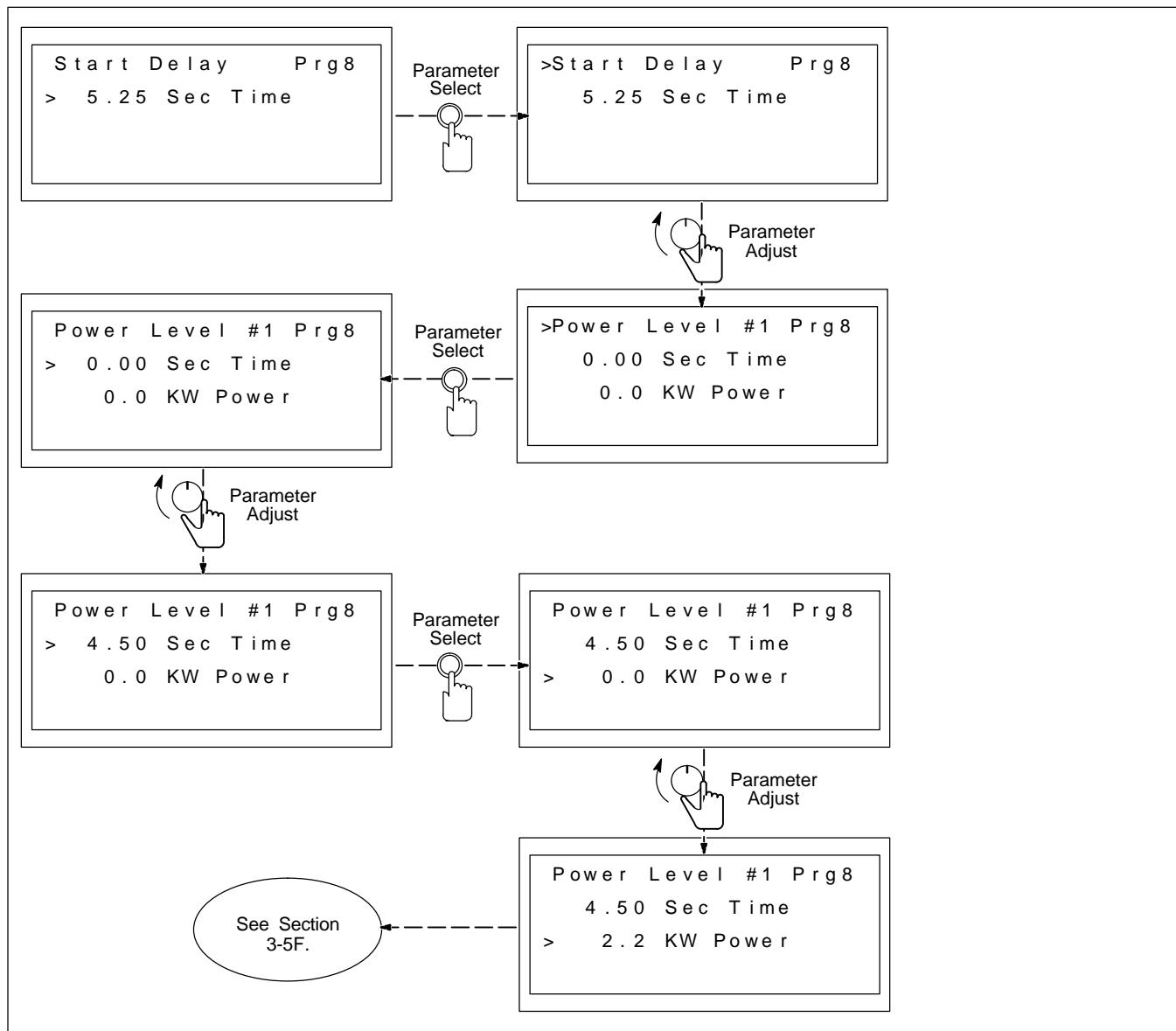
Single Program Screens →



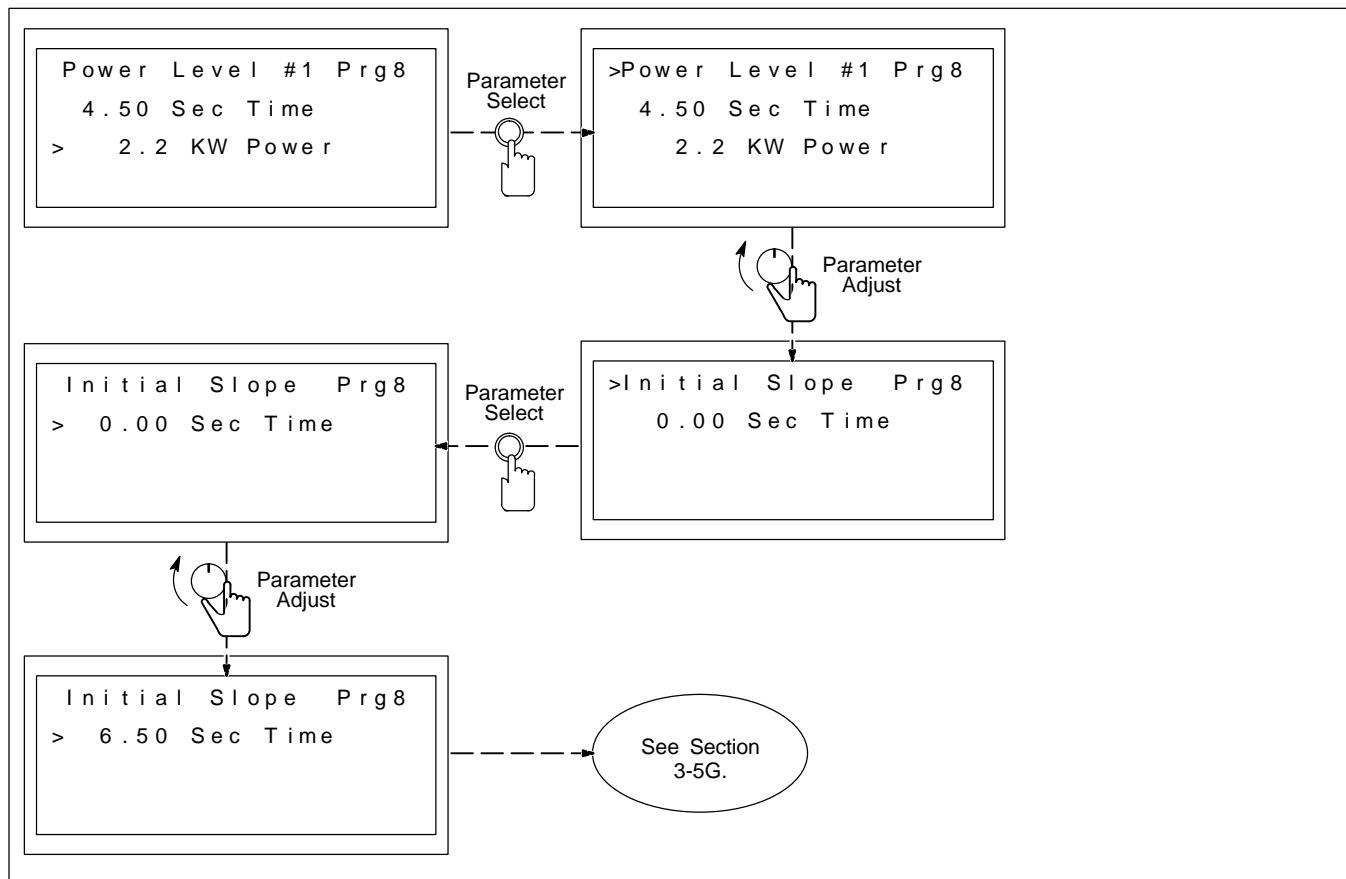
Multiple Programs Screens →



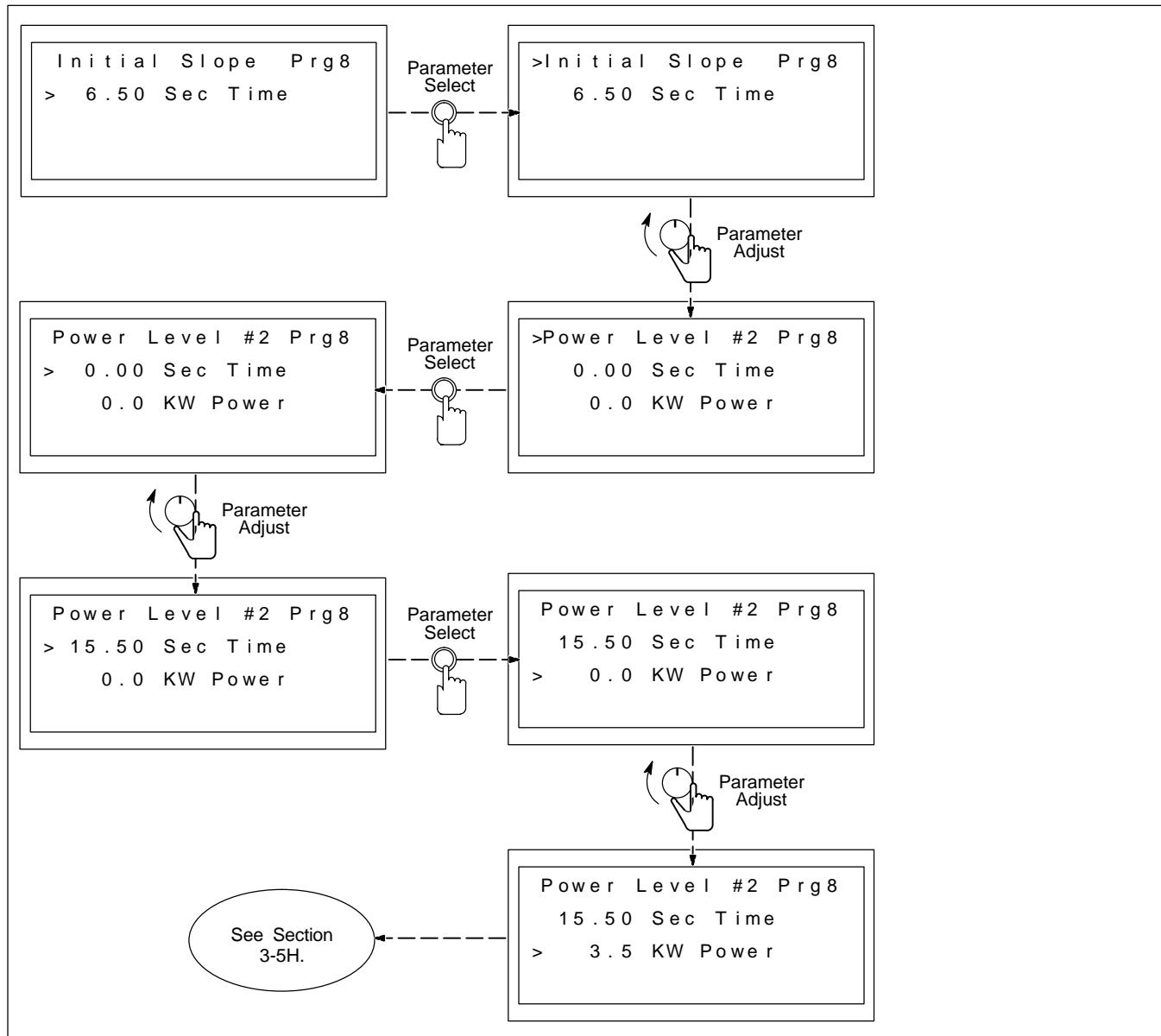
E. Setting Timed Cycle Power Level #1



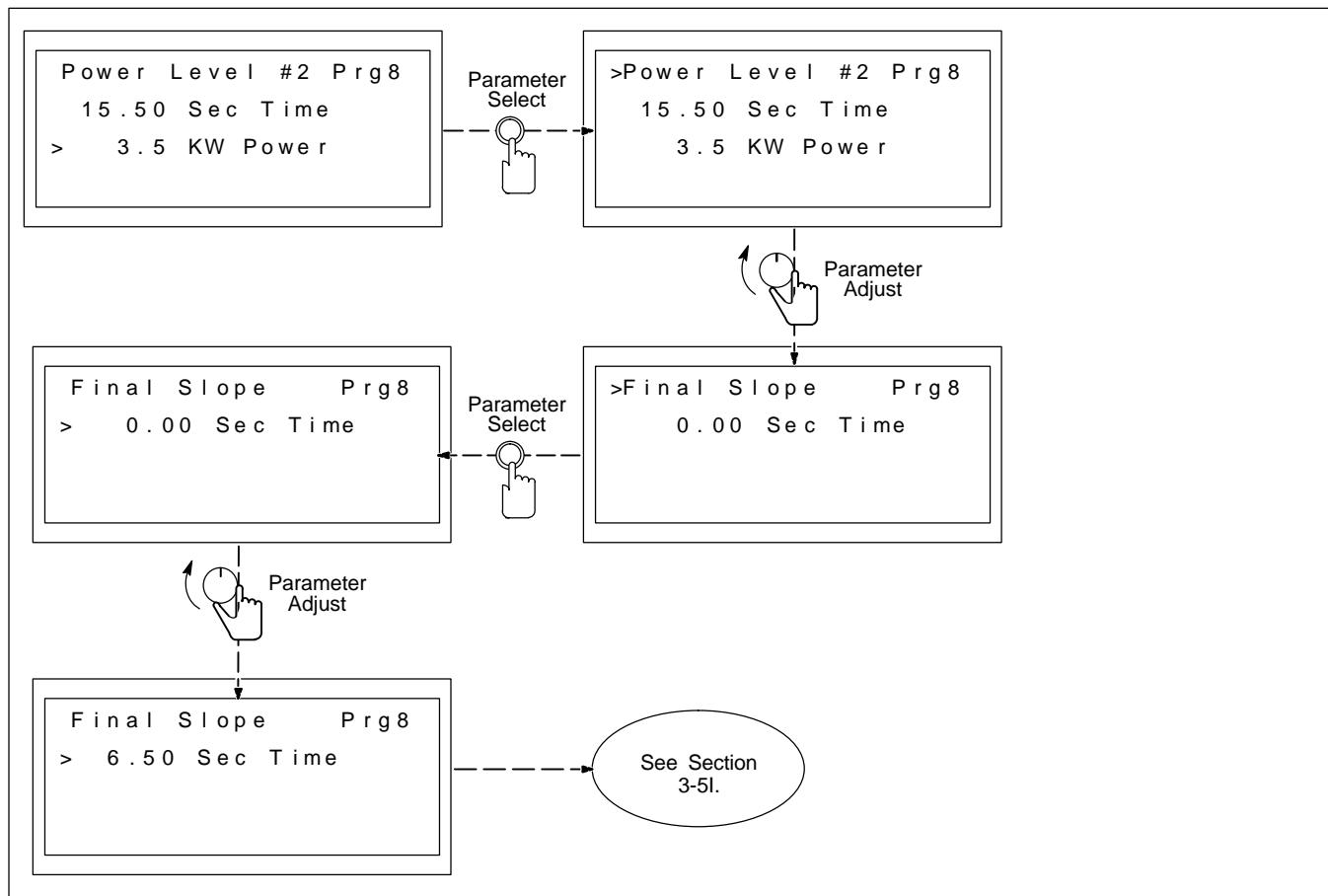
F. Setting Timed Cycle Initial Slope



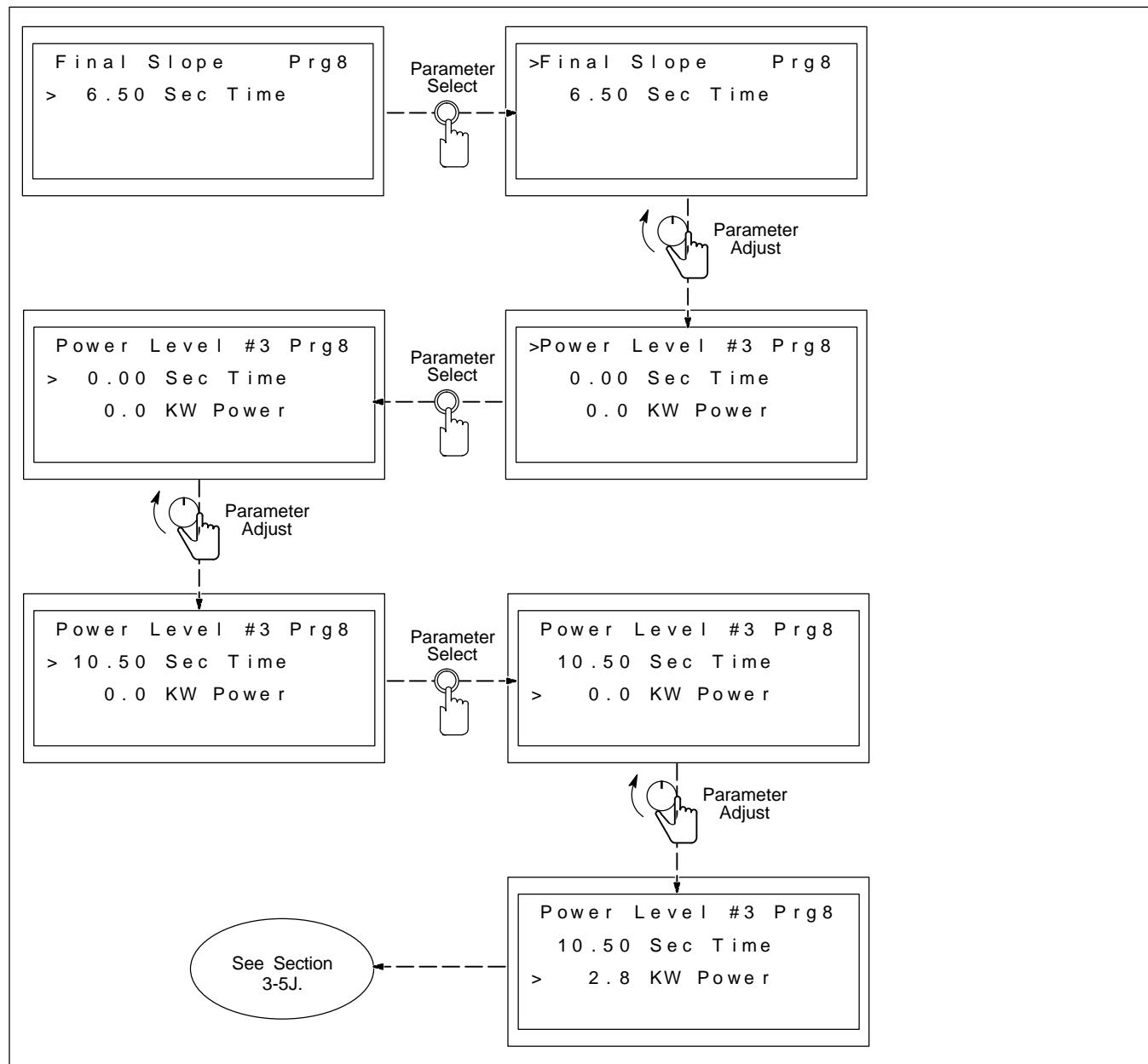
G. Setting Timed Cycle Power Level #2



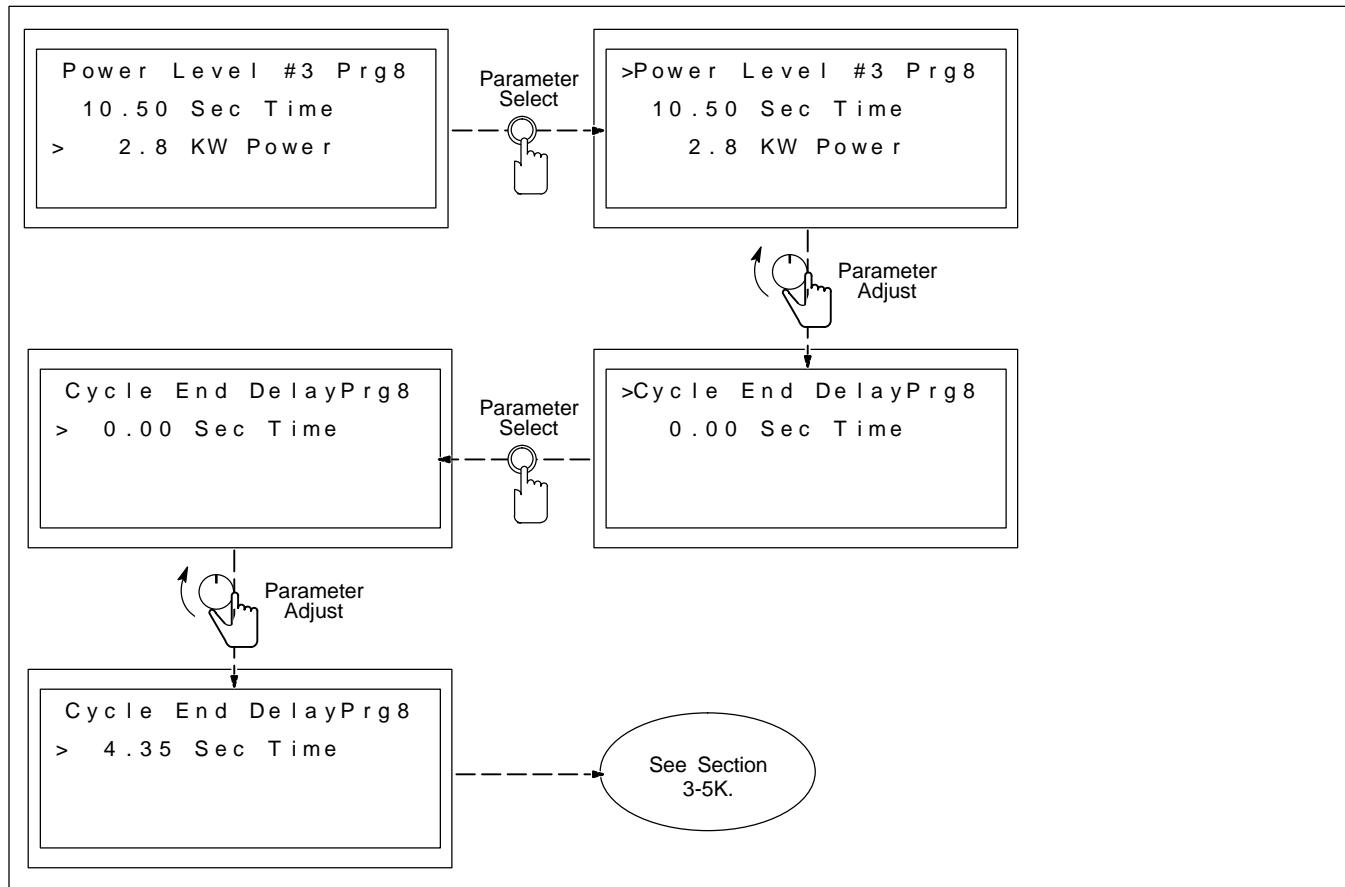
H. Setting Timed Cycle Final Slope



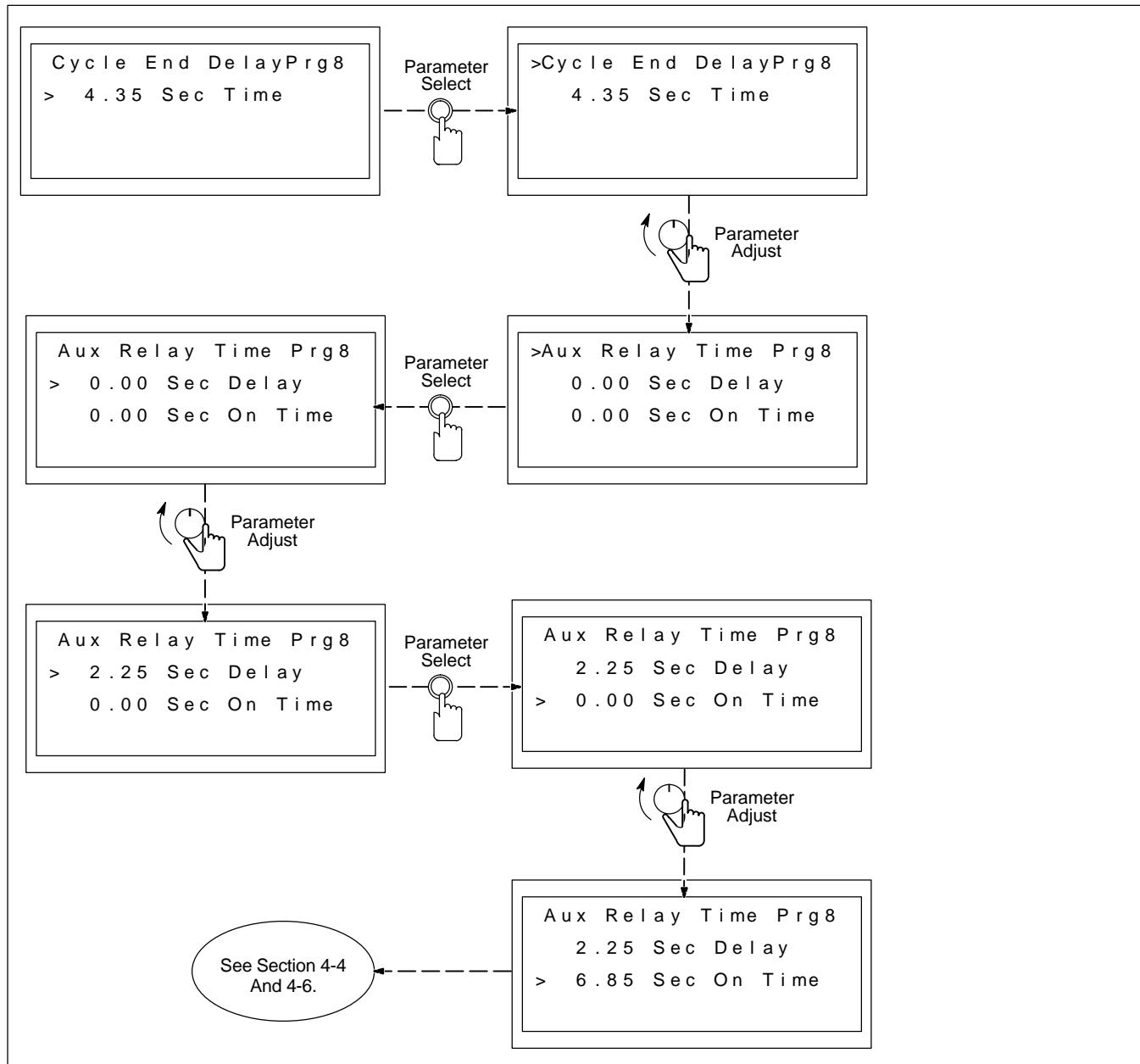
I. Setting Timed Cycle Power Level #3



J. Setting Timed Cycle End Delay

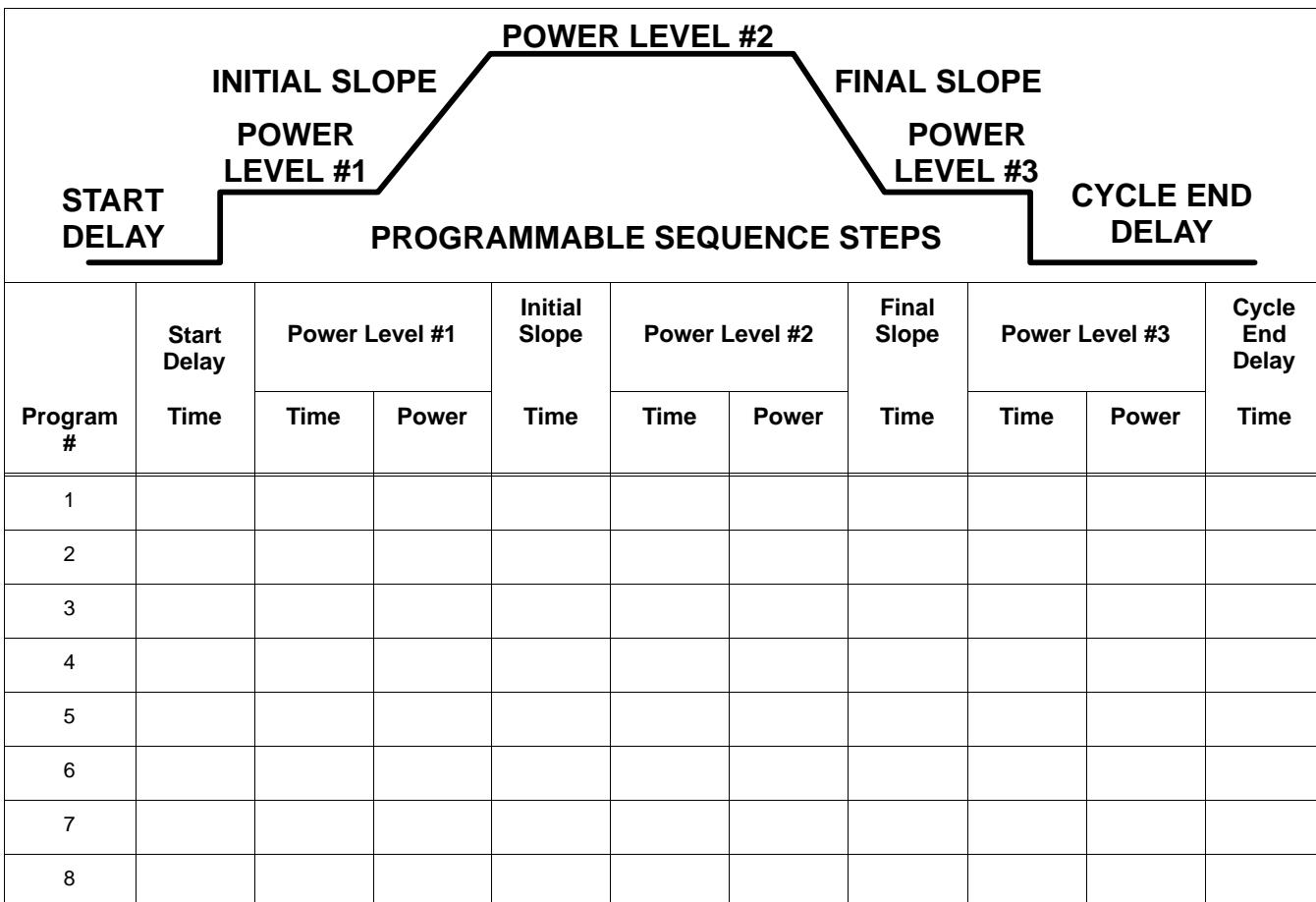
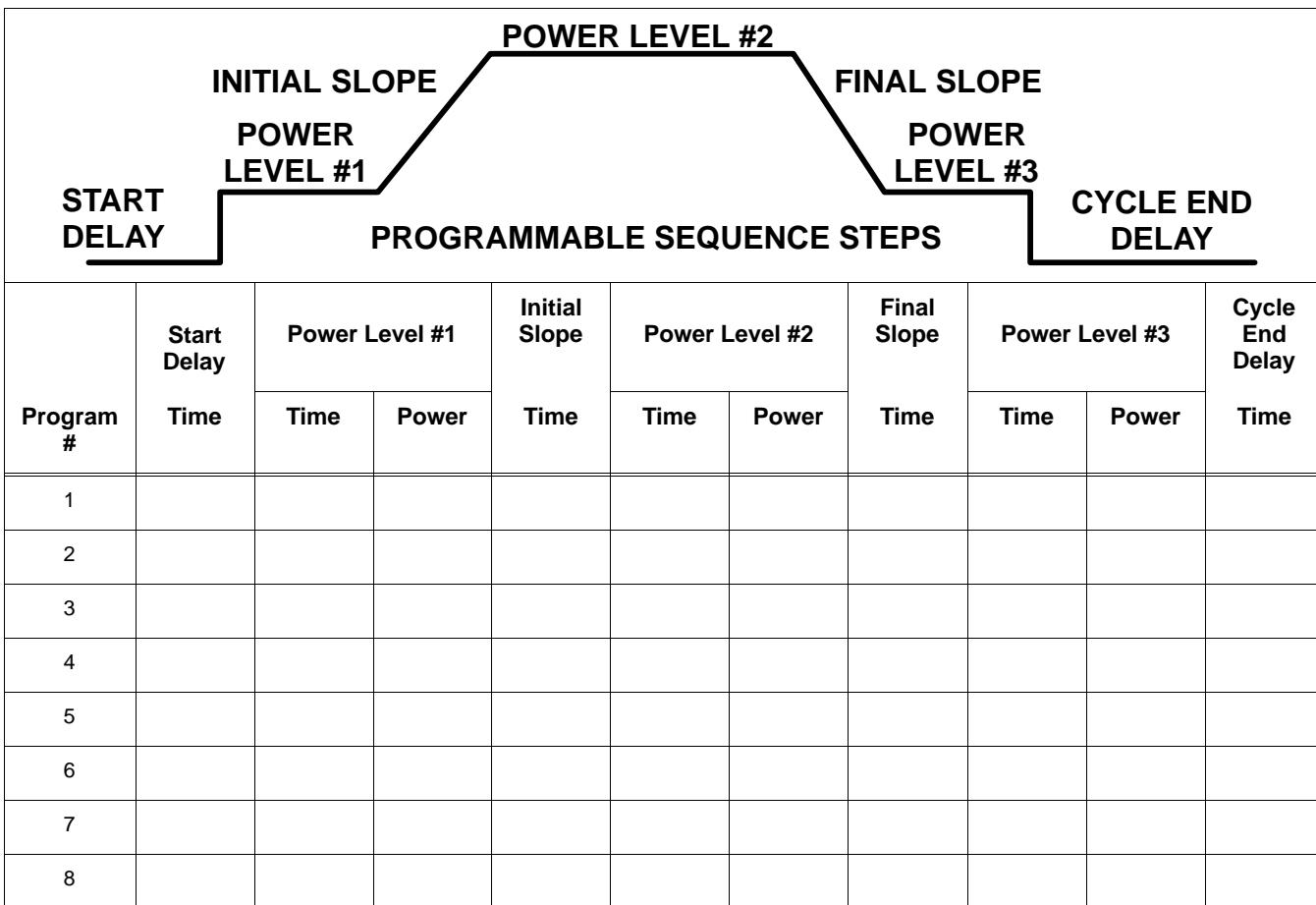


K. Setting Timed Cycle Auxiliary Relays



NOTE

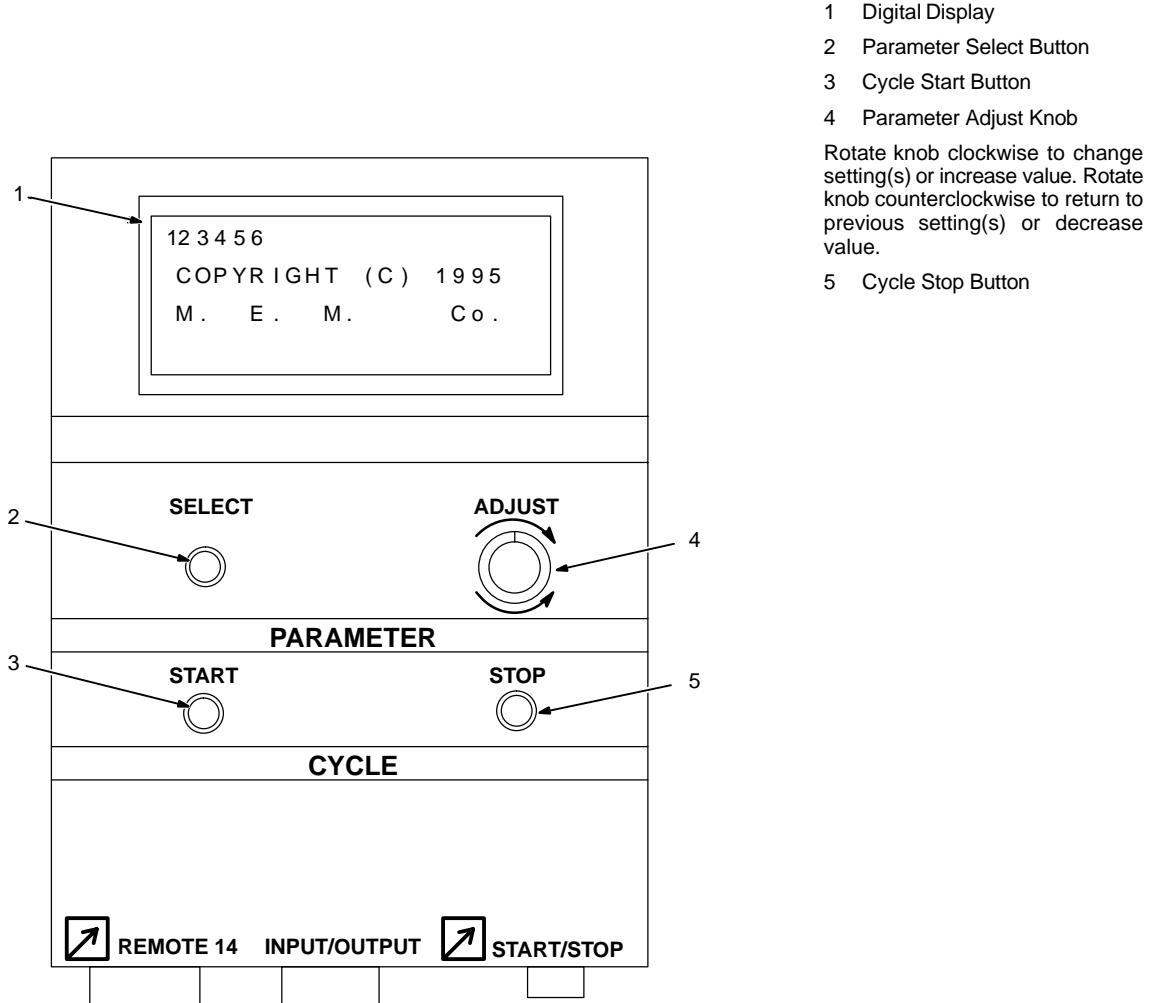
Make copies of charts on next page for future use.



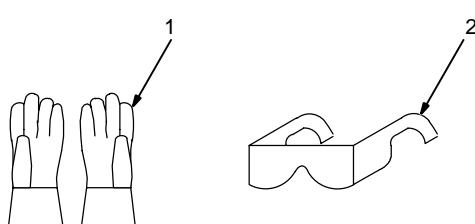
SECTION 4 – OPERATION



4-1. Controls



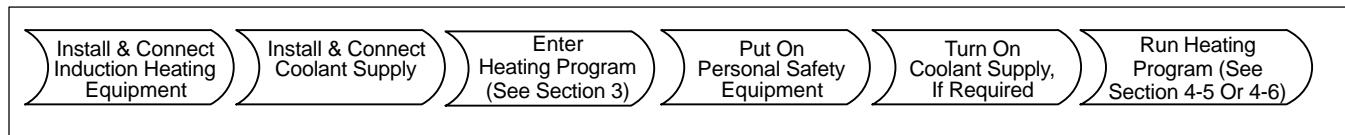
4-2. Safety Equipment



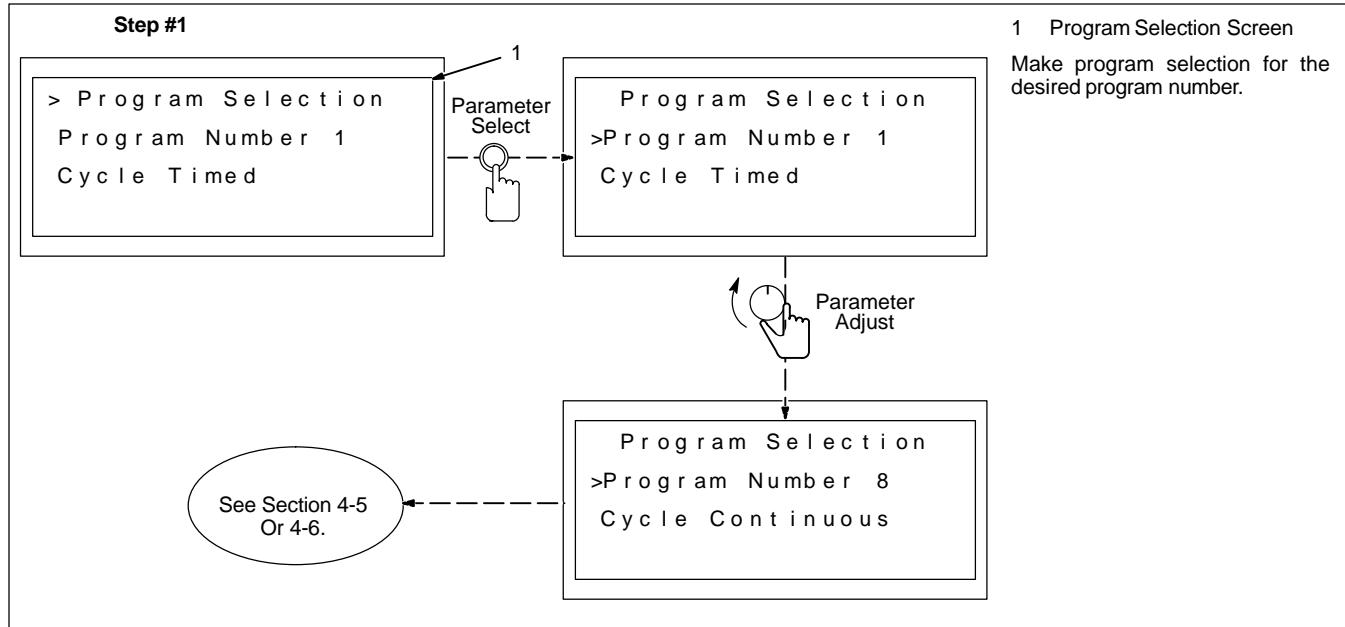
Wear the following during operation:

- 1 Dry, Insulating Gloves
- 2 Safety Glasses With Side Shields

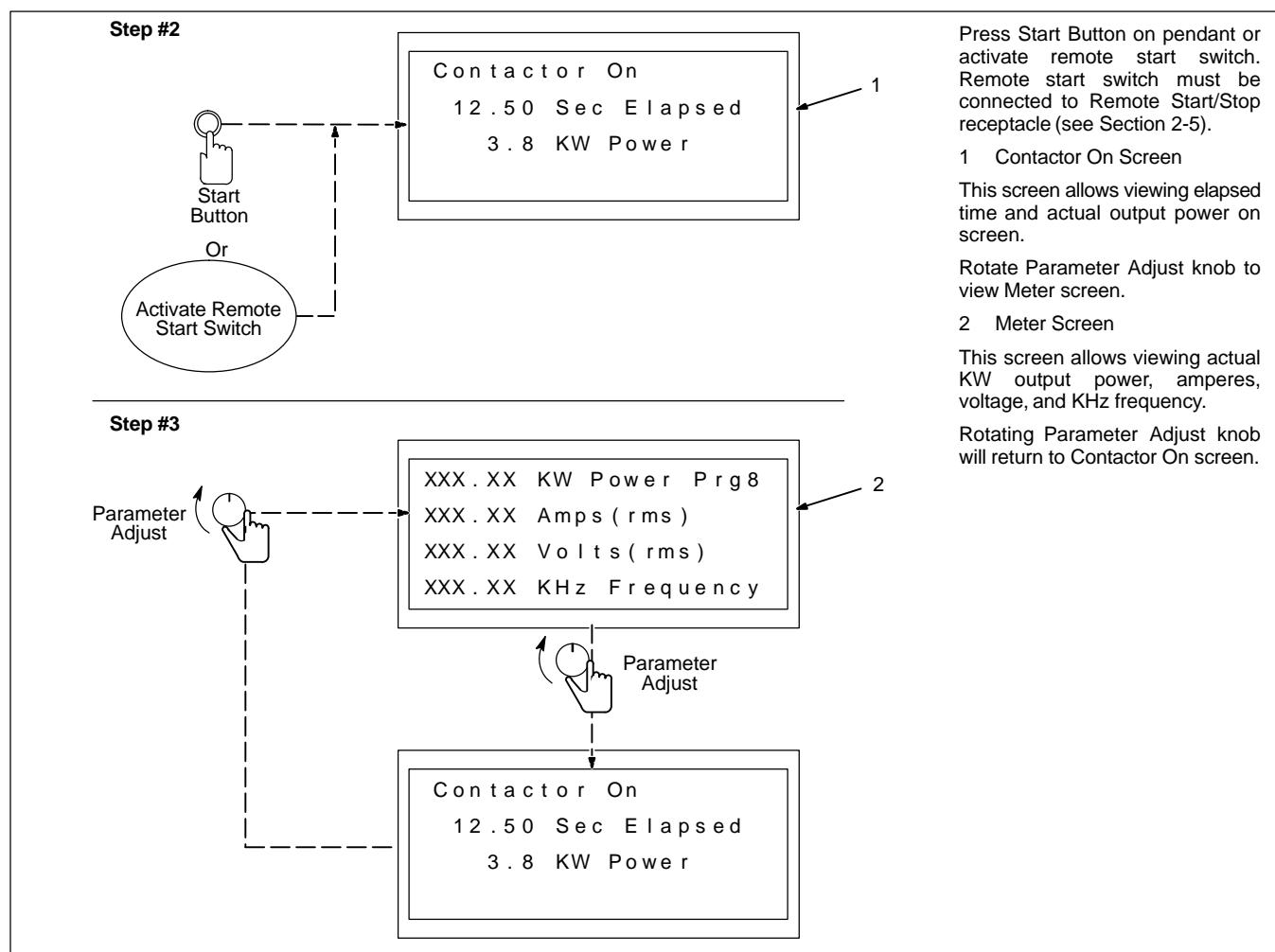
4-3. Sequence Of Induction Heating Process



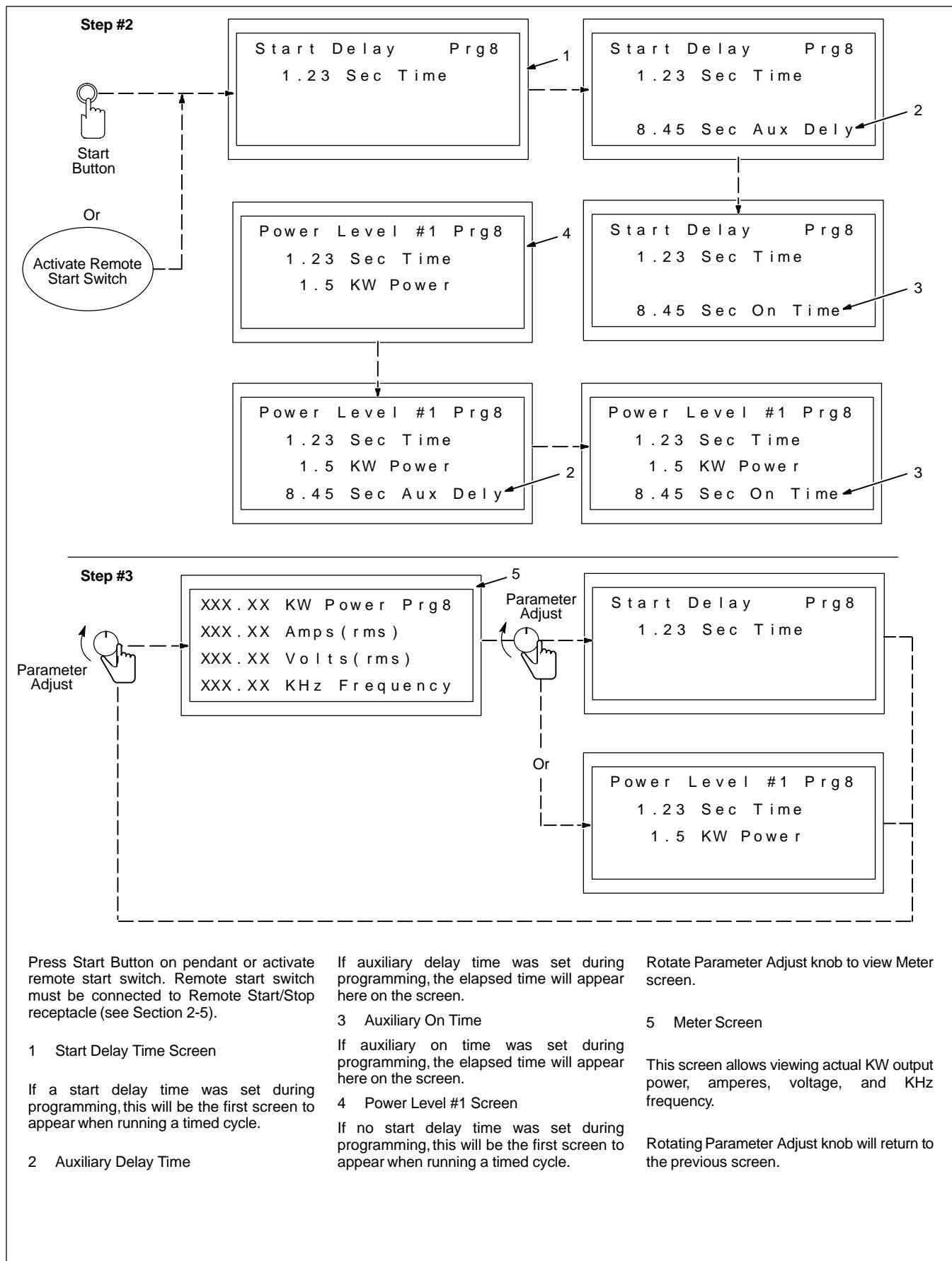
4-4. Program Number Selection With Multiple Programs Accessible



4-5. Running Continuous Cycle

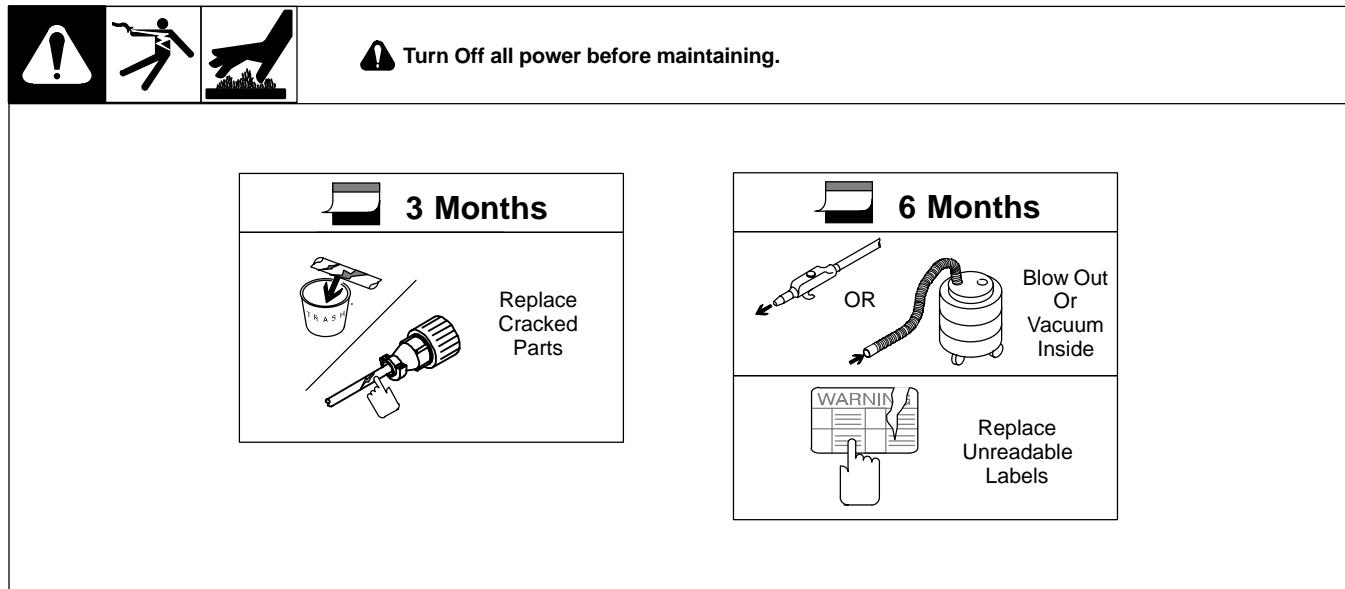


4-6. Running Timed Cycle

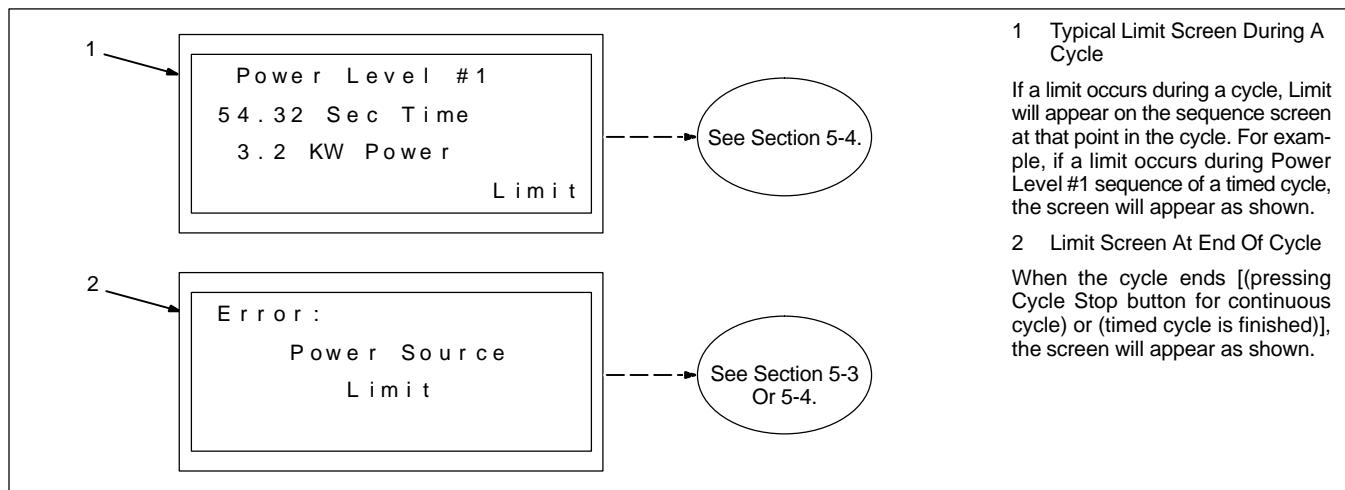


SECTION 5 – MAINTENANCE & TROUBLESHOOTING

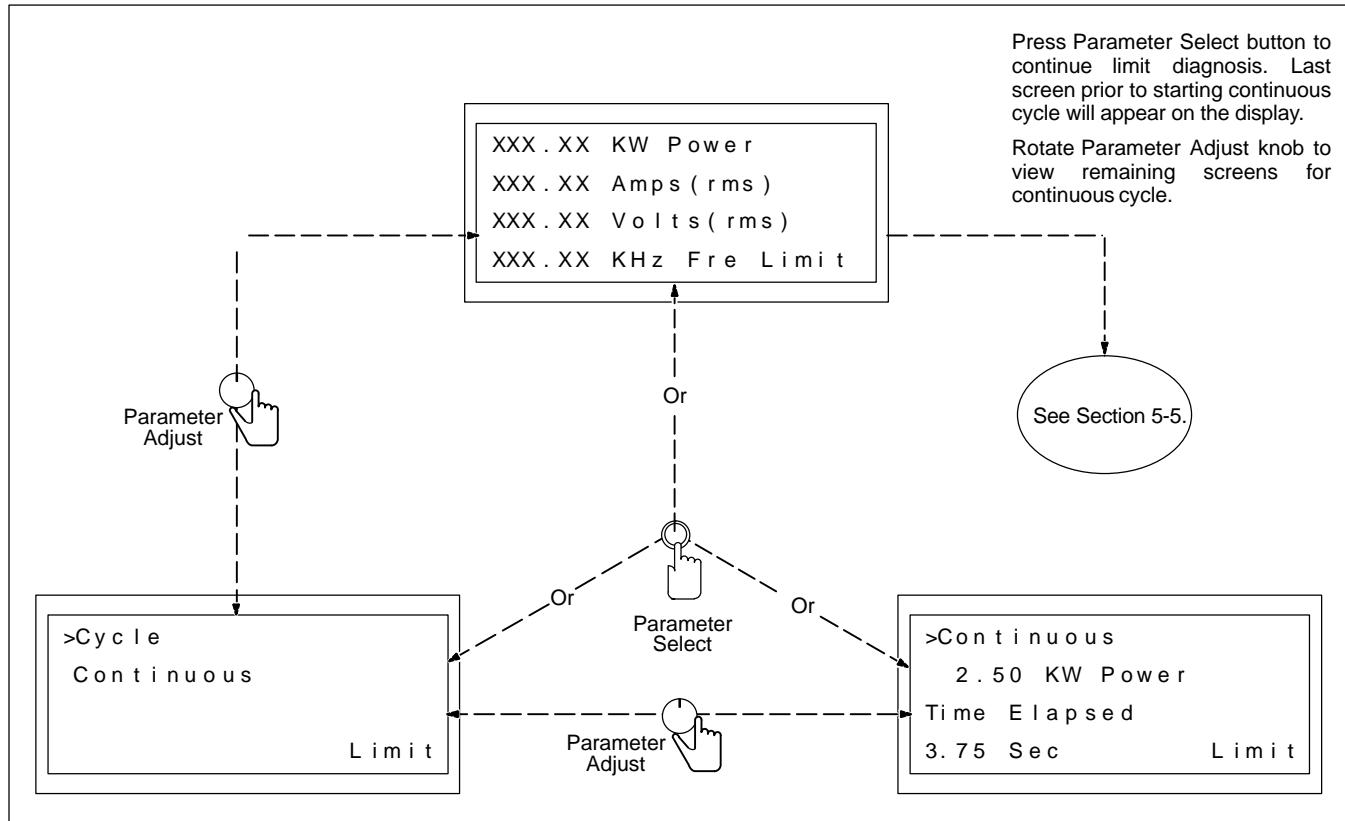
5-1. Routine Maintenance



5-2. Limit Screen During A Cycle Or At End Of Cycle

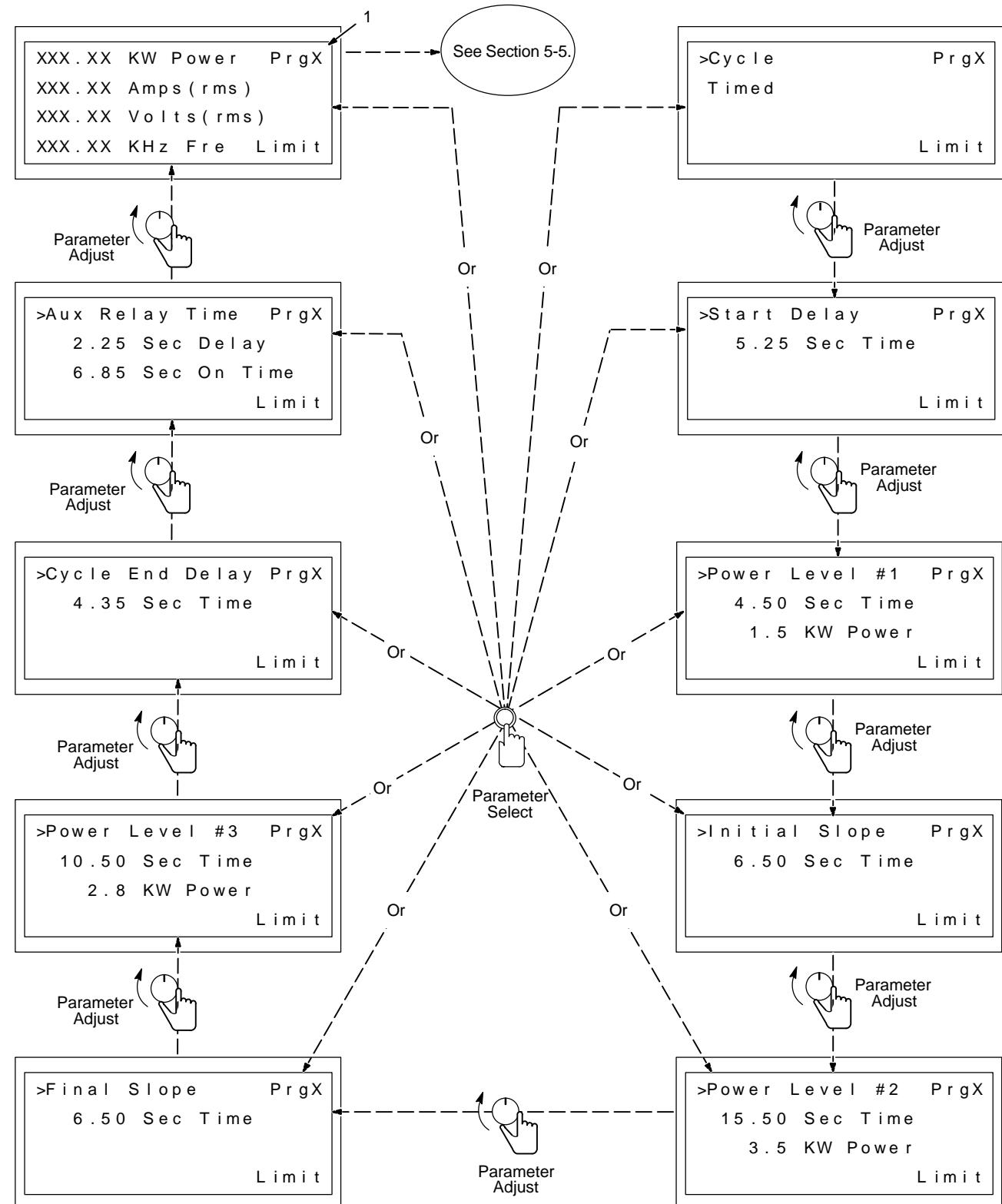


5-3. Possible Screens For Continuous Cycle Prior To Starting Cycle After A Limit



5-4. Screens For Timed Cycle At Time Of Limit

The Limit screen will display the program number for which a limit occurred regardless of the program being linked or not.

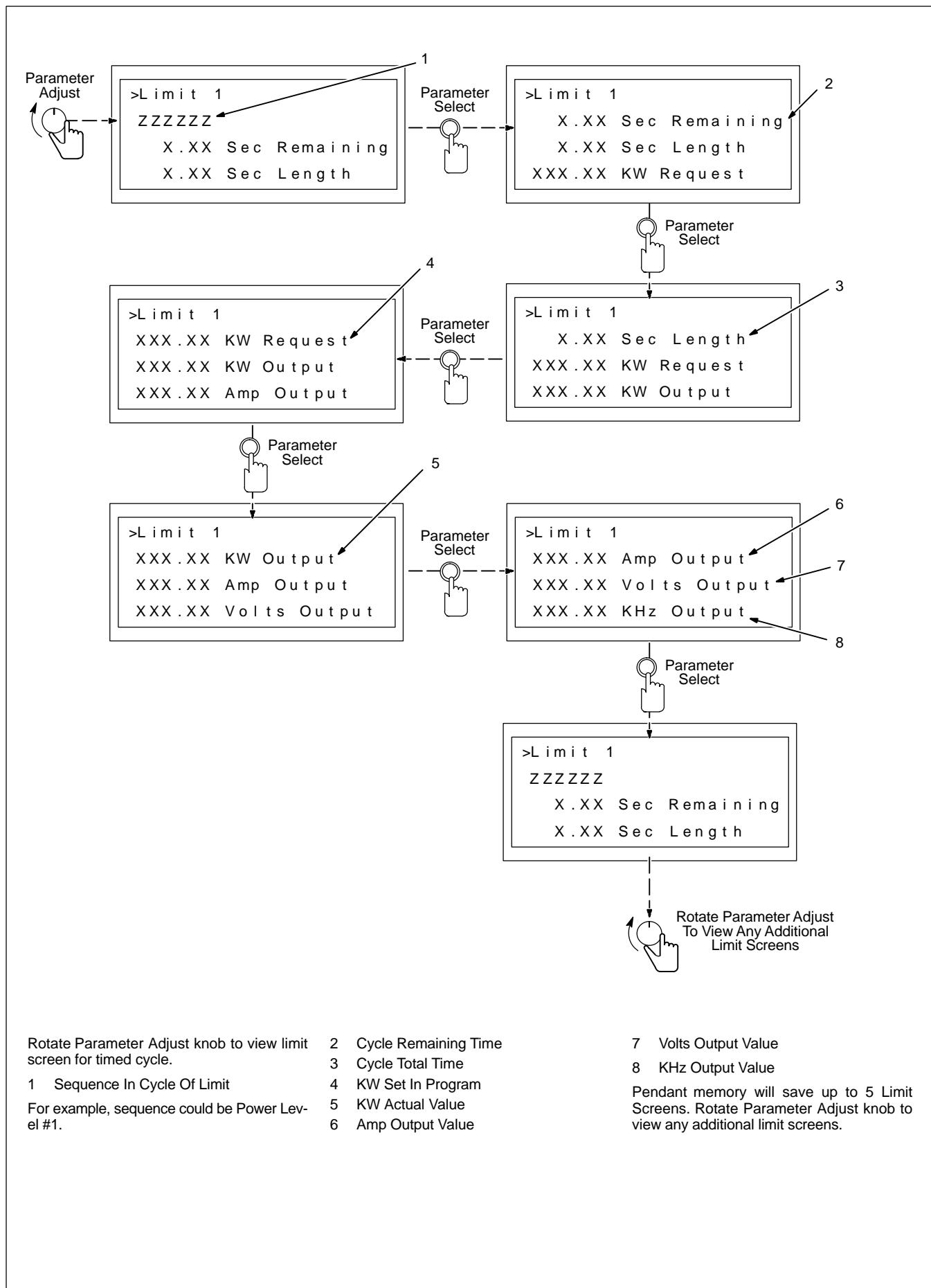


1 Program number that limit occurred in.
Press Parameter Select button to continue limit diagnosis. Last screen prior to starting timed cycle will appear on the display.

Rotate Parameter Adjust knob to view remaining screens for timed cycle.

To continue limit diagnosis, see Section 5-5.

5-5. Limit Screen



Rotate Parameter Adjust knob to view limit screen for timed cycle.

1 Sequence In Cycle Of Limit

For example, sequence could be Power Level #1.

2 Cycle Remaining Time

3 Cycle Total Time

4 KW Set In Program

5 KW Actual Value

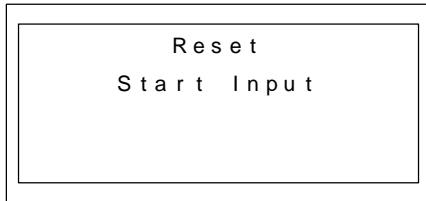
6 Amp Output Value

7 Volts Output Value

8 KHz Output Value

Pendant memory will save up to 5 Limit Screens. Rotate Parameter Adjust knob to view any additional limit screens.

5-6. Reset Start Input Error



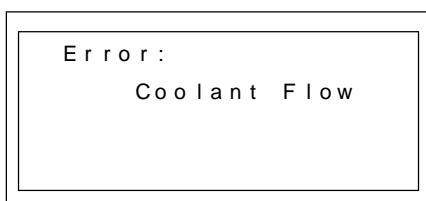
Timed cycle has ended and remote start contacts are still closed. Open contacts to reset error.

5-7. Power Source Not Ready Error



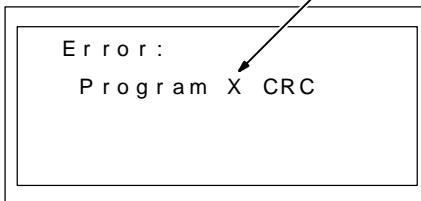
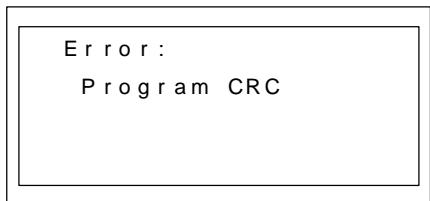
Check all cord connections. Turn power source off and back on.

5-8. Coolant Flow Error



Recirculating coolant system not turn on. Turn on coolant system. Check coolant flow switch.

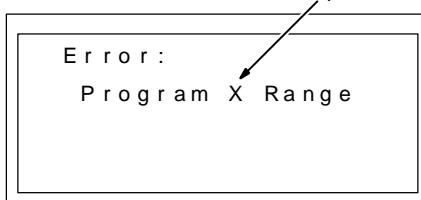
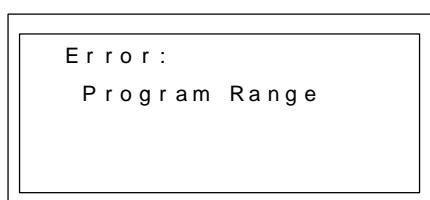
5-9. Program CRC Error



Faulty memory. Reset memory, set parameters in setup, and enter program parameters (see Section 3-3).

1 Program Number

5-10. Program Range Error



Parameter out of range in program. Check program and correct parameter.

1 Program Number

5-11. Troubleshooting



Trouble	Remedy
No heat output.	Secure interconnecting cord plug in pendant receptacle (see Section 2-2).
	Secure interconnecting cord plug in power source receptacle (see Section 2-2).
	Check parameters in program being run (see Section 3).
	Check remote start switch and, if applicable, external device connections (see Sections 2-5 and 2-7).
	Replace building line fuse or reset circuit breaker.

SECTION 6 – ELECTRICAL DIAGRAMS

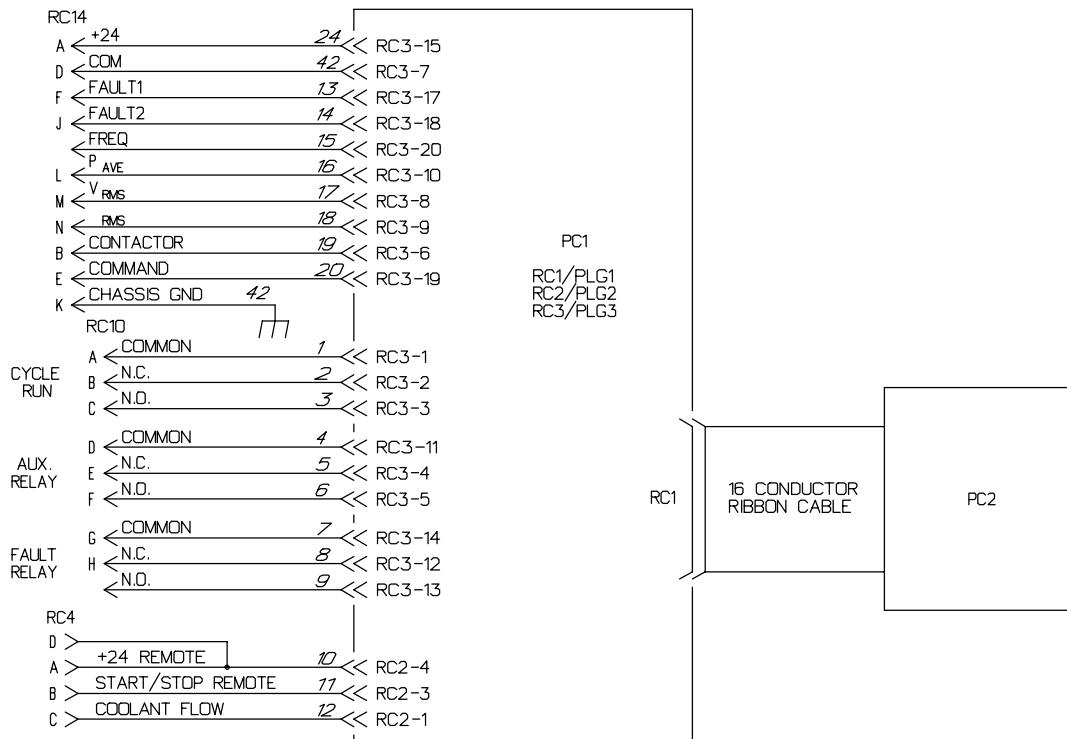


Figure 6-1. Circuit Diagram For IH/PC

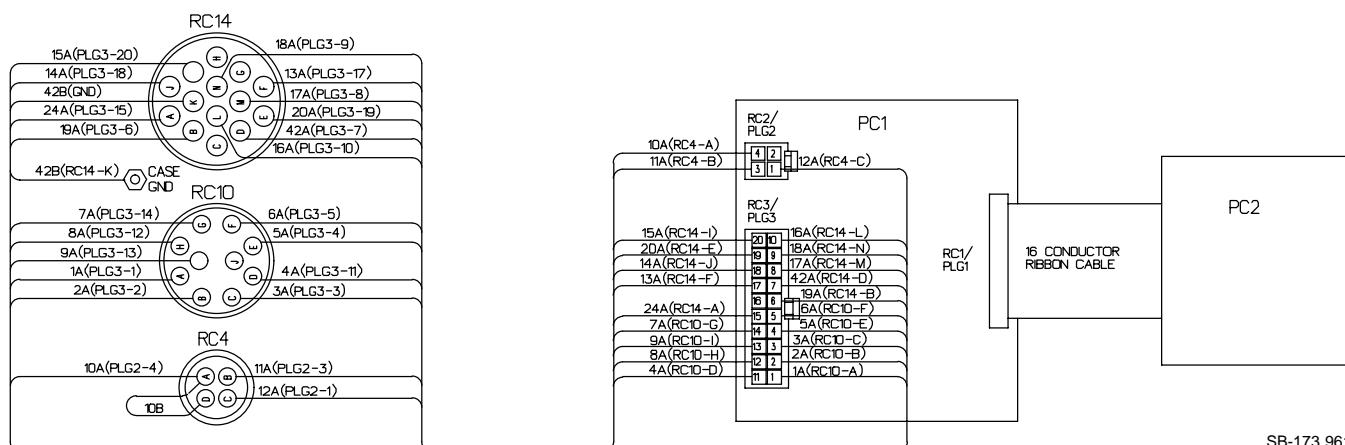


Figure 6-2. Wiring Diagram For IH/PC

SECTION 7 – PARTS LIST

Dia. Mkgs.	Part No.	Description	Quantity
Complete Assembly			
	173 110	CASE SECTION, front/ends	1
	173 111	PANEL, rear	1
	173 112	WRAPPER	1
		NAMEPLATE, (order by model and serial number)	1
PC1	181 697	CIRCUIT CARD ASSY PENDANT CONTROL	1
PC2	147 583	LCD, w/ribbon cable	1
	156 005	TUBING, nyl .140 ID x .250 OD x .375	4
	174 445	METER LENS, (consisting of)	1
	174 446	GASKET, meter lens	1
PLG2	164 899	CONNECTOR	1
RC4	073 687	CONNECTOR, circ 4skt size 14	1
RC10	089 646	CONNECTOR, circ 10 pin sz 18rcpt	1
RC14	152 492	RECEPTACLE w/PINS	1
PLG3	169 240	CONNECTOR & SOCKETS	1
	144 842	ACTUATOR, switch	3
	167 633	WASHER, shldr .612 ID x 1.060 OD x .62thk	1
	144 844	STAND-OFF, 6-32 x .875 lg	4
	115 443	STAND-OFF, 6-32 x .750 lg	2
	094 484	STAND-OFF, 6-32 x 1.000 lg	3
	010 291	WASHER, flat .625 ID x 1.250 OD x .125thk	1
	159 264	RING, rtng ext .625 shaft x .042 thk	1
	019 663	MOUNT, nprn 15/16 OD x 3/8 rec 3/16 x 3/8	4
	039 828	CONNECTOR, circ clamp str rlf size 14	1
	073 331	CONNECTOR, circ clamp str rlf size 18	1
	089 647	CONNECTOR, circ 10skt size 18	1

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Notes

Warranty

Effective January 1, 2000
(Equipment with a serial number preface of "LA" or newer)

This limited warranty supersedes all previous manufacturers warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY – Subject to the terms and conditions below, warrants to its original retail purchaser that new equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped from factory. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, manufacturer will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Manufacturer must be notified in writing within thirty (30) days of such defect or failure, at which time manufacturer will provide instructions on the warranty claim procedures to be followed.

Manufacturer shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original retail purchaser, or one year after the equipment is sent to the distributor.

1. 5 Years Parts – 3 Years Labor
 - * Original main power rectifiers
2. 3 Years — Parts and Labor
 - * Transformer/Rectifier Power Sources
 - * Plasma Arc Cutting Power Sources
 - * Semi-Automatic and Automatic Wire Feeders
 - * Engine Driven Welding Generators
(NOTE: Engines are warranted separately by the engine manufacturer.)
3. 1 Year — Parts and Labor
 - * DS-2 Wire Feeder
 - * Motor Driven Guns (w/exception of Spoolmate 185 & Spoolmate 250)
 - * Process Controllers
 - * Positioners and Controllers
 - * Automatic Motion Devices
 - * RFCS Foot Controls
 - * Induction Heating Power Sources
 - * Water Coolant Systems
 - * HF Units
 - * Grids
 - * Spot Welders
 - * Load Banks
 - * Running Gear/Trailers
 - * Field Options
(NOTE: Field options are covered under the limited warranty for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts and Labor
 - * MIG Guns/TIG Torches
 - * Induction Heating Coils and Blankets
 - * Plasma Cutting Torches
 - * Remote Controls
 - * Accessory Kits
 - * Replacement Parts
 - * Spoolmate 185 & Spoolmate 250
 - * Canvas Covers

Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, relays, brushes, slip rings, or parts that fail due to normal wear.**
2. Items furnished by manufacturer, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than manufacturer, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MANUFACTURER'S PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at manufacturers option: (1) repair; or (2) replacement; or, where authorized in writing by manufacturer in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. manufacturer's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at an authorized service facility as determined by manufacturer. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MANUFACTURER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MANUFACTURER IS EXCLUDED AND DISCLAIMED BY MANUFACTURER.

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.



Owner's Record

Please complete and retain with your personal records.

Model Name	Serial/Style Number
Purchase Date	(Date which equipment was delivered to original customer.)
Distributor	
Address	
City	
State	Zip



Resources Available

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:	Welding Supplies and Consumables Options and Accessories Personal Safety Equipment Service and Repair Replacement Parts Owner's Manuals Circuit Diagrams
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Contact the Delivering Carrier for:	File a claim for loss or damage during shipment.
For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.	